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Unveiling the Impact of Illegal Oil Trading on Nigeria's Economy: A Regression Analysis Approach

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Abstract
The study examines the intricate dynamics of illegal oil trading spanning from 1995 to 2017, shedding light on its implications for the Nigerian economy. Employing ordinary least square multiple regression analysis, the research uncovers a significant relationship between illegal oil trading and economic growth in Nigeria, unveiling the far-reaching consequences of this illicit activity. One of the noteworthy findings of the study is the negative coefficient associated with the volume of oil theft, aligning with the anticipated expectation. Furthermore, the inclusion of one-year lagged variables of the dependent variables proves to be statistically significant in contributing to the dependent variable, underscoring the persistence and cumulative impact of illegal oil trading over time. The study's overarching conclusion underscores the detrimental effects of illegal oil trading on the Nigerian economy, particularly within the study period. It highlights the urgent need for proactive measures to curb this illicit practice, emphasizing the pivotal role of law enforcement authorities in addressing this pressing issue. Among the recommendations put forth by the study, a key emphasis is placed on the imperative of instituting robust and effective sanctions against offenders. By imposing stringent penalties and enforcement mechanisms, authorities can deter individuals and entities engaged in illegal oil trading, thereby safeguarding the integrity of Nigeria's economy and fostering sustainable development. The study serves as a clarion call for concerted action to combat illegal oil trading, advocating for comprehensive strategies that combine legal measures, enforcement initiatives, and deterrent mechanisms to protect Nigeria's economic interests and promote a climate of transparency, accountability, and rule of law.

Keywords: Illegal Oil Trading, Nigeria, Economic Growth, Regression Analysis, Law Enforcement
JEL Codes: Q34, O17, K42

1. INTRODUCTION

The study offers a comprehensive overview of the pervasive issue of oil theft within Nigeria's maritime domain, discerning between local small-scale oil theft aimed at the domestic market and the larger-scale illicit activities involving the transport of stolen oil by sea-going tankers to international destinations. It delves into the staggering volume of oil stolen, elucidates the associated effects on various facets of Nigerian society and economy, and explores potential solutions to address this multifaceted challenge. By meticulously examining the scope and scale of oil theft, the work brings to light the magnitude of the problem and its profound implications for Nigeria's maritime security, economic stability, and environmental sustainability. It underscores how the illicit trade in stolen oil not only deprives the country of crucial revenue but also perpetuates a cycle of criminality, corruption, and socio-economic inequality. Moreover, the work highlights the distinct nature of local small-scale oil theft, which often occurs within Nigeria's territorial waters and is predominantly driven by domestic demand. In contrast, the larger-scale oil theft involving the transport of stolen oil by sea-going tankers represents a more sophisticated and organized form of criminal activity, with far-reaching consequences for international maritime security and global energy markets. In addressing the complex challenge of oil theft, the work proposes a range of potential solutions encompassing regulatory reforms, law enforcement initiatives, technological advancements, and international cooperation. It advocates for strengthened governance frameworks to enhance transparency and accountability in the oil sector, as well as improved surveillance and monitoring capabilities to detect and deter illicit activities at sea. Furthermore, the study emphasizes the importance of regional and international collaboration to combat oil theft, calling for concerted efforts to disrupt criminal networks, interdict illicit shipments, and prosecute perpetrators. It also underscores the need for holistic approaches that address the root causes of oil theft, including poverty, unemployment, and socio-economic marginalization.

The transition of Nigeria from an agrarian-based economy to one heavily reliant on oil revenues within a short span of time, as highlighted by Garuba (2006, 2010), underscores the profound impact of the oil industry on the country's economic and political landscape. This shift has catapulted Nigeria into the category of "rentier states," characterized by their dependence

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on external rent, particularly from multinational corporations operating in the oil sector. Consequently, the state's role has evolved into that of a rent collector, rather than a proactive agent driving economic development and social progress. The emergence of Nigeria as a rentier state has significant implications for governance, social dynamics, and power relations within the country. As the primary mediator of oil revenues, the state becomes a focal point for contestation and negotiation among various societal actors vying for a share of the resource wealth. This phenomenon transforms the state into a contested terrain, where competing interests vie for influence and control over the distribution of oil rents. The observed leakages and inefficiencies in Nigeria's management of oil resources validate the thesis put forth by Chazan et al. (1992), which emphasizes the critical link between a state's ability to assert control over its people and resources and the concrete interests it represents and manages. In the Nigerian context, these leakages underscore the challenges faced by the state in effectively harnessing and managing oil revenues for the collective benefit of its citizens. Moreover, the concentration of economic power and resources within the oil sector has profound socio-economic ramifications, exacerbating inequalities, fostering corruption, and fueling social unrest. The rentier nature of the state creates incentives for rent-seeking behavior and patronage politics, undermining institutional effectiveness and hindering sustainable development efforts. In navigating the complex dynamics of oil dependency, Nigeria faces the imperative of enhancing governance mechanisms, promoting transparency and accountability, and diversifying its economy away from overreliance on oil revenues. Addressing the structural challenges inherent in the rentier state model requires concerted efforts to strengthen institutions, promote inclusive growth, and foster socio-economic development that benefits all segments of society.

The prevalence of illegal oil trading in Nigeria is deeply rooted in the constitutional framework that vests ownership and control of minerals, including oil, in the Federal Government. This constitutional provision, enshrined in Section 44(3) of the 1999 Constitution of the Federal Republic of Nigeria, traces its origins back to the 1946 Mineral Ordinance. By granting the Federal Government exclusive authority over the country's mineral resources, including oil, this constitutional provision establishes a legal basis for regulating and controlling their exploitation and distribution. However, despite the constitutional mandate for federal oversight, the reality on the ground often diverges from legal prescriptions. Illegal oil trading thrives in Nigeria due to a combination of factors, including weak governance structures, institutional corruption, and porous regulatory enforcement mechanisms. Criminal syndicates and illicit networks exploit loopholes in the regulatory framework to engage in various forms of illegal activities, including oil theft, smuggling, and adulteration. Moreover, the lucrative nature of the oil industry, coupled with high levels of poverty and unemployment, creates strong incentives for individuals and groups to engage in illicit oil trading as a means of economic survival. The lack of viable alternative livelihood opportunities in many oil-producing regions further exacerbates the problem, driving marginalized communities to resort to illegal activities as a source of income. The constitutional provision granting federal control over mineral resources serves as a legal framework for combating illegal oil trading. However, its effectiveness hinges on the capacity and willingness of government institutions to enforce regulations, prosecute offenders, and deter illicit activities. Strengthening regulatory oversight, enhancing law enforcement capabilities, and promoting transparency and accountability in the oil sector are essential steps toward addressing the root causes of illegal oil trading in Nigeria. In addition to regulatory measures, addressing the socio-economic drivers of illicit activities, such as poverty alleviation, job creation, and community development, is crucial for reducing the prevalence of illegal oil trading. By fostering inclusive growth and equitable development, Nigeria can create a more conducive environment for lawful economic activities and mitigate the vulnerabilities that fuel illicit trade in the oil sector.

The surge in illegal oil trading in Nigeria gained public attention in 1993, coinciding with the emergence of senior military officers and their civilian associates as key players in the illicit trade. This period marked a significant shift in the dynamics of the oil industry, particularly with regard to the control and distribution of crude oil and refined products, such as petrol. The combination of domestic subsidies and the devaluation of the Nigerian Naira created lucrative opportunities for diverting legally lifted products to more profitable markets, particularly the Communaute Financiere Africaine (CFA) Franc States, under the guise of government-sanctioned arrangements. Illegal oil trading in Nigeria solidified its foothold through clandestine collaborations between corrupt government officials and oil company workers stationed at oil wellheads or granted access to them. Bunkerers, individuals engaged in illegal oil tapping, utilized sophisticated methods to siphon crude oil directly from pipelines located away from official oil company facilities. These operations often involved connecting pipelines to hidden barges concealed in remote creeks with dense mangrove forest cover, evading detection and interception by authorities. The proliferation of illegal oil trading attracted the attention of high-ranking military personnel, who increasingly viewed it as a lucrative source of personal wealth accumulation. As military leaders focused on securing their financial interests and providing benefits to subordinate ranks, the illegal oil trade became entrenched within the military hierarchy. This trend was driven by the anticipation of eventual retirement or disengagement from military service, prompting individuals to seek alternative avenues for financial security and prosperity. Scholars and researchers, such as Lewis (1999, 2007), have documented the evolution of illegal oil trading in Nigeria, highlighting the complicity of state actors, oil company employees, and military officials in perpetuating the illicit trade. The proliferation of corruption, collusion, and illicit enrichment within Nigeria's oil industry underscores the complex interplay between political, economic, and social factors driving illegal activities in the country's energy sector.

Oil theft poses multifaceted challenges with far-reaching consequences across various dimensions. Economically, it undermines the revenue base of the Nigerian government, depriving the country of vital resources that could be allocated to

development projects, infrastructure, and social welfare programs. The significant revenue losses resulting from oil theft exacerbate poverty and socioeconomic disparities, particularly in the Niger Delta region, where communities often bear the brunt of environmental degradation and social unrest associated with oil extraction activities. Moreover, oil theft perpetuates environmental degradation, as illicitly tapped pipelines and illegal refining operations pose serious risks of oil spills, contamination of waterways, and destruction of fragile ecosystems. The adverse environmental impacts of oil theft not only threaten biodiversity and ecosystem health but also undermine the livelihoods of local communities dependent on natural resources for sustenance and economic activities such as fishing and agriculture. From a governance perspective, oil theft reflects systemic weaknesses in law enforcement, regulatory oversight, and institutional capacity, allowing criminal syndicates to operate with impunity and exploit regulatory gaps for illicit gain. The prevalence of corruption, collusion, and complicity among government officials, security forces, and industry stakeholders further compounds the challenges of addressing oil theft effectively. In addition to its economic, environmental, and governance dimensions, oil theft poses significant security risks, fueling conflict, instability, and violence in the Niger Delta region. Criminal networks engaged in oil bunkering often operate with sophisticated weaponry and employ tactics of intimidation and coercion, exacerbating tensions between communities, government forces, and oil companies. The recognition by the Nigerian government of the negative impact of oil theft on the economy underscores the urgency of addressing this illicit practice through comprehensive strategies that combine law enforcement efforts, regulatory reforms, community engagement, and international cooperation. Tolerating oil theft as a manageable problem is no longer viable, given its escalating magnitude and adverse consequences for Nigeria's economic development, environmental sustainability, governance integrity, and security stability. Bold and concerted action is needed to combat oil theft effectively and safeguard Nigeria's natural resources, economic prosperity, and social well-being.

2. METHODOLOGY

The first step in the methodology involved collecting and organizing data from the aforementioned sources. This included gathering information on the volume of illegal oil trading, cargo throughput in Nigerian ports, economic indicators, and other relevant variables over a specified time period. Once the data was collected, it was carefully reviewed and cleaned to ensure accuracy and consistency. Any missing or inconsistent data points were addressed through interpolation, estimation, or exclusion from the analysis, as appropriate. Next, the variables of interest were identified, including those related to maritime illegal oil trading, such as the volume of illegal oil exports, number of reported incidents, and enforcement efforts by maritime authorities. Other variables, such as economic indicators, government policies, and international oil prices, were also considered as potential factors influencing illegal oil trading. Specifically, the components of maritime illegal oil trading are denoted as follows:

- VASt: Total value of stolen oil in year t
- VOSt: Total volume of stolen oil in year t

The dependent variable, denoted as GDP, represents the level of cargo throughput in year t. By regressing on the various components of maritime illegal oil trading, the study seeks to assess the impact of illegal oil trading activities on cargo throughput within the specified timeframe.

Regression analysis enables the identification of significant relationships and quantification of the impact of maritime illegal oil trading components on cargo throughput. Through statistical modeling, the study aims to provide insights into the dynamics between illegal oil trading and maritime activities, shedding light on the potential implications for the Nigerian economy, maritime sector, and broader socioeconomic development. By leveraging rigorous statistical techniques and robust data sources, this analysis contributes to a deeper understanding of the multifaceted challenges posed by illegal oil trading and its ramifications for maritime trade and economic activity in Nigeria.

3. DATA ESTIMATION

Table 1 presents the results of the Augmented Dickey-Fuller (ADF) unit root test conducted on the variables under consideration. This test helps to determine the stationarity of the variables and their order of integration, which is crucial for time series analysis. For the variable VOS, the calculated T-statistic is -3.527962, which falls below the critical value of -3.052169 at the 5% significance level. This indicates that the null hypothesis of a unit root is rejected, suggesting that VOS is stationary at level with an order of integration of I(0) at the 5% significance level. Similarly, for the variable VAS, the T-statistic is -8.649341, significantly below the critical value of -3.920350 at the 5% significance level. Therefore, the null hypothesis of a unit root is rejected, indicating that VAS is stationary at the first difference with an order of integration of I(1) at the 5% significance level. Regarding the variable GDP, the calculated T-statistic is -3.287799, which is below the critical value of -3.065585 at the 5% significance level. Hence, the null hypothesis of a unit root is rejected, implying that GDP is stationary at the first difference with an order of integration of I(1) at the 5% significance level. In short, based on the ADF unit root test results, it can be concluded that all three variables, VOS, VAS, and GDP, exhibit stationarity after differencing once. This implies that they are integrated of order one, denoted as I(1), and suitable for further time series analysis.

Table 2 provides the results of the Johanssen co-integration test, which assesses the long-run relationship between the variables in the specified model. The test identifies the number of co-integrating equations and the nature of equilibrium

they represent. In this case, the model focuses on Maritime Illegal Oil Trading and Cargo Throughput. The Johanssen co-integration test indicates that there is one co-integrating equation in the model. This suggests the existence of a long-run equilibrium relationship between Maritime Illegal Oil Trading and Cargo Throughput. The presence of a single co-integrating equation implies that there is one long-term equilibrium relationship that binds Maritime Illegal Oil Trading and Cargo Throughput together. This relationship is stable over time and persists in the long run, indicating a strong connection between the two variables. Overall, the Johanssen co-integration test results provide evidence of a significant long-term association between Maritime Illegal Oil Trading and Cargo Throughput, highlighting the importance of considering their relationship in further analysis and policymaking.

Table 1: Unit Root Test for the Variables Employed.

	Augmented Dickey-Fuller Unit Root Test			
Variable	T-statistic.	Critical value	Order of Integration	Significance
VOS	-3.527962	-3.052169	1(0)	5%
VAS	-8.649341	-3.920350	1(1)	5%
GDP	-3.287799	-3.065585	1(1)	5%

Table 2: Co-integration and Test Results

	Johanssen Co-integration Test		
Model		Number of Co-integrating Equations	Nature of Equilibrium
1	Maritime Illegal Oil Trading and Cargo Throughput	1	Long-run

Table 3 presents the outcomes of the regression analysis, providing various statistical measures to assess the goodness of fit and the overall performance of the model. The R-square value, a measure of how well the independent variables explain the variability of the dependent variable, is reported as 0.902. This indicates that approximately 90.2% of the variability in the dependent variable is explained by the independent variables included in the model. The Adjusted R-square, which adjusts for the number of predictors in the model, is slightly lower at 0.889. The standard error of the regression (S.E. of Regression) is given as 4269296, indicating the average deviation of the observed values from the predicted values by the regression model. The sum of squared residuals, a measure of the overall fit of the model, is reported as 2.73E+14. The Durbin-Watson statistic, which tests for the presence of autocorrelation in the residuals, is computed as 2.457565. A value close to 2 suggests no significant autocorrelation. The mean and standard deviation of the dependent variable are provided as 14640113 and 12827473, respectively. These statistics describe the central tendency and dispersion of the dependent variable in the dataset. Additionally, various information criteria such as the Akaike information criterion, Schwarz criterion, and Hannan-Quinn criterion are reported, with values of 33.52, 33.67, and 33.54, respectively. These criteria are used for model selection, with lower values indicating better fit. Finally, the F-statistic, a measure of overall significance of the regression model, is reported as 69.23413, with a corresponding p-value of 0.00000, indicating that the regression model is statistically significant at conventional levels of significance.

Table 3: Results Outcomes-I

Test-Statistic	Least Square
R-square	0.902
Adjusted R-square	0.889
S.E of Regression	4269296
Sum of squared residual	2.73E+14
Log likelihood	-298.7053
Durbin-Watson stat	2.457565
Mean dependent Variable	14640113
S.D. dependent Variable	12827473
Akaike info criterion	33.52
Schwarz criterion	33.67
Hannan-Quinn criterion	33.54
F-statistic	69.23413
Prob(F-statistic)	0.00000

Table 4 provides the results of the regression analysis for two variables, X1 (Value of Oil Theft, VASt) and X2 (Volume of Oil Theft, VOS), along with their respective coefficients, standard errors, and calculated t-statistics. For the variable X1 (Value of Oil Theft, VASt), the coefficient is reported as 7067.458, with a standard error of 617.1261. The calculated t-

statistic for this coefficient is 11.45221, indicating that the coefficient is statistically significant. The significance level, denoted by "Significance," is reported as 0.0000, which means the coefficient is significant at a very high level of confidence. Similarly, for the variable X2 (Volume of Oil Theft, VOS), the coefficient is reported as -0.059312, with a standard error of 0.011282. The calculated t-statistic for this coefficient is -5.257127, indicating that the coefficient is statistically significant as well. The significance level for this variable is reported as 0.0001, indicating high statistical significance. Additionally, the table provides tabulated critical values for the t-statistic at 1% and 5% significance levels. For both variables, the calculated t-statistics exceed the critical values at these significance levels, further supporting the conclusion of statistical significance.

Table 4: Results Outcome-II

Variables	X_1, Value of Oil Theft, VAS_t	X_2, Volume of Oil Theft, VOS
Test Statistic		
Coefficient of the Variable	7067.458	-0.059312
Standard Error	617.1261	0.011282
T-Statistic Calculated	11.45221	-5.257127
	NS	NS
T-Statistic Tabulated 1%	2.95	2.95
T-Statistic Tabulated 5%	2.13	2.13
Significance	0.0000	0.0001

4. CONCLUSIONS

Based on the findings, it is evident that maritime illegal oil trading has had a significant negative impact on the economy. The high volume of illegal oil trading poses a considerable threat to economic stability and development. Therefore, it is imperative for maritime authorities to intensify efforts in combating this illicit activity. To strengthening enforcement measures and implementing effective sanctions, it is crucial to address the root causes of maritime illegal oil trading. This includes addressing underlying socio-economic factors such as poverty, unemployment, and corruption, which can contribute to the prevalence of illicit activities. By investing in socio-economic development programs and promoting transparency and accountability in governance, authorities can create an environment less conducive to illegal activities like oil trading. Furthermore, regional and international cooperation is essential in combating maritime illegal oil trading. Given the transnational nature of the illicit trade, collaboration among neighboring countries, regional organizations, and international bodies is vital to effectively disrupt illegal networks and prosecute offenders. This includes sharing intelligence, coordinating enforcement efforts, and harmonizing legal frameworks to facilitate cross-border cooperation. Moreover, public awareness and community engagement initiatives can play a significant role in combating maritime illegal oil trading. Educating local communities about the negative consequences of illegal activities and involving them in efforts to report suspicious behavior can help authorities identify and disrupt illicit operations. Additionally, engaging with stakeholders such as industry players, non-governmental organizations, and civil society can foster a collaborative approach to addressing the issue. It is also important to address the environmental impact of maritime illegal oil trading. Oil spills resulting from illegal activities can have devastating effects on marine ecosystems, biodiversity, and livelihoods. Therefore, authorities must prioritize environmental protection measures, including monitoring and clean-up efforts, to mitigate the ecological damage caused by illegal oil trading. Overall, addressing maritime illegal oil trading requires a comprehensive and multi-dimensional approach that combines enforcement, socio-economic development, regional cooperation, public awareness, and environmental protection measures. By addressing the root causes, enhancing enforcement capabilities, and fostering collaboration among stakeholders, authorities can effectively combat this illicit activity and safeguard maritime resources for future generations.

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