Research Article

Armed Banditry-Public Debt Nexus in Sokoto State, Nigeria: Quantile Analysis

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Abstract
This study examined the eimpact of Armed Banditry on public debt using time series data from Sokoto State Nigeria between 2023Q1-2015 to Q3-2023. The model was estimated using ordinary least squares and quantile regression techniques. The quantile results show that public debt increases as areme banditry activities increases in the state. The impact of armed banditry on the state public debt is more noticeable at higher quantiles than at lower ones. The analysis's conclusion demonstrates that Banditry activities in sokoto state Nigeria exacerbate the state's level of public debt. The study recommended that the government look into non-military strategies and other funding sources for the fight against terrorism in an effort to decrease the threat that terrorism poses to the nation.

Keywords: Armed, Banditry, Public-Debt, Quantile Regression

1. Introduction

In recent years, the issues of armed banditry and terrorism has undergone a remarkable globally and specifically Nigeria especially in the nort western Nigeria. Sokoto state is one of the worst hit of armed bandits activities according to Beacon consult (2024). The Armed Bandits activities has generated threats and serious problems to the Nigerian economy [1]. It's economic consequences affects the state's security spending, raised the budgetary expenditure and thus the level of total public . Armed Banditry is "the systematic threat or use of violence, by non-state actors, whether for or in opposition to established authority, with the intention of communicating a economic, religious or ideological message to a group larger than the victim group, by generating fear and so altering (or attempting to alter) the behavior of the larger group [2].

Sokoto State, located in Northwestern Nigeria, has experienced a surge in armed banditry over the past decade. This rise in armed banditry has raised concerns about a possible link between the armed banditry and the state public debt. Armed banditry, characterized by activities such as kidnapping, cattle rustling, and armed robbery, has disrupted socio-economic activities and strained public resources. Simultaneously, the state's public debt has escalated, potentially limiting its capacity to address infrastructural and other societal issues effectively. Security spending is the most common strategy of the world in the fights against terror. This required spending of huge public fund in defense sector. In neoclassical views, security expenditure is a diversion of economic resources from the real productive sector to the defense sector [3]. The infrastructural expansion that will enhance growth were exchanged for spending on guns and ammunitions, and thus crowd out investments [4].

Huge security spending will increase state public spending and thus increases the level of public debt. The study adds to the existing literature on the Armed banditry-public debt link by exploring the impact of armed banditry on public debt in Sokoto state, Nigeria. The study differs from others in that it analyzes the nexus using a non-linear quantile technique. Second, using the empirical findings, this study will provide some insights on policy measures. The paper is organized as follows. Section 2 is the literature review, section 3 describes the methodology and data. The results and interpretations are in section 4, and finally, section 5 offers conclusion and recommendation.

2. Literature Review

The damaging effects of armed banditry on the public can be explained by the rational choice theory. A government facing

of armed banditry attacks must fight back fiercely [5]. The fight against terror requires huge security spending hence the need for more resources that may lead to high debt profile. The rise in public debt of numerous African nations can be explained by the fact that African states in general are improving defence spending budgets under the pretext of battling terrorism (Chen & Siems, 2004). The increase of armed banditry has obliged Sokoto state of Nigeria to earmark substantial funds to anti armed banditry operations. This budgetary provision necessitates increased borrowing, thereby expanding public debt. For instance, Yusuf and Mohd (2022) opined that insecurity is a critical issue driving up security expenditure, which resulted in high public debt profile. Their study outlines economic costs of growing armed banditry, including its impact on public debt. Adegoke (2023) discusses the economic cost of insecurity, noting that the government's efforts to combat these threats have been both slow and costly in terms of public funds spent [6].

The study emphasizes that the financial strain of addressing insecurity has significant implications for the nation's fiscal stability. These studies are further supported by Adelakun and Osah (2025) study that examines the impact of insecurity on socio-economic development, finding that such insecurity negatively affects poverty, unemployment, food security, education, health, income, and the general standard of living [7]. These disruptions hinder the government's ability to generate revenue, thereby increasing reliance on debt to finance public expenditures. The persistent nature of armed banditry poses long-term challenges to debt sustainability. Continuous security spending and economic disruptions strain public finances, leading to a cycle of borrowing that undermines fiscal stability. Studies suggest that without effective measures to address insecurity, the government's debt burden will continue to grow, potentially leading to a debt crisis.

Other studies discuses the connection between terrorism and public debt; for instance Abid & Sekrafi (2020); Lamia et al. (2019); Procasky & Nacasius, (2014) [1,8,9]. shows that terrorism increases public debt of the countries fighting against terror. Unfortunately, there has been barely any study examining how armed banditry affects sokoto state's steadily rising public debt since armed baditr attacks escalate and the "War on Terror" which requiress huge financing increases. The majority of the literature to date has focused on the indirect economic costs of terrorism and how it affects variables like foreign direct investment and GDP growth, for example [4,10-12]. However, the majority of the literature now in circulation is on insecurity which does not specify the actual type insecurity. Moreover, most of the existing literature are panel of countries, or Nigeria as a whole, this type of studies may not suit policy formulation in sokoto state which tagged the poorest state in Nigeria according to (National Bureau of Statistics, 2022). This study therefore, intend to fill in this existing gap.

3. Methodology
The study uses secondary data spanning from Q1-2015 to Q4-2023, obtained from the National Bureau of Statistics, Sokoto State Ministry of Finance, and security reports from the Nigeria Police Force. Ordinary Least Squares (OLS) and Quantile Regression approaches are used to investigate the impact of armed banditry on Sokoto state's public debt. OLS regression were to see whether there is a linear relationship between terrorism and public debt. The OLS also shows the magnitude of the impact. However, quantile regression can help us comprehend outcomes that are not normally distributed and have nonlinear associations with the predictor variable. It accomplishes this by enabling the knowledge of correlations between variables that are not reflected by the data's mean. To guarantee stationarity and integration, all variables are submitted to a unit root test.

Ordinary least squares (OLS) can only describe the mean impact of the independent variables (X) on the explanatory variable (Y). If the random error term adheres to the standard econometric requirements of zero mean, homoscedasticity, and normal distribution, the OLS technique is the minimum variance unbiased estimate (MVUE). The quantile regression is based on regressing the independent variable (X) by the conditional quantile of the explanatory variable (Y), allowing for the creation of a regression model over all quantiles. As a result, unlike ordinary least squares regression, quantile regression precisely describes the effect of the explanatory variable (X) on the variation range and conditional distribution of the explained variable (Y). Additionally, quantile regression can capture the tail properties of a variable distribution. Quantile regression can better characterize a variable distribution that is biased to the left or right. In addition, the coefficient estimate of quantile regression is more robust than that of OLS regression [13].

3.1. Empirical Model
Consistent with the empirical work of Abid & Sekrafi, (2020); Procasky & Ujah, (2015) this study adopts the following functional model [1]

$$PDT = f(ABT, RVG, SEX)..(3)$$

The function is transformed into Economic model as:

$$PDT_t = \beta_1 ABT_t + \beta_2 RVG_t + \beta_3 SEX_t.......................................(4)$$

where PDT represents Public Debt, ABT is the Armed Bandit Attacks, and RVG stands for
Revenue Generation, and EdX represent Security Expenditure.

3.2. Data
Data for the study is a time series data of Nigeria spanning from Q1-2015 to Q4-2023. The data for state public debt, Security expenditure and RVG were sourced from Sokoto State Ministry of Finance. The data of the armed banditry Attack were obtained from Beacon consult data bank.

4. Results and Discussion

Variables	Observations	Mean	St. Deviation	Min.	Max.
PDT	32	20.65033	12.90509	5.276108	31.5
ABT	32	229	229.3949	6	512
SEX	32	1.363636	2.063683	.5	3.5
RVG	32	4.33	2.04	-1.6	4.4
Source: Authors calculation from STATA 15.					

Table 1: Descriptive Statistics Results

The results shown in the descriptive statistics on the Table 1 state that the mean value of the PDT in model 1 is 20.65033, its standard deviation is 12.90509, with a minimum of 7.3 and 51.7 as its maximum. Again, the mean value of NTA is 229. Throughout the study (2001-2022), the number of terrorist attacks in the affected countries increased from 6 to the maximum of 714 attacks.

Variables	Level		First Difference	
	ADF	PP	ADF	PP
Public Debt (PDT)	-1.0224	-1.0012	-2.2313 ***	-2.2326***
Armed Bandit Attacks (ABT)	1.1023	1.0453	4.2410***	3.3351***
Security Expenditure (MEX)	2.1102	1.4200	3.5303***	3.0025***
Revenue Generation (RVG)	-1.1022	-1.0023	-3.0022***	-4.0053***
Source: Authors calculation Using STATA 15				

Table 2: ADF and PP Unit Root Tests Results

Tables 2 shows the unit root tests based on estimates ADF Fisher and Philip Peron, the test indicates that the variables are stationary.

Public Debt	Coefficient	Bootstrap Standard Error	t-test	P-Value
OLS				
Armed Bandits Attacks	0.0040		2.25**	0.057
Security Expenditure	0.0034		3.33***	0.023
Revenue Geneartion	-0.0002		-2.23**	-0.024
Constant	14.334		32.23***	0.000
Q25				
Armed Bandits Attacks	0.0038	0.0831	2.03*	0.051
Security Expenditure	0.0048	0.6743	2.64**	0.025
Revenue Geneartion	-0.0005	-0.0546	-2.36**	-0.027
Constant	28.046	2.3224	4.352***	0.000
Q50				
Armed Bandits Attacks	0.0046	0.0032	3.78**	0.044
Security Expenditure	0.0063	0.0042	3.23**	0.038
Revenue Geneartion	-0.0022	-0.0226	-4.22***	-0.000
Constant	32.056	2.3344	4.35***	0.000
Q75				
Armed Bandits Attacks	0.0042	0.0433	6.08***	0.000
Security Expenditure	0.0052	0.0062	4.62***	0.000
Revenue Geneartion	-0.0022	-0.0445	-4.53***	-0.000
Constant	45.055	4.0232	3.72***	0.000
Note: ***, ** and * denote significance at 1%, 5% and 10% levels, respectively.				
Source: Authors calculation using STATA 15				

Table 3: Results of OLS and Quantile Regression (DV: Public Debt)

Table 3 presents OLS and Quantile regressions results. The outcome of the OLS regression shows that number of armed bandits ttacks enhances public debt of sokoto state. Similarly, the quantile results also revealed positive impact of Bandits activities on public debt in Sokoto statye. The outcomes shows that the impact of banditry on public debt is more prominent in the higher quantile compared to the lower quantiles. This is inline with the expectation and findings of [12]. At each quantile, the relationship between security expenditure and public debt is positive, with the highest quantile showing the greatest level of significance.

Similarly, RVG rate has also shown a significant negative impact on public debt in all the different quantiles. Meaning that as RVG increases the tune of public debt decreases in sokoto state. This results support the findings [14].

Heteroscedasticity test	H: Constant variance
Chi-Square statistics	0.06
P-value	0.7513
Source: Author's calculation using STATA 15	

Table 4: Breusch-Pagan/ Cook-Weisberg Test for Heteroscedasticity

The output of B-P/C-W test statistic in Table 4 proofs that the model doesn't suffer from the problem of non-constant error variance.

Variable	VIF	1/VIF
Armed Banditry Attacks	1.04	0.933012
Security Expenditure	1.05	0.920761
Revenue Generatrion	1.07	0.944428
Mean VIF	1.22	
Source: Author's calculation using STATA 15		

Table 5: Test for Multicollinearity

Autocorrelationtest	H0: no serial correlation
Chi-Square statistics	0.447
P-value	0.3591
Source: Author's calculation using STATA 15	

Table 6: Durbin's Alternative Test for Autocorrelation

Table 5 reports the value of variance inflation factor (VIF) to detect the presence of multicollinearity among the explanatory variables of the model. The mean VIF has been found to be 1.22, which is below benchmark of 5. This lets us accept the null hypothesis and conclusively determine the absence of the multicollinearity problem in the model. In Table 6, we have also performed the test of serial autocorrelation for our estimated model using Durbin Watson's (DW) alternative test for autocorrelation. So, we can't reject the null hypothesis and confirm that first-order autocorrelation doesn't exist in the model by looking at the results of the DW's test for autocorrelation in this Table 6 that evidences the absence of first-order autocorrelation in the model.

5. Conclusion and Recommendations

The link between armed banditry and public debt has been the subject of rare empirical studies, despite its position in the heart of the worldwide fight against terror. Similarly, there is no evidence of exixting study that examined relationships across the different quantiles. This study examines the connection between aemed banditry and public debt in Sokoto state Nigeria using quantile regression method. The outcome of the study shows that armed bandit attacks significantly improved public debt in Sokoto state. Gross domestic product and security expenditure also increase the level of public debt in state according to the empirical investigation. However, revenue generation in Sokoto state has negated the rise of public debt level in the state. The empirical investigation findings also discloses that armed bandits activities enhances public debt more pronouncedly at the higher quantile than the lower quantile.

These findings have implications for debt sustainability in Sokoto state Nigeria.. the study mainly considere factors that can be categorized as in-house to Sokoto state, which means the state government can exercise control over these factors in the pursuit of debt sustainability. For example, te is mainly an internal variable in line with the government's core responsibility of maintaining law and order within its borders. Along the same line, the amount of funds allocated to the security is the prerogative of the government, although such spending can be influenced by the occurrence and intensity of the attacks. Regarding the other variables, it is the role of government to exercise restraint on spending by ensuring that deficits are created mainly for investments that can guarantee future streams of income rather than for the purpose of recurrent spending. The study also recommend non military strategy in addition to military strategy to reduce extant security spending.

Equally, the government can reduce deficits by strengthening its revenue-generating capacity. Although this may not be a straight-forward solution, it also lies within the government's capacity to seek ways of resolving the persistent incidence of terorism in the country given its effect on external debt. The role of other factors like economic growth should also be put into consideration in the quest to keep public debt within manageable limits [15-29].

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