Original Research Article

Do Violent Extremism Impact Foreign Direct Investments in the Lake Chad Basin Countries?

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Abstract

The paper examined how foreign direct investment (FDI) responded to violent extremism in Lake Chad Basin Countries (LCBCs). The LCBCs are those countries that are situated within the Lake Chad area. Based on the selected countries' distinctive characteristics, such as small, open, and developing economies, the study pooled time series and cross-sectional data within the Panel Structural Vector Autoregressive (P-SVAR) model framework, to examine how FDI responded to terrorism in LCBCs. The data for this study were sourced from the World Bank's and World Development Indicators (WDI) dataset, and the data are sampled at the same frequency, following Kalman filter technique. The data was analyzed through thematic literature reviewed using e-views. The findings of the study were presented in a scientific report for examination. Firstly, the study investigated the extent to which the inflow of FDI is determined by the level of political or institutional quality. Secondly, the study used a panel VAR model in a dataset of the LCBCs spanning 2000 to 2019 to explore the extent to which violent extremism in the form of terrorism affected FDI. The results showed a mixture of positive and negative shocks. Furthermore, the findings reveal that FDI significantly responds to terrorism. It argues that higher level of terrorism impedes FDI. The findings also reveal that terrorism increased military expenditure. Thus, the study shows that there is a significant positive relationship between terrorism and military expenditure. Consequently, the study recommended that the LCBCs region should guide against terrorism and be conscious of its occurrence to attract FDI to improve economic growth and the general wellbeing of the region.
Keywords: Lake Chad, PSVAR, FDI, Violent extremism, Boko Haram.

INTRODUCTION

The rise in terrorism, which has taken a global dimension, has also been aided by regional ethnic and religious composition. When nations that shares border are confronted with terrorist challenge, the homogeneity or otherwise of people occupying such a given geographical area contribute to a large extent to the success or otherwise of the global war against terrorism. The cultural, religious, and ethnic solidarity of the people around such borders provides opportunities for the terrorists to freely through the various borders escape when faced with superior fire and to smuggle in arms for the act. For the states, they suffer economic and security consequences as a result of terrorism. On the economic front, investors become sceptical in investing in a state where terrorist acts are prevalent. While a few studies related to this study have examined the relationship between FDI and conflicts (see Bray, 2010), Civil war and FDI among countries (see Murshed and Tanna,

2017) and FDI and violence on country specific (see Bray, 2010; Umuhire and Muteteri, 2018; Omumbo, 2020; Amit, Barua, and Kafy, 2021), the dilemma remains about the narratives of FDI and extreme terrorism among group of nations having common boundaries and economic interest. This study seeks to fill this gap. Therefore, the question remains, "does violent extremism impact on FDI?

The area regarded as Lake Chad is centrally located in Central-North Africa. The Lake Chad Basin countries (LCBCs) are countries situated around the Lake Chad Basin. They have divided into two: the riparian countries and the conventional countries. The riparian countries are eight countries that shared the total areas of 2.434m km² in the next percentages: Nigeria (7%), Libya (0.5%), Niger (28%), CAR (9%), Chad (45%), Algeria (4%), Cameroon (2%) and Sudan (4%). The conventional of the LCBCs share 20% of the total

area covered by Lake Chad Basin (LCB), which is approximately 427500 km^2. This is referred to as the Conventional Basin (Galeazzi, Medinilla, Ebiede, and Desmidt, 2017).

The LCB area has been under attacks by the violent extremist group Boko Haram. Following Bak, Tarp, and Liang (2019), "violent extremism is a violent type of mobilisation that aims to elevate one group's status while excluding or dominating its 'others' based on markers, such as gender, religion, culture and ethnicity. In doing so, violent extremist organisations destroy existing political and cultural institutions, and supplant them with alternative governance structures that work according to the principles of a totalitarian and intolerant ideology". Boko Haram, among other groups, has assumed a prominent presence in the discussion on violent extremism in Africa. Boko Haram extremist groups were reputed to be the third out of the top five perpetrators groups responsible for suicide bombing between the calculated periods 1970-2016. It is responsible for 5.3% of the total global suicide bombing (Cordesman, 2017). This dreaded violent extremist group's activities have become a huge challenge to the governments of the conventional LCBCs: Nigeria, Niger, Cameroon and Chad. The Lake Chad Basin has come to assume an important geopolitical and strategic position. First for the riparian LCBC states and then for the violent extremist groups. For the LCBCs, the discovery of oil reserves at the lake's base reignited their interest in the lake, which according to Jane's Intelligent Watch (2005) have 232 billion barrels of oil reserves. The LCB area, according to US Geological Survey (2010), has about 14.7 trillion cubic feet of natural gas. With this discovery, it is expected that it will further attract investors in the form of foreign direct investments into the Lake Chad area and the other parts of the LCBCs.

For the violent extremist groups, the valuable natural resources at the Lake Chad Basin made the area more attractive for their criminal activities (Omenma, 2019). The contest over these resources has contributed to the split of the violent extremist groups striving over the economic viability and the control of the area. There are many factors that are responsible for the emergence and proliferation of these violent groups in the region. Factors such as poverty, inequality, unemployment, inflation etc. have been explained to Granger cause terrorism in the region (Lawal, Babajide, Asaleye and Ise Olorunkanmi, 2019). In exchange for the provision of security and other social services they rendered to the locals, the various splinter groups take charge of imposing taxes and other economic activities in areas under the control of such group (Samuel, 2019). This group's activities spread across the geographical boundaries of these four countries; this has necessitated the setting up of a joint multinational effort at curbing their violent activities. The next section examines previous studies on the connection between terrorism and foreign direct investment influx to the LCBCs.

LITERATURE REVIEW

Enders and Sandler (1996), in their study involving Spain and Greece, investigated how the net foreign direct investment (FDI) responded to terrorism. The result showed that FDI became reduced by 13.5% and 11.9% in their VAR analysis in Spain and Greece. Investors would prefer countries that are less prone to violence as they seek the safety of their investment (Esquivias and Harianto, 2020). Using an extended gravity model on a study of selected countries between 1960 and 1993, Nitsch and Schumacher (2004) found that an increase in terrorist activity negatively affects the economy by reducing its growth by 4%. Abadie and Gardeazabal (2008), revealed that there is a reduction in net foreign investment in significant proportion as a result of risk associated with terrorism. In an earlier study, Abadie and Gardeazabal (2003) opined that apart from foreign direct investment, terrorism also affects financial markets, leading to a decrease in the flow of investments. Bezic, Galovic, and Misevic (2016) in an empirical study of 29 European Union (EU) nations and the European Economic Area (EEA) Member States whose economies were categorised as no risk, medium risk, high risk, very high risk, insignificant risk and low risk of terrorist attacks between 2000 and 2013, found that the activities of terrorism impact negatively on security. It also reduces investors' confidence in such nations and reduces the inflow of FDI to the selected economies. Lutz and Lutz (2014), in their study, concluded differently. Their study examined the impact of terrorism on the activities of the international economy in sub-Saharan Africa. They found seemingly little indication that supported the claim that terrorism has negative impacts on foreign investment. The study of Shahbaz, Javed, Dar and Sattar (2013) on the relationship between Terrorism and FDI in Pakistan revealed the confidence of investors in such economies as terrorist activities increases. In other words, their study showed a negative relationship between activities of terrorists and foreign investors' confidence. Bandyopadhyay, Sandlery and Younasz (2014), in their study of 78 developing countries, used a theoretical model to investigate the relationship between the domestic and transnational on one hand and foreign direct investment (FDI) the other hand. Analysing how the relationships between the various estimators are affected by foreign aid flows, the study found that the two types of terrorism negatively affect foreign direct investment. In other words, terrorism, both domestic and transnational, depresses foreign direct investment. Li and Resnick (2003) examined the relationship between foreign direct investment inflows and political instability. Using a time series panel of 53 countries between 1982 and 1995, they sought to know whether democratic institutions jeopardises or promote foreign direct investments inflows to these developing countries.

The study results showed that foreign direct investment inflows to developing countries are not negatively affected by political instability. For Powers and Choi (2012), in a study of 123 developing countries, using a time series panel from 1980-2008, the study revealed that foreign direct investment inflow is negatively affected when terrorist attacks target transnational corporations (TNCs) in these developing countries, while there is no statistically significant effect on foreign direct investments in these countries when businesses are not the target of terrorists. Hany (2019), in a study on the MENA countries, examined the effects of the Arab Spring on the flow of foreign direct investment. The study found out that a country's institutional quality is an important determining factor of the flow of foreign direct investment. This current study examines the effects of violent extremism on foreign direct investment flow in the LCBCs.

Hypothesis:
To achieve the aim of this study, the following hypotheses are proposed.

H$_{0a}$: Extremism terrorism does not impact on FDI
H$_{1a}$: Extremism terrorism impacts on FDI
H$_{0b}$: Extremism terrorism does not affect military expenditure
H$_{1b}$: Extremism terrorism affects military expenditure

Scope and Justification of the Study
This study focuses on the Lake Chad Basin countries. The countries are Chad, Niger, Central Africa Republic (CAR), Algeria, Nigeria, Sudan, Libya, and Cameroon. The choice of pooling these countries is based on the high concentration of terrorism in the LCB zone, as reported in Samuel (2019). This choice is considered significant enough because the zone cuts across the highly populated area of Africa.

Data, Data Sources and Measurement of Variables
Data and Sources of Data
Data from 2002 to 2019 are used in this study. Data availability informs the choice of the starting and cut off dates. Besides terrorism and military expenditure, the cut-off date is assumed to capture recent information in FDI, which is our variable of interest. This procedure is in line with earlier studies that finished their data points on the most recent period to capture the latest activities (Bezic, Galovic, and Misevic, 2016; Lutz and Lutz, 2014 and Volker and Schumacher, 2004). The study sourced data from Word Development Indicator (2021). Following Bandyopadhyay, Sandlery and Younasz (2014), Bezic, Galovic, and Misevic (2016) and Lutz and Lutz (2014), the study uses terrorism index to capture the dynamics of foreign direct investment. Likewise, military expenditure is included to take into action the government's effort to combat terrorism. The need for data reliability and validity dictates the choice for the databases used to collect data for this study.

Variables and Definitions of Variables
Foreign Direct Investment (FDI)
Joshua, Adedoyin and Sarkodie (2020) define foreign direct investment (FDI) as investment from foreign resources. According to them, the FDI is presumed as panacea for economic growth. Furthermore, the FDI complements the role of the beneficiary country, mostly developing countries that usually suffer from scarce local resources.

Terrorism Index (TI)
The Global Terrorism Index (TI) is a periodically published value that offers a composite score to produce an ordinal ranking of nations on the effect of terrorism.

Military Expenditure (ME)
Military expenditures are all capital and current expenditures on the defence ministries, peacekeeping forces, armed forces, and other government agencies that are engaged in paramilitary forces and defence projects. Civil and military personnels, retirement pensions of military personnel, military operations and maintenance, military research and development, procurement, and military aid are also categorized as military expenditure.

Data Measurement
Variables selected used in this study are as follows: FDI, military expenditure and terrorism index. Consequently, FDI and military expenditure have been expressed in logarithm forms. Every variable is subjected to the stationarity test using the versions of Levin, Lin and Chu (LLC), Im, Pesaran and Shin (IPS), Phillip Peron Test (PP) and Augmented Dickey-Fuller Test (ADF). Various procedures are employed for comparison and validation of their results and to further ascertain reliability (See Levin, Lin, and Chu, 2002; Im, Pesaran and Shin, 2003). Consequently, the results reveal a mixed level of stationarity. Terrorism index and foreign direct investment are stationary at the level form while military expenditure is stationary at the first different. As a result, the study proceeds to estimate a P-SVAR. This procedure is debatably unswerving with the literature (See Sim, Stock and Watson, 1990).

RESEARCH METHODOLOGY
Following various recent panel studies like Rotimi and Ngalawa (2017), Akande and Kwenda (2017), and Kutu and Ngalawa (2016), this study pools time series and cross-sectional data to examine how FDI responds to terrorism. The approach is based on the selected countries' distinctive characteristic, such as small open developing economies. However, this study's findings are based on a review of the dynamics of FDI and macroeconomic variables alongside insight from the SVAR framework.

Research Techniques

To capture the dynamics of terrorism on the selected domestic open economies', the study employs a three-variable $P - SVAR$ model consisting, foreign direct investment, terrorism, and military expenditure. According to Rotimi and Ngalawa (2017), the PSVAR model is suitable to analyse the dynamics of a model. It is carried out by subjecting the model to unanticipated shocks. Furthermore, the $P - SVAR$ has been used in this study to capture the dynamic behaviour of all variables employed in the model and furthermore to offer a more effective estimation of parameters. The procedure assumes that the three variables of each country are independent of each other. The structure of $P - SVAR$ is the same with $P - VAR$ models because every variable is endogenous and inter-reliant assumed.

Furthermore, the same logic applying to the standard $P - VAR$ also applies to $P - SVAR$ except that structural restrictions are imposed $P - SVAR$. The imposition differentiates $P - SVAR$ and thus makes it a much stronger estimating tool suitable to address macroeconomic policy. The $P - SVAR$ if found suitable for this study because it captures both dynamic and static inter-reliance, thus, it treats the links across several units in unrestricted way. In addition, according to Kutu and Ngalawa (2016) and Rotimi and Ngalawa (2017), it accounts also for cross-sectional dynamic heterogeneities. The $P - SVAR$ methodology suggests that restrictions be imposed on the contemporaneous structural parameters to derive realistic analytical structures. $\tau_{21} - \tau_{31}$ and "0" are the traditional restrictions, respectively denoting the contemporaneous and sluggish lagged association. It is believed that this method will offer more robust results that will offer better direction to how FDI responds to terrorism in the LCB region.

To examine the actual response of FDI to terrorism and establish the transmission process of terrorism on the selected variables, the generalised impulse response functions of the P-SVAR will be carried out.

Data Series and Conversion

Data for this study are sampled at the same frequency. Following Kalman filter technique (see Meinhold and Singpurwalla, 1989) to construct missing data as noted in Ngalawa and Viegi (2011) that advocates interpolation and more recently, Eraker, Chiu, Foerster, Kim, and unlike Seoane (2008) who used similar technique within the Bayesian framework, this study uses a simple moving average method to construct data that are missing in FDI and military expenditure for Libya. This procedure aligns with the literature (see Camacho and Perez-Quiros, 2010).

Model Specification and Set-up of the Panel SVAR

According to Sim, Stock and Watson (1990), Vector Autoregressive (VAR) is an econometric estimating technique that explains variable using the lag of the variable. VAR considers the recent and the last values of the remaining variables. The VAR system disregards whether variables are either exogenous or endogenous. Rather, variables are mutually endogenously assumed. Hence, estimating technique like Ordinary Least Square (OLS) could discretely solve each equation. Gujarati (2004) notes that VAR supports analysis of data being carried out at levels. Gujarati's view disfavours data transformation. Buttressing this view, Harvey (1989) argues that data transformation findings are sometimes unreliable and unsatisfied. Sim, Stock and Watson (1990) suggested the VAR model as an appropriate estimator to define the dynamic performance of economic variable to produce reliable multivariate benchmark forecasts in their numerous variances in applied economics.

Nonetheless, the advantages of the VAR model to describe dynamic performance of economic variables are restricted in providing essential results. To overcome the weakness associated with the variant VAR system, Canova (2005) opined the structural VAR (SVAR). He believes that the SVAR uses economic theory to sort out the contemporary relationships between economic data. The SVAR also analyses the dynamics of a model. It subjects model to an unexpected shocks since the restrictions for identification are frequently compatible with wide spectrum of alternative theories.

Following Hoare and Hoe (2013), who opines that it is necessary to develop a generalised statement, among economic specific, based on economic theory and having relevance that apply to real-life analysis. Consequently, this study adopts the Panel SVAR. The model, P-SVAR is applied and estimated in this study based on three endogenous variables, namely, foreign direct investment, military expenditure and terrorism index. The terrorism index is pertinent because it seeks to examine how FDI responds to it and, very importantly, how the terrorism index significantly impacts FDI in the Lake Chad Basin region.

Consequently, supposing that the following structural panel equation represents the chad basin region:

$$\delta \omega_{it} = \lambda_{io} + \vartheta_1 \omega_{it-1} + \vartheta_2 \omega_{it-2} + \dots + \vartheta_p \omega_{it-p} + \Psi \xi_{it} \qquad (1)$$

where δ is an invertible $(w \times w)$ matrix defining the contemporaneous connection among all variables used in the study; ϑ_{it} is $(w \times 1)$ vector of endogenous variables, such that $\omega_{it} = \omega_{1t}, \omega_{2t}, \dots \omega_{nt}$. λ_{io} is $(w \times 1)$ vector of constants symbolising country-specific intercept; ϑ_i is a $(w \times w)$ matrix of coefficients of endogenous variables lagged (for every $i = 1 \dots p$); Φ is a vector of coefficients. Ψ is

a $(w \times w)$ matrix whose non-zero diagonal elements consider direct effects of shocks over one endogenous variables in the system; and ξ_{it} is a vector of uncorrelated error terms (white-noise structural disturbances).

Equation (1) is the $P - SVAR$ model. Because of the feedback characterising the SVAR procedure [1], the model cannot be estimated directly (see Enders, 2004). But it is possible to estimate and recover the information in the SVAR system. According to Kutu and Ngalawa (2016) and Ngalawa and Viegi (2011), the model can be estimated by estimating an abridged form, $SVAR$ implicit in the equations. A pre-multiplication of (1) by δ^{-1} gives:

$$\omega_{it} = \delta^{-1}\lambda_{io} + \delta^{-1}\vartheta_1\omega_{it-1} + \delta^{-1}\vartheta_2\omega_{it-2} + \ldots + \delta^{-1}\vartheta_p\omega_{it-p} + \delta^{-1}\Psi\xi_{it} \qquad (2)$$

This can be represented as,
$$\delta^{-1}\lambda_{io} = k_i, \delta^{-1}\vartheta_1 \ldots . \delta^{-1}\vartheta_p = \zeta_i \ldots . \zeta_p, \delta^{-1}\Phi = \alpha$$
and $\delta^{-1}\Psi\xi_{it} = \varepsilon_{it}$ $\qquad (3)$

From equation 3, we derive (4):
$$\omega_{it} = k_i + \delta_1\omega_{it-1} + \delta_2\omega_{it-2} + \cdots \ldots . + \delta_p\omega_{it-p} + \varepsilon_{it} \qquad (4)$$

Thus, (1) differs from (4). (1) is known as a $P - SVAR$ or primitive system where the variables have simultaneous effects on one another while (2) is known as a abridged form, $P - SVAR$ or a $P - SVAR$ stated in standard form in which the variables that are found on the right-hand side are prearranged at time t and no variable has a direct contemporaneous (immediate) impact on one another in the model. Also, Enders (2004) settled that the error term (ε_{it}) is a composite of shocks in ω_{it}.

However, equation (4) can be stated in a condensed form as in (5):
$$\omega_{it} = k_i + \delta(\Gamma)\Phi_{it} + \varepsilon_{it} \qquad (5)$$
where ω_{it} is $(w \times 1)$ vector of variables given by
$$\omega_{it} = (FDI, TI, ME) \qquad (5.1)$$

Equation 5.1 is the vector of the LCBCs, and they are, in this study, defined as endogenous variables. k_i denotes the vector of constants that symbolises the intercept terms of the countries. $\delta(\Gamma)$ and $\rho(\alpha)$ are matrices of polymonial/multinomial lags capturing the relationship between the endogenous variables as well as their lag lengths. $\varepsilon_{it} = \delta^{-1}\Psi\xi_{it}$ is a vector of random disturbances, which also could be written as $\delta\varepsilon_{it} = \Psi\xi_{it}$.

(6) and (7) are alike. Both are abridged forms of $P - SVARs$ that are derived from the primitive P-SVAR

system of (1) where every variable is assumed to simultaneously impact each other. It is also assumed to describe the response of the FDI in the LCBCs. However, for the information in the structural equation to be recovred, restrictions are imposed on matrices $\delta = \Psi$ in the system of equation (6).

$$\begin{bmatrix} 1 & 0 & 0 \\ \tau_{21} & 1 & \tau_{23} \\ \tau_{31} & 0 & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{it}^{FDI} \\ \varepsilon_{it}^{TI} \\ \varepsilon_{it}^{ME} \end{bmatrix} = \begin{bmatrix} x_1 & 0 & 0 \\ 0 & x_2 & 0 \\ 0 & 0 & x_3 \end{bmatrix} \begin{bmatrix} \xi_{it}^{FDI} \\ \xi_{it}^{TI} \\ \xi_{it}^{ME} \end{bmatrix} \qquad (6)$$

Equation 6 present the restricted matrixes. The first matrix is the δ-matrix of the model's non-recursive restrictions. The second, Ψ-matrix, is the diagonal matrix. $\varepsilon_t^{FDI}, \varepsilon_{it}^{TI}$ and ε_{it}^{ME} are reduced-form residuals for the variables. The associated structural shocks with the equivalent equations are represented with the following residuals: $\xi_{it}^{FDI}, \xi_{it}^{TI}$ and ξ_{it}^{ME}.

In the short run SVAR, the study developed identification by placing restrictions on matrices in (6). It is assumed to be non-singular, and it also ensures the precise identification of the system. Nonetheless, since there are $g(g + 1)/2$ free parameters in the matrices, given its symmetric nature, numerous parameters could be estimated in (6). g is the number of variables. Therefore, since there are $2g^2$ parameters in equation (6), then, the identification order condition entails that $2g^2 - 0.5g(g + 1)$ or $0.5g(3g - 1)$ further restriction should be placed on the elements of the matrices. Following Amisano and Giannini (1997), this study argues that the $P - SVAR$ employed in this study, therefore, needs $2g^2 - 0.5g(g + 1)$ or 12 restrictions be placed absolutely on the matrices in (6). To identify the scheme since matrix δ is supposed to be a non-singular diagonal matrix, six exclusion restrictions will be imposed on it, while six exclusion restrictions are anticipated to be imposed on matrix ρ. But, since our $non - recursive\ P - SVAR$ has imposed 22 zero restrictions on matrix δ, the system is considered to be over identified and 8 free parametres in matrices δ and 7 in matrix ρ (see (6)).

Order and identification of variables are in line with the literature (see Rotimi and Ngalawa, 2017). However, identifying restrictions in this study follows these economic intuitions- variables influence each other based on economic theory, and this depends on the position of the variable in the identification arrangement; terrorism affects FDI, military expenditure affects terrorism and FDI but may not be otherwise.

Given that the non-zero coefficients (c_{kj}) in the non-singular matrices is employed to show that variable j instantaneously affects variable$k$.For instance, the FDI is captured in row 1, the terrorism index in row 2 and row

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[1]The SVAR system incorporates feedback. This makes it problematic to be estimated since endogenous variables

affect one another in the past and realisation time path of $\delta\omega_{it}$.

3 is the military expenditure. Based on the δ matrix in equation 6, FDI in row 1 may respond contemporaneously to terrorism and military expenditure because investors are conscious of their investment environment. Row 2 presents the terrorism index equation. The FDI responds contemporaneously to terrorism and military expenditure. An environment that attracts a reasonable level of military expenditure is assumed to have minimised terrorism, hence, free for investment. Their restrictions are denoted with τ_{21} and τ_{31} ; this suggests that FDI positively improvement in terrorism and military expenditure. These transmission channels assert the belief that foreign direct invest flourishes in a safe environment devoid of economic instability and terrorism, conflicts and political impasses (see Bezic, Galovic and Misevic, 2016). Similarly, it is expected that military expenditure will positively respond to terrorism. A rise in terrorism level will demand higher military intervention, thus increasing military expenditure and vice versa. The contemporaneous response is represented as c_{32}.

5.0 ESTIMATION AND RESULTS
5.1 Lag length test
This study selected the optimal lag length. The procedure is guided by a recognised criterion as in Rotimi and Ngalawa (2017). Using various lag selection measures like sequential modified LR test statistic (LR), Final prediction error

(FPE), Akaike information criterion (AIC), Schwarz information criterion (SIC) and Hannan − Quinn information criterion (HQ) to estimate the P-SVAR model, lag 2 is found suitable for the model. It will offer more accurate and robust dynamics without having to remarkably shorten the estimation sample that will compromise the degrees of confidence (see Rotimi and Ngalawa, 2017; Kutu and Ngalawa, 2016). Furthermore, the selected lag length provides no room for serial correlation in the residuals (see Kose and Baimaganbetov).

Following Ngalawa and Viegi (2011), this study checks for the joint significance of the variables to determine the robustness of the model. The results reveal that the endogenous variables are jointly significant at each lag length for all equations. The results also reveal that disjointedly, the equations are significant also at second lag length order.

Analyses of the Impulse Response (IRS): *The responses of FDI to TI and ME and the response of ME to TI*

The study plots impulse response functions (IRF) [2] of the various variables employed in the study. Specifically, it displays the response of the FDI to terrorism index and military expenditure on the one hand and the response of the military expenditure to terrorism on the other hand (see figures 1a and 1b).
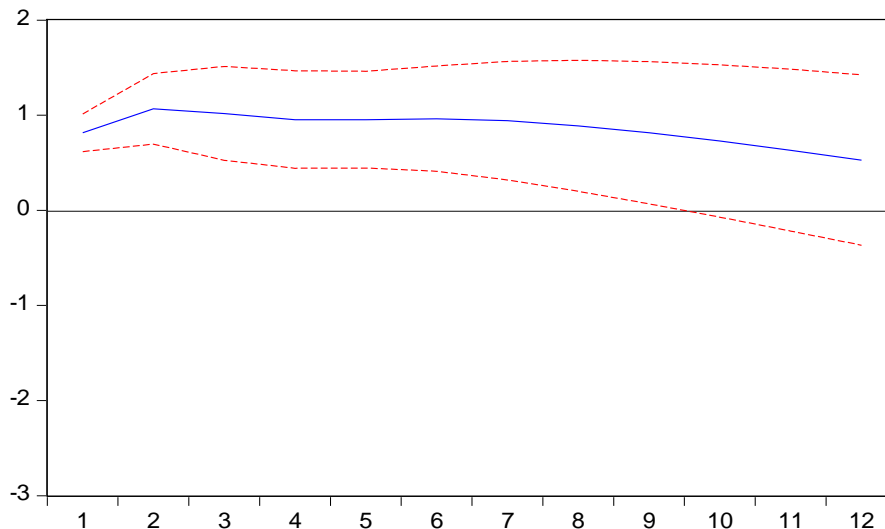

**Figure 1a*: Response of Foreign Direct Investment to Terrorism Index**

Contrary to the null hypotheses 0a and 0b, the results show that FDI significantly and statistically responds to terrorism index and military expenditure (see Figure 1a and 1b). This suggests that the duo, terrorism index and military expenditure are sacrosanct factors to

determine FDI and probably its volume simultaneously. This finding aligns with Bandyopadhyay, Sandlery, and Younasz (2014). The results also support Bezic, Galovic, and Misevic (2016) carried out on the European Union. This study asserts that both terrorism index and military

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[2]The IRF shows a response to structural one standard deviation innovation of one variable to the other (see Rotimi and Ngalawa, 2017).

expenditure explain movement in FDI within the Lake Chad Basin. As shown in Figure 1a, FDI responds negatively to terrorism index and the response is found to statistically significant from period 1 to 9. This finding aligns with earlier studies that terrorism impedes FDI. In addition, it implies that as the country witnesses rising activities of terrorism, investors would be discouraged from investing their resources in the country to avoid unforeseen loss. Also, gradual withdrawal may be observed where there are existing investments in the country. This is obvious in the case of firms and multinational that has relocated from Nigeria and Chad region to places like South Africa. To cushion this, military expenditure is increased as shown in Figures 1a. The figure shows that FDI and terrorism index are negatively related. In the figure, FDI increases from period 1 to 2 before it begins to significantly decline up to period 9. The decrease continues statiscally insignificantly into period 12. Furthermore, while military expenditure concurrently increases with terrorism index, it decreases with FDI on the other hand (see Figure 1b).
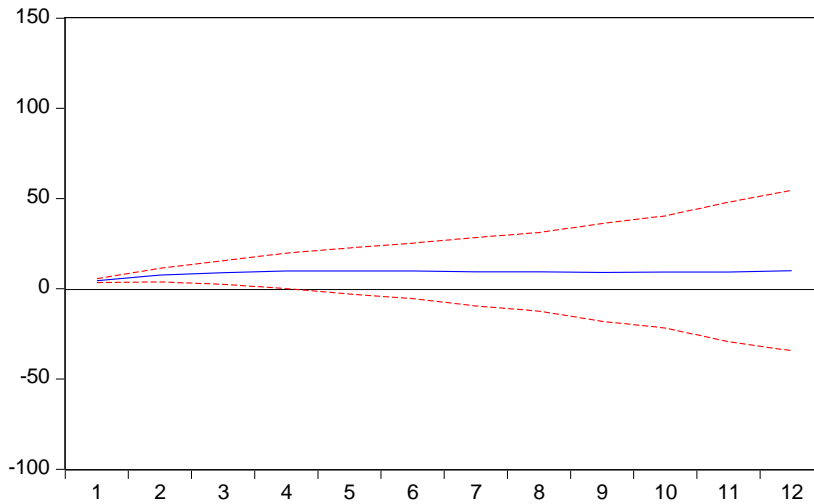
Figure 1b: Response of Military Expenditure to Terrorism Index

The impulse response function on military expenditure to terrorism index is presented in Figure 1b and it shows a positive association between military expenditure and terrorism. This implies that the military expenditure positively responds to structural one standard deviation innovation in terrorism. It also implies that one structural innovation introduced to terrorism will lead to a rise in total expenditure incurred in the military sector. As revealed in Figure 1b, increase in military expenditure is statistically significant from period 1 through to period 4. As it proceeds into period 5 and lastly to period 12, it continues to rise but statistically insignificant. This probably suggests that there may be other intervention which may be different from military interventions that are used to counter terrorism.

Overall, the general responses of the endogenous variables to structural one standard innovation in terrorism show that foreign direct investment and military expenditure are statistically significant and stable.

Variance Decomposition Results

Table 1: Variance Decomposition of Foreign Direct Investment

Period	Foreign Direct Investment	Terrorism Index	Military Expenditure
3	99.59540	0.304924	0.099680
6	99.34809	0.400953	0.250954
9	99.10216	0.456356	0.441479
12	98.82445	0.507048	0.668498

Tables 1 present the Variance Decomposition results using the Cholesky ordering- Foreign Direct Investment, terrorism index and military expenditure. Table 1 reveals that shocks to the terrorism index and military expenditure cumulatively account for less than 0.40 per cent fluctuation in foreign direct investment in period 3. In period 6, the cumulative shocks to terrorism and military expenditure slightly rise 0.65 per cent and later progresses to 0.89 per cent in period 9 and 1.17 per cent in period 12.

Table 2: Variance Decomposition of Military Expenditure

Period	Foreign Direct Investment	Terrorism Index	Military Expenditure
3	0.220736	1.046301	98.73296
6	0.468882	2.267162	97.26396
9	0.951749	3.707945	95.34031
12	1.418472	4.872005	93.70952

The findings for the variance decomposition of military expenditure are presented in table 2. The results show that shocks terrorism largely accounts more than foreign direct investment for the fluctuation in military expenditure in period 3. Specifically, it accounts for 1.04 per cent as against 0.22 per cent of foreign direct investment. In period 6, terrorism and foreign direct investment account for about 2.26 per cent and 0.46 per cent. This finding aligns with d literature that terrorism induces military expenditure. The trend continuously rises to 0.95 per cent and 3.70 per cent for foreign direct investment and terrorism, respectively and finally peaks at 1.41 per cent and 4.87 per cent.

SUMMARY AND CONCLUSION

This study examines a three-variable (lnFDI, TI and lnME), P-SVAR model to determine how FDI responds to violent extremism within the Lake Chad basin region for the period covering 2000-2019. The result reveals that foreign direct investment significantly responds to terrorism. Thus, higher rates of terrorism impede foreign direct investment. The result also reveals that terrorism increases military expenditure. Findings from this study reveal a significant positive connection between terrorism and military expenditure.

On the other hand, it shows a significant negative connection between foreign direct investment and terrorism; this implies that terrorism plays a significant role in determining foreign direct investment volume variations, which may subsequently stimulate economic growth. It also suggests that terrorism prompts military expenditure.

The results from the variance decomposition show that shocks to terrorism account for fluctuation in foreign direct investment. This result validates the claim in the literature that terrorism hampers foreign direct investment (see Bezic, Galovic, and Misevic, 2016; Rotimi *et al.,* 2013). On this basis, this study recommends that the region should guide against terrorism to attract foreign direct investment, which will enhance economic growth and the general well-being of the region. This study, among other things, recommends that further study may want to extend this research by considering how violent extremism impact household expenditure and consumption patterns which could not be considered in this study due to data paucity.

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