EFFECT OF CRIME ON POVERTY IN NIGERIA

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Abstract

The link between crime and poverty was considered in this work by controlling for economic growth. That is, the study examined the cointegration of these variables and based on previous work; the issue of causal relationship among these variables were studied. Moreover, the study extends the theory of rational choice to poverty situation in Nigeria by testing the crime-wealth hypothesis in rational choice theory. In testing these hypotheses, the study used data set from 1990 to 2012 and analysed data through the estimation of bounds test; vector error correction model and Granger causality test. Also, for policy making the levels of shocks convergence were determined by variance decomposition test. However, the results showed that there is existence of short-run impact of crime on poverty and a unidirectional causality of crime affecting poverty using the Granger causality which support the crime-wealth hypothesis. In addition, growth played crucial role by impacting on poverty in the short-run and further, a bidirectional relationship was obtained between growth and poverty in the Granger causality. Based on these results, the study suggested that the policy makers should encourage policies that can improve economic growth with the possibility that crime may be reduced in the country and consequently, the reduction of poverty as well..

Keywords: crime, poverty, growth, bounds test approach, vector error correction model and Granger causality.

JEL Classification: K4, O1, O2, O4

1. Introduction

The incidence and severity of poverty are higher among households in Nigeria (Akerele et al., 2012) and a greater percentage of the Nigerian population lives in poverty, despite the huge wealth in the country (Holmes et al., 2012). This is because high poverty income and poor asset distribution, unequal access to basic infrastructure and services like education and health still persist in Nigeria (Holmes et al., 2012). Moreover, in a bid to reduce poverty in Nigeria, the Federal Government in September, 1999 introduced a nine-year universal basic education due to the financial inability of many parents to send their children to school (Umukoro, 2013). In addition, the government provides job for young graduates through the Graduate Internship Scheme (GIS) that was launched in October,

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2012 and Subsidy Reinvestment and Empowerment Programme (SURE-P) with a projected allocation of N180bn in 2013 (Okogu, 2013). This amount according to Okogu (2013) was meant for further improved provision of social safety net schemes, maternal and child healthcare, youth development, vocational training and the provision of critical infrastructure. Thus, these steps reflected on the MDGs achievement in 2013 but not adequate because achievement is still below the target (see MDG Report, 2013). That is, the achievement is still below the target because crime remains a threat to budget implementation, achievement of Millennium Development Goals and Vision 20: 2020 in Nigeria (Federal Ministry of Finance Nigeria, 2014).

Moreover, criminal practices in Nigeria and other African nation's affects poverty reduction through diversion of funds meant for poverty alleviation programmes by government representatives (Handley et al., 2009). Also, Umukoro (2013) affirmed that corruption has affected the poverty programmes in Nigeria. For example, the embezzlement of US$250 million by a former governor of Delta state James Ibori was meant for vital public services (Burleigh, 2013 and Dike, 2014). Besides, Costa (2007) asserted that money stole from Nigeria coffers between 1960 and 1999 was estimated to be US$400 billion that should have translated into meaningful public goods like vaccinations for children; hospitals and water treatment facilities; kilometres of roads and hundreds of schools. Thus, the evidence of teenagers and young adults committing crime due to poverty in Nigeria has been challenging (Okei-Odumakin, 2011). Besides, poverty remains a socio-economic problem that may increase criminal risk as rapid urbanisation is taking place in Nigeria (Odumosu, 1999). Thus, there is a need to statistically showcase the extent that crime has affected poverty or how they have causally affected each other in Nigeria.

However, criminal activities in a society are characterised by prolonged poverty (Huang et al., 2004). That is, crime related matters may disrupt the development course (Mehlum et al., 2005) like economic growth (Mauro & Carmeci, 2007). More so, studies have shown relationship exist between crime and poverty. Poveda (2012) established that poverty has a positive influence on violence in Colombia, and poverty measures help in reducing the financial burden on the family because poverty measures had been found to reduce non-violent crime in Brazil (Loureiro et al., 2009). Similarly, in a cross country of 39 Fajnzylber et al., (2002) showed that poverty is significant with crime and came up with the need to estimate poverty alleviation effects of violent crime. Meloni (2014) has proven that welfare spending through Unemployed Heads of Household Programme have contributed to crime reduction in Argentina but, further raised these investment options between policing expenses and relief spending in relation to crime. Also, in respect of the nature between crime and poverty; few studies have focus on how crime and crime-related issues like corruption and violence-conflict have impacted on poverty. For example, McKeown (1948) used the parametric approach to relate criminal activities to poverty; and Gupta et al. (2002) examined the crime of corruption on poverty as Justino and Verwimp (2013) relates violence-conflict with poverty in Rwanda.

Theoretically, the assertion that poverty is positively related to criminal activities has been established by the criminologists (McKeown, 1948). In line with this assertion, Becker (1968) and Ehrlich (1973) have used the economic approach to further establish that poverty of lower income means is significantly associated with crime. Besides, the

economic approach has postulated that crime would make society to incur some social loss since more resources will have to be used in curbing crime (Bourguignon, 1999). Thus, loss of resources would reduce the implementation of developmental programmes that could assist in reducing the poverty income in the society. That is, the position is that an increase in crime rate in the society would led to more disproportionate in income which encourage more poverty income in the society. In view of the economic approach to crime by Becker (1968) and Ehrlich (1973), the crime effects on how crime has led to poverty has been greatly overlooked or neglected. This neglect has provided scanty literature on how crime has contributed to poverty in the society.

Similarly, the work of Huang, Laing and Wang (2004) came up with the dynamic equilibrium approach to establish relation between crime and poverty. The dynamic equilibrium approach was necessitated by the geographical area that is concentrated with more crime activities. This concentrated environment was noted to have features of low educated workforce, low chances of employment and prolonged poverty. To this, changes in the rate of crime assist in limiting the important development for labour market in terms of decrease in income for the young unskilled workers and reduction in the rate of unemployment. This important development for labour market showed a connection of a priori for the fact that individual may decide to either or not engage in criminal activities on the basis of time allocation. Meanwhile, the engagement in criminal activities would make income gains of high human capital workers to be stolen and further create fear in them. This fear would not enable them to participate in the labour market and by this; the anticipated yield to formal employment would be reduced. That is, crime imposed an indirect tax on educated workers by depleting the value of their schooling but, they noted that interference provided by the authorities may reduce the imposed indirect tax by crime on educated workers. Also, their low involvement in labour market would not encourage firms' business operation thereby causing low productivity which would discourage the firms from setting up their business in such society. In this regard, the effect of low firm participation in society would lessen the number of formal employment that would be provided in such community which may encourage poverty income. Thus, the occurrence of high crime would not only correlate with existence of high poverty but also, increase poverty in a society.

Hence, the consideration of crime affecting poverty is seen as a novel idea using crime-poverty data set in Nigeria. This is because this study would be the first to empirically establish that crime affect poverty based on the theoretical idea of crime-wealth hypothesis in the rational choice theory. In addition, the study would aid the policy makers in the country on policy formulation and direction in curbing crime, promoting economic growth and consequently reduced poverty. However, to explain how crime has impacted on poverty in Nigeria, this study consider these two questions. What is the extent of crime affecting poverty in Nigeria? Again, does causal effect exist in this relation of crime and poverty?

2. Methodology

2.1. Data sources and description.

This study tested for cointegration and the Granger causality in the link between crime and poverty using economic growth as policy to reduce poverty in Nigeria. Thus,

the study sourced data from the World Bank (2014) for the real growth of per capita income and also, poverty using the percentage of population that have access to water from 1990 to 2012. Besides, the used of the percentage of population that have access to water as proxy for poverty was based on United Nations (2007) where this proxy was listed as one of the indicators to measure poverty for sustainable development. In addition, yearly data for poverty in Nigeria was not available and due to this data problem on poverty; the study limit the coverage period to 23 years from 1990 to 2012 and also following the work of Farooq, Shahbaz, Arouri and Teulon (2013) that face similar data problem on corruption and consequently used the same coverage time from 1987 to 2009. However, data on crime was obtained from various reports of the National Bureau of Statistic and the Nigeria Police. The variability of the data and their definition are presented in Table 1.

Table no.1: Descriptive statistics and definition of variables

Variables	Observations	Mean	Std. Dev.	Minimum	Maximum	Definition
POVW	23	55.365	5.684	45.600	64.000	Percentage of Population having access to water as proxy for poverty
CR	23	159.116	80.831	59.765	304.831	Crime recorded per 100,000per population
GRPC	23	28.027	30.417	-5.498	113.847	Real GDP per capita growth

2.2. Model specification

To embark on this work, this study estimated the poverty model in equation 1 in order to examine the effect of crime on poverty and see the impact of growth on poverty. Thus, the poverty model estimated is presented in equation 1 based on Adams and Pages (2005) and Gupta, Pattillo and Wagh (2009). Moreover, in the poverty model β_1 is the crime elasticity of poverty and it is expected to be negative for the percentage of population having access to water to be reduced which indirectly would increase poverty. Meanwhile, β_2 is the growth elasticity of poverty and it is expected to be positive for the percentage of population having access to water to be increased which indirectly would reduce poverty. In addition, previous studies have recognised endogeneity existence between corruption and poverty (Gupta, 2002); therefore, this work would consider the causal link between crime and poverty following Nayaran and Smyth (2004) and Detotto and Pulina (2012). Thus, the following causality model were specified as presented in equation 1 to 3. In the causality model below, crime and poverty variables were logged ($\ln$) while real growth rate per capita was differenced (δ). Moreover, ε_t , φ_t and σ_t are the error terms for each of the model while π_1, π_2 and π_3 are constants. Also, each of the variable was in turn regressed on other variables time to show the characteristics of causality.

$$\ln(POVW_t) = \pi_1 + \beta_1 \ln(CR_t) + \beta_2 \delta(GRPC_t) + \varepsilon_t \ldots\ldots\ldots [1]$$

$$\ln(CR_t) = \pi_2 + \beta_3 \ln(POVW_t) + \beta_4 \delta(GRPC_t) + \varphi_t \ldots\ldots\ldots [2]$$

$$\delta(GRPC_t) = \pi_3 + \beta_5 \ln(POVW_t) + \beta_6 \ln(CR_t) + \sigma_t \ldots\ldots\ldots [3]$$

2.3. Test of stationarity

In view of the problem of non-stationarity that time series data often suffer from, this study overcomes this problem by putting those variables into test of stationarity of the Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) tests. These unit root tests gave the study a confidence that the result obtained were not spurious. That is, non-stationary data were made stationary at integration order of I(0) and I(1). However, the results show that this study is having a mixture of I(0) and I(1) series data as highlighted in Table 2. In view of this, this called for the use of the autoregressive distributed-lag model (ARDL) as proposed by Pesaran, Smith & Shin (2001).

Table 2: Result of the Unit Roots Test

variables	Augmented Dickey-Fuller (ADF)				Phillip-Perron (PP)				decisions
	I(0)	I(0)	I(1)	I(1)	I(0)	I(0)	I(1)	I(1)	
	α	α and t	α	α and t	α	α and t	α	α and t	
POVW	-6.997***	0.104	-0.148	-7.397***	-32.184***	-1.021	-1341	-22.318***	I(0)
CR	-1.512	-2.298	-6.380***	-6.286***	-1.613	-2.320	-6.380***	-6.142***	I(1)
GRPC	-5.020***	-4.960***	-7.371***	-3.819**	-5.116***	-5.194***	-18.389***	-19.040***	I(0)

NOTE: the figures reported are t-ratio that possessed the p-values of MacKinnon (1996) one-sided at various level of significant. The level of significant was asterisked (*) at 10%; (**) at 5% and (***) at 1%.

2.4. Bouds Test Approach

The bound test approach required that equation 1 to 3 be transformed into autoregressive distributed-lag as indicated in equation 4 to 6. This transformation helps the study to affirm the existence of cointegration as submitted by Engle and Granger (1987) that variables in a model must move together theoretically.

$$\Delta \ln(POVW)_t = \pi_1 + \beta_1 \ln(POVW_{t-1}) + \beta_2 \ln(CR_{t-1}) + \beta_3 \delta(GRPC_{t-1}) + \sum_{i=1}^{p} \alpha_1 \Delta \ln(POVW_{t-i}) + \sum_{i=0}^{p} \alpha_2 \Delta CR_{t-i} + \sum_{i=0}^{p} \alpha_3 \Delta \delta(GRPC_{t-i}) + \varepsilon_t \quad \ldots\ldots\ldots (4)$$

$$\Delta \ln(CR)_t = \pi_2 + \beta_1 \ln(POVW_{t-1}) + \beta_2 \ln(CR_{t-1}) + \beta_3 \delta(GRPC_{t-1}) + \sum_{i=1}^{p} \alpha_1 \Delta \ln(POVW_{t-i}) + \sum_{i=0}^{p} \alpha_2 \Delta CR_{t-i} + \sum_{i=0}^{p} \alpha_3 \Delta \delta(GRPC_{t-i}) + \varphi_t \quad \ldots\ldots\ldots (5)$$

$$\Delta \delta(GRPC)_t = \pi_3 + \beta_1 \ln(POVW_{t-1}) + \beta_2 \ln(CR_{t-1}) + \beta_3 \delta(GRPC_{t-1}) + \sum_{i=1}^{p} \alpha_1 \Delta \ln(POVW_{t-i}) + \sum_{i=0}^{p} \alpha_2 \Delta CR_{t-i} + \sum_{i=0}^{p} \alpha_3 \Delta \delta(GRPC_{t-i}) + \sigma_t \quad \ldots\ldots\ldots (6)$$

Based on Pesaran *et al.*, (2001) cointegration test should be carried out with lag selection for the model. That is, appropriate lag must be determined to ascertain the choice of the model for analysis. This selection of lag criteria helps to reduce the

problem of autocorrelation in the residual (Shyh-Wei, 2009). Thus, this study specified the models based on the Akaike Information Criterion with lag 3 for dependent variables and likewise, lag 3 was selected for the regressors. In view of this lag selection, the model used for each independent variable is presented in Table 3. Moreover, each of the models was run using restricted intercept and no trend based on case II of the ARDL of Pesaran *et al.,* (2001). Thus, the bound test was used to ascertain the presence of cointegration in the long-run using the F-test statistic. That is, the joint significance of F-statistic tested the coefficients at one period of lag as shown in equation 4-6. Also, the null hypothesis is that $H_0 : \beta_1 = \beta_2 = \beta_3 = 0$ (implies no cointegration hypothesis) and the alternative is $H_1 : \beta_1 \neq \beta_2 \neq \beta_3 \neq 0$ where at least one of the $\beta_1 \ to \ \beta_3 \neq 0$ (implies cointegration).

The long-run relationship main criteria is that the F statistic test value must not below or in between the I(0) and I(1) bounds but must be above I(0) and I(1). Here, the study reject the null hypothesis that no cointegration exist at the appropriate level of significance. Moreover, the result of the bound test as presented in Table 4 showed that all the models were cointegrated at 5%.

Table 3: Summary of the selected lagged criteria

Dependent variable	LogL	AIC*	BIC	HQ	Adj. R-sq	Specification
LOG(POVW)	122.328	-11.929	-11.481	-11.853	0.999	ARDL(3, 3, 0)
LOG(CR)	-14.976	-1.050	-0.801	-1.008	0.933	ARDL(2, 0, 0)
D(GRPC)	-88.354	10.353	10.850	10.437	0.407	ARDL(3, 1, 3)

Table 4: Bounds test for the existence of cointegration

Dependent variable	F-statistic	Critical Value at various levels of significance				
		5% at I(0)	5% at I(1)	10% at I(0)	10% at I(1)	k
$LOG(POVW) = f(\log(cr)\ \delta(grpc)$	9.151	3.1	3.87**	2.63	3.35	2
$LOG(CR) = f(\log(povw)\ \delta(grpc)$	4.183					
$D(GRPC) = f(\log(povw)\ \log(cr)$	6.557					

Note: the ** indicate the bound test for each model was significant to show if there is cointegration or not among the dependent variable and the regressors.

2.5. Granger causality test

The long-run Vector Error Correction (VEC) model was highlighted in equation 7 while equations 8-10 indicate the short-run Granger causality which show that error correction term were inserted in the short-run of the bounds test. This is in line with the convention in the literature that in determining the Granger causality in both long-run and short-run; Engle and Granger (1987) suggested the inclusion of error correction term to Vector Autoregressive (VAR) model in order to determine the cointegration. Also, variables to be included in the model must be integrated at order of one. However, the use of VEC model in this work is due to the cointegration at 5% using the bound test

approach in spite of variables employed were in mixed integration order of zero and one.

Moreover, Halicioglu (2012) employed the use of VEC in determining the long-run for the relation between crime and real income per capita as highlighted in equation 7. Also, in VEC models, each of the dependent variables is regressed against its previous values of such variable and similarly, for other variables in the multivariate models. The Wald Test was used to obtain the selection of optimal lag for the probability length in all the VEC models. The Wald Test showed the joint determination of a common lag criteria for the models at lag 2. The ECT_{t-1} indicated the cointegration of disequilibrium in each VEC model and it determines the presence of long-run Granger causality (Halicioglu, 2012). Thus, the presence of cointegration does not necessarily mean a temporal causality but it is only suggesting that at least a causal direction exist (Nayaran & Smyth, 2004). Hence, the result of the long-run and short-run Granger causality test is highlighted in Table 7.

$$(1-L)\begin{bmatrix} POVW_t \\ CR_t \\ GRPC_t \end{bmatrix} = \begin{bmatrix} \varphi_1 \\ \varphi_2 \\ \varphi_3 \end{bmatrix} + \sum_{i=1}^{p}(1-L)\begin{bmatrix} \theta_{11i} \dots\dots \theta_{11i} \\ \theta_{21i} \dots\dots \theta_{22i} \\ \theta_{31i} \dots\dots \theta_{33i} \end{bmatrix}\begin{bmatrix} POVW_{t-1} \\ CR_{t-1} \\ GRPC_{t-1} \end{bmatrix} + \begin{bmatrix} \partial_1 \\ \partial_2 \\ \partial_3 \end{bmatrix}[ECT_{t-1}] + \begin{bmatrix} \omega_1 \\ \omega_2 \\ \omega_3 \end{bmatrix} \quad \dots(7)$$

$$\Delta \ln(POVW)_t = \pi_1 + \beta_1 \ln(POVW_{t-1}) + \beta_2 \ln(CR_{t-1}) + \beta_3 \delta(GRPC_{t-1}) + \sum_{i=1}^{p} \alpha_1 \Delta \ln(POVW_{t-i}) + \sum_{i=0}^{p} \alpha_2 \Delta CR_{t-i} + \sum_{i=0}^{p} \alpha_3 \Delta \delta(GRPC_{t-i}) + \theta_{POVW} ECT_{t-1} + \varepsilon_t \dots\dots\dots (8)$$

$$\Delta \ln(CR)_t = \pi_2 + \beta_1 \ln(POVW_{t-1}) + \beta_2 \ln(CR_{t-1}) + \beta_3 \delta(GRPC_{t-1}) + \sum_{i=1}^{p} \alpha_1 \Delta \ln(POVW_{t-i}) + \sum_{i=0}^{p} \alpha_2 \Delta CR_{t-i} + \sum_{i=0}^{p} \alpha_3 \Delta \delta(GRPC_{t-i}) + \theta_{CR} ECT_{t-1} + \varepsilon_t \dots\dots\dots (9)$$

$$\Delta \delta(GRPC)_t = \pi_3 + \beta_1 \ln(POVW_{t-1}) + \beta_2 \ln(CR_{t-1}) + \beta_3 \delta(GRPC_{t-1}) + \sum_{i=1}^{p} \alpha_1 \Delta \ln(POVW_{t-i}) + \sum_{i=0}^{p} \alpha_2 \Delta CR_{t-i} + \sum_{i=0}^{p} \alpha_3 \Delta \delta(GRPC_{t-i}) + \theta_{GRPC} ECT_{t-1} + \varepsilon_t \dots\dots\dots (10)$$

2.6. Diagnostic Test

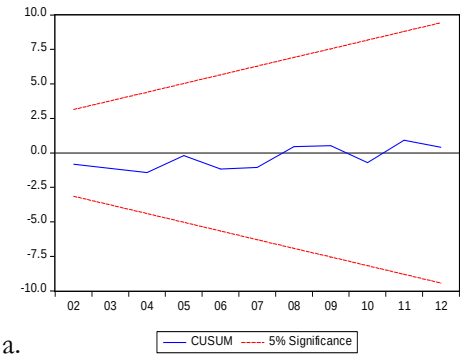
To show the robustness of the result for the cointegration, the estimates of the ARDL were diagnosed as presented in Table 5 with the normality test; functional test; serial correlation test; heteroscedasticity test and stability tests. The results of the normality test of Jarque-Bera indicated that Model 1 and Model 3 passed the test and with the excess of the Kurtosis in Model 2; the study was certained that model 2 also passed the normality test in line with Saridakis (2011). Besides, all the models passed the tests of LM of Breusch-Godfrey of serial correlation, the Breusch-Pagan-Godfrey Heteroskedasticity and the Ramsey RESET Test of functional form at 5% level of significance using both the F-statistic and Observed R^2 probabilities values and the t-statistics for the functional form test. Moreover, to ensure that the parameters were not varied for all coefficients and variances of the disturbance terms in the models especially in long-run relationship (Pesaran & Pesaran, 2009), this study carried out the test of stability of cumulative sum and cumulative sum of squares. Thus, the results of cumulative sum and cumulative sum of squares were highlighted in Figure 1 to 3 and it

provided that all the three models passed the stability tests at 5% level of significance with the exception of cumulative sum of squares for crime model in Model 2.

Table 5: Diagnostic test for the ARDL Cointegration

		Model 1	Model 2	Model 3
Jarque-Bera		1.180 *(0.554)*	10.699 *(0.004)*	1.480 *(0.476)*
Kurtosis		1.851	5.969	1.716
Ramsey's RESSET Test	t-statistic	1.115 (10) *(0.290)*	1.495 (15) *(0.155)*	0.508 (8) *(0.624)*
	F-statistic	1.245(1, 10) *(0.290)*	2.235 (1, 15) *(0.155)*	0.258 (1,8) *(0.624)*
LM Test	F-statistic	0.862 (2, 9) *(0.454)*	0.326 (2,14) *(0.726)*	0.087 (2, 7) *(0.917)*
	Obs*R^2	3.216 (2) *(0.200)*	0.936 (2) *(0.626)*	0.464 (2) *(0.792)*
BPG Test	F-statistic	0.481 (8,11) *(0.845)*	1.473 (4,16) *(0.256)*	0.404 (9, 9) *(0.903)*
	Obs*R^2	5.183 (12) *(0.737)*	5.653 (4) *(0.226)*	5.468 (9) *(0.791)*

Note: All p-values are in parenthesis and italic with three decimals.



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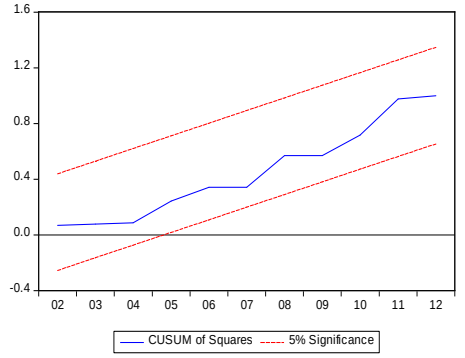

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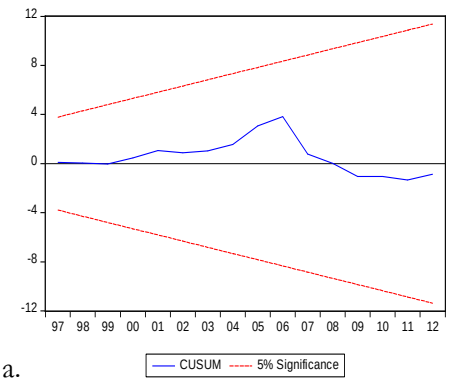
Figure 1: Stability test for model 1.



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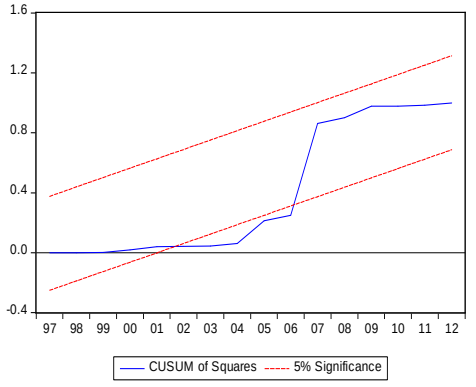

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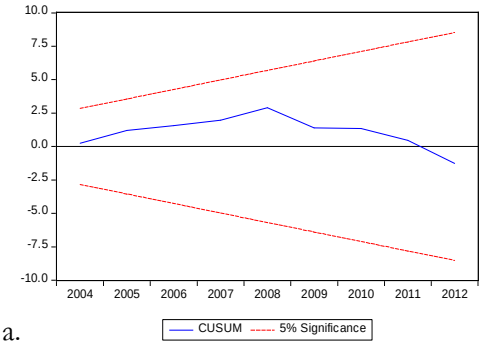
Figure 2: Stability test for model 2



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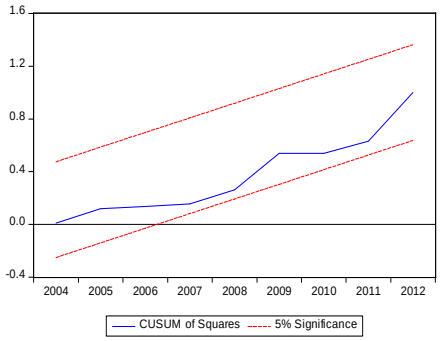

b.

Figure 4: Stability test for model 3

2.7. Results

This study tested the effect of crime on poverty through growth policy by using Model 1 and 4 in order to see whether these variables moved together. Also, the result of the bounds test showed that there is co-integration at 5% level of significance (see Table 4). Due to this joint significance of these variables, the study in turn looks at the long-run and short-run of the coefficients as presented in Table 6. In the long-run, the variable of interest which is crime was not significant in determining poverty. But in the short-run, the study obtained a significant effect at 10%; that is, crime is still relevant in determining the level of poverty in Nigeria. In addition, a 10% increase in crime rate would reduce the percentage of population that have access to water by 2%. This means that when the percentage of population that have access to water is reduced by 2%, poverty would be increased. Thus, an increase in crime rate would positively increases the level of poverty. To this, Gupta *et al.* (2002) affirmed that corruption increased the level of poverty and by this, people were denied good developmental programmes in society. More so, when the means of income was destroyed in the previous years, family tends to suffer loss of income which encourage poverty; that is, the act of violence affects household income where family would be subjected to poverty (Justino & Verwimp, 2013).

However, growth and growth policy have shown no significant long-run impact on poverty in Nigeria. Growth over the years in Nigeria has been revolving between 5% and 7% in the last 10 years but, the standard of living is gradually worsen on yearly basis. Notwithstanding, the short-run result indicated that growth affect poverty at 5% in the preceding two years poverty took place with low coefficient; the low coefficient was also noted by Aigbokhan (2008).

Table 6: Estimates of the poverty model in the long-run and short-run relationship using ARDL Model

Long-run Variables			**Short-run Variables**		
LOG(CR)	-0.001	(-0.032)	DLOG(POVW(-1))	-0.833***	(-4.901)
D(GRPC)	-0.000	(-1.064)		-0.454*	(-
			DLOG(POVW(-2))	2.069)	
Constant	4.493	(125.085)	DLOG(CR)	-0.001*	(-

	1.889)	
DLOG(CR(-1))	0.000	(0.275)
DLOG(CR(-2))	0.002*	(2.175)
D(GRPC, 2)	-0.000**	(-3.004)
CointEq(-1)	-0.073***	(-7.047)

NOTE: the figures reported are t-statistics in parenthesis and coefficients indicating various level of significant with asterisked (*) at 10%; (**) at 5% and (***) at 1%.

Moreover, the Granger causality test of long-run and short-run results were presented in Table 7. In the long-run, the results of ECT_{t-1} for the poverty and growth models were negatively significant at 5%. These two models showed that there were changes of disequilibrium in the co-integration of long-run relationship while the crime model was not co-integrated. Moreover, in the poverty function the presence of Granger causality ran interactively from crime and growth to poverty. Likewise, the Granger causality ran interactively in growth function from crime and poverty to growth and with no such occurrence of interactive of poverty and growth in the crime function. In addition, the ECT_{t-1} coefficients are fairly moderate with -1.987 for poverty and -2.615 for growth and with these figures, it showed that the shock convergence is fairly good. Hence, the results of the poverty function lend supports the crime-wealth hypothesis in rational choice theory.

However, the short-run analysis revealed that imbalance took place in the poverty function, changes happened through crime and growth. That is, crime significantly Granger-causes poverty at 1%; likewise, growth Granger-causes poverty at 10%. In a similar way, poverty Granger-causes growth at 1% when considering the growth function but, crime did not Granger-causes growth. Besides, crime was not Granger-causes neither by poverty nor growth. Meanwhile, it is worthy to note here that a bi-directional causality was obtained in the relation of poverty and growth but, there is neutrality between crime and growth. Also, this study was able to come up with unidirectional Granger causality in the link between crime and poverty. Nevertheless, the short-run causality especially on the variable of interest supported the crime-wealth hypothesis.

Table 7: Long-run and short-run of Granger causality Test

Dependent variable	**F − statistic (probability)**			ECT_{t-1} **(t − statistic)**
	$\Delta log(povw)$	$\Delta log(cr)$	$\Delta\delta(grpc)$	
$\Delta LOG(POVW)$	-	1.115 (0.572)	9.975***(0.006)	-1.987**
$\Delta LOG(CR)$	11.651***(0.003)	-	0.196 (0.906)	-0.646
$\Delta D(GRPC)$	5.507* (0.063)	0.257 (0.879)	-	-2.615**

Note: t-statistic and p-value were presented in the table and the p-values are in parenthesis and were significant at 10% (*); 5% (**) and 1% (***).

The variance decomposition of poverty showed the level of shocks that come from poverty and through other variables in the poverty model. Firstly, on the self-shocks of poverty in the short-run at period 2 and 3 stood at 84.62% and 68.44% while in the

long-run it decreases to 59.05%. Secondly, crime caused the level of shocks of 13.42% and 24.82% in the short-run for poverty at the period of 2 and 3 but this shock later increased to 31.02% in the tenth year. Thirdly, growth produced less shocks in both the short-run and long-run when compared with crime in the same period; that is, the shock produced by growth on poverty was 1.95% in period 2 which increased to 6.72% in period 3; this later increase to 9.92% in period 10 in the long-run. Lastly, the extent of variability of shocks in the poverty model is more in the long-run when compared to the short-run. That is, the shocks increased in terms of variability from 0.001% and 0.0016% in both period 2 and 3 to 0.006% in period 10.

Table 8: Variance Decomposition of POVW

Period	S.E.	LOG(POVW)	LOG(CR)	D(GRPC)
1	0.000774	100.0000	0.000000	0.000000
2	0.001021	84.62637	13.42127	1.952359
3	0.001681	68.44896	24.82435	6.726697
4	0.002162	64.53721	27.00962	8.453171
5	0.002845	66.94899	25.19019	7.860817
6	0.003435	63.48869	27.96379	8.547519
7	0.004183	61.38421	29.46998	9.145814
8	0.004851	60.10010	30.24082	9.659084
9	0.005601	60.16228	30.18579	9.651932
10	0.006312	59.05351	31.02464	9.921856

Cholesky Ordering: LOG(POVW) LOG(CR) D(GRPC)

3. Conclusion

In this work, attempts were made in examining the effect of crime rate on poverty while controlling for economic growth. The idea of controlling for economic growth is that when policies were formulated to promote growth; such policies must be capable of enhancing the citizens' income based and good access to infrastructure. Consequently, the poverty rates would reduce and standard of living would improve among in the country. But, this is not the case in Nigeria in spite of better formulation policies on growth with meaningful resources used to execute those policies and programmes. This is because the transmission of growth policies to reduce poverty in the country was not made possible due to one reason or the other. Particularly, this impossibility was due to criminal activities of corruption, theft, unlawful possession of property, murder, armed robbery, forgery and fraud, and many more. Moreover, in the result of this study it was observed that crime affect poverty at 10% level of significance in the short-run which translate that citizens were denied through criminal activities, the accessibilities to good infrastructure and better standard of living. For example, crime of corruption has grossly made the social protection on development inadequate in Nigeria (Umukoro, 2013). Also, illegal wealth were made possible in the country through unnecessary concessions on import and licences; over inflation of contract and political bribery (JICA, 2011). Moreover, 83 micro financial institutions were listed for bankruptcy due to fraudulent practices (Aborisade,

2014). That is, the higher rate of insider abuse and fraud were found to militate against micro financial institutions' activities in Nigeria (Moghalu, 2010).

However, the direction of the result in the short-run and the Granger causality showed that crime encourages poverty to increase in the country. Thus, the work suggested that government should ensure adequate and prompt prosecution of criminals in order to enhance the status of institutions and their performance in the country. That is, performance of institutions would ensure that growth policies are well monitored and executed which shall provide more comfort to the citizens in the country. In addition, growth policies should not be politicised so that the real people in need of the programmes would benefit immensely from it and not the other way round. Thus, while the government is commended for the previous growth efforts in the country, it worthy to mention here that the adoption of these suggestions would enhance future implementation of growth policies in the country.

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