SOCIO-ECONOMIC DETERMINANTS OF CRIME: FURTHER EVIDENCE FROM NIGERIA

SUNDAY OSAHON IGBINEDION , IKPONWOSA EBOMOYI [*]

ABSTRACT: *This study examines the socioeconomic and demographic determinants of crime in Nigeria, using error-correction modelling approach for 1981-2015. The results indicate that the twin macroeconomic problems of inflation and unemployment positively impact on crime rate in Nigeria. The level of education was also found to be significant and negatively related to crime rates, suggesting that education not only make people risk averse, but also indirectly alters individual's decision to adopt criminal behaviour. Also, the one-period lagged value of average income was significant and negatively related to crime rate, suggesting that, appreciable increase in per capita income tends to reduce the incentive to commit crime. Accordingly, the study recommends, among others, the need for the relevant authorities to design and implement policy measures aimed at combating the twin evil of inflation and unemployment on the one hand, and increasing the level of education and schooling, especially among the indigent.*

KEY WORDS: *Crime, Misery index, Demographics Time Series, Nigeria.*

JEL CLASSIFICATION: *C01, I2, J24, N3.*

1. INTRODUCTION

For ages, every nation has had to wrestle with one form of crime or the other, a phenomenon that has come to be described as the 'darker side of humanity'. Essentially, crime is an offence against the value system of any given society. It is usually conceived as the outcome of a multiplicity of conditions, ranging from economic, social, cultural and family. The costs and effects of crime vary among the various facets of the population and touch almost everyone in varying degrees. Since the seminal work of Becker (1968), however, the general perception of the determinants of crime has changed significantly from what it used to be. Prior to that

[*] *Ph.D., Department of Economics and Statistic, University of Benin, P.M.B. 1154, Benin City, Nigeria, sunday.igbinedion@uniben.edu*
Department of Political Science, University of Benin, P.M.B. 1154, Benin City, Nigeria

ground-breaking work of Becker, criminal choices were perceived to be largely determined by mental illness or bad attitudes. Since 1968 however, the economics of crime has come to be considered on the basis of a maximization problem, where the agents tend to compare the costs (by way of arrest and punishment) and expected returns from crime.

Since the early 1980s, the economics of crime had witnessed an outpour of empirical studies on the determinants of crime, incorporating socio-economic and demographic factors, among others. Such studies have been partly informed by the significant rise in criminal activities in several Western countries and, partly by the corresponding rise in social and economic problems like unemployment, migration and the widening income within and between countries.

In Nigeria, as in many other developing countries in Africa, the incidence of crime has been on the rise over the years. In Nigeria, for instance, the total number of reported cases of crime which stood at 157,748 in 1980 rose to about 226,530 a decade later, representing about 44 percent increase. At the turn of this century however, the total number of reported crimes declined to about 86,893 and, thereafter maintained an upward trend reaching, 107,820 in 2010 and 125,790 in 2016 (see table 1 in appendix).

Also, within the Nigerian context, three socioeconomic factors have been identified as playing vital role in our understanding of the incidence of crime: unemployment, income and inflation. From table 1, unemployment and inflation rates have been relatively high, while GDP per capita has remained low when compared to a number of developing countries at the level of development. Given these stark socio-economic realities, it does not come as a surprise that Nigeria as high rates of crime. In fact, given the 2016 statistics on crime rates, Nigeria ranked 6th among the top ten countries with the highest crime rates in the world (Gazetterview, 2016).

Despite these startling evidences and the growing concern about the relationship between crime and socio-economic and demographic factors, there is a dearth of empirical studies on crime in Nigeria. Hence, the objective of this study is to investigate the socio-economic and demographic determinants of crime in Nigeria, within the context of cointegration and error-correction modelling procedure for the period 1981-2015.

The structure of the paper is as follows. Following the introductory section, section 2 presents the theoretical and empirical literature, while section 3 takes account of the methodological part. Section 4 presents the results and discusses the findings. Section 5 concludes the paper with some pertinent policy recommendations.

2. A BRIEF LITERATURE REVIEW

There is an avalanche of theoretical and empirical literature on the determinants of crime in both developed and developing countries. Starting with the seminal work of Becker (1968), he sees the choice to commit crime as a function of the costs and benefits associated with either committing a crime or not. Ehrlich (1973) however extends the frontier of Becker' work by incorporating income levels, distribution of income and unemployment and their impact on criminal propensity and crime rate. The study reveals that unemployment rate was a less important determinant

of crime rate than the other two. Teles (2004) on his part, provided a theoretical linkage between inflation and crime. He pointed out that monetary and fiscal policies impact on crime. Specifically, he observed that while monetary policy influences crime via inflation, fiscal policy does same via government spending.

Blackmore (2003) investigates the determinants of crime in South Africa across the 9 provinces over 8-year period. The results reveal that income per capita, drug use, population, unemployment, among others, affect the level of crime in those provinces. Studies by Raphael and Ebmer (2001), Edmark (2005) tend to reveal that unemployment rates tend to increase the motivation of people to participate in criminal activities. In a related study, Gillani, Rehman and Gill (2009) investigate the relationship between crime and economic indicators like unemployment, poverty and inflation in Pakistan for the period, 1975-2007. The findings reveal that, unemployment, poverty and inflation tend to impact positively the level of crime in Pakistan.

Halicioglu (2012) investigates the causes of crime in Turkey for the period of 1965-2009 using cointegration framework. The result reveals that, in both violent and non-violent crimes, income seems to be the principal determinant of crime rate, while unemployment and divorce were also found to be significant. In a related study, Khan, Ahmed, Nawaz and Zaman (2015) examine the impact of socio-economic factors on crime rate in Pakistan for the period of 1972-2011. The study finds a positive relationship between crime rate and factors like unemployment, poverty and income, but crime was inversely related to higher educational level.On their part, Lobont, Nicolescu, Moldovan and Kuloglu (2017), examined the relationship between crime and socioeconomic factors in Romania over the period 1990-2014. The result revealed that income inequality and urban agglomeration are significant determinants of crime in that country.

There are a few Nigerian studies that investigate the determinants of crime. Aminu, Manu, El-Maude andKabiru (2013) investigate the relationship between crime, level, unemployment, poverty, corruption and inflation in Nigeria between 1980-2009. Their finding showed that unemployment, poverty and corruption are negatively related to crime, while inflation rate impacted positively on crime rate.

In another study, Kilishi, Mobolaji, Usman, Yakubu and Yaru (2014) examine the relationship between unemployment and crime in Nigeria for a period spanning 1996-2005. The result revealed that both employment and quick trial and prosecution of criminals were found to be significant determinants of crime rates within the period. Omotor (2009) investigates the demographic and socioeconomic determinants of crimes, using a pooled dataset of Nigerian states between 2002 to 2005. The result revealed that per capita income, population density and lagged crime rate were major determinants of crime rate in those states.

The above-mentioned studies on Nigeria are defective in a number of ways. For instance, Kilishi et al (2014) merely examined the relationship between crime and unemployment to the exclusion of other socioeconomic and demographic determinants of crime. This has limited policy relevance for the relevant authorities as there are multiplicity of socio-economic determinants of crime. Further, the latest period examined by the various authors was 2009. And considering the fact that the Nigerian

nations has witnessed series of security challenges in recent times (especially those of the Boko-Haram insurgencies) makes the policy prescriptions there from somewhat doubtful. Besides, this study utilizes a longer sample period than any of the previous studies in this regards thus taking into cognizance the security realities prevailing in the nation in recent times.

3. METHODOLOGY AND MODEL SPECIFICATION

This section highlights the sources of data, the theoretical underpinnings of the study as well as techniques of the analysis.

3.1. Theoretical framework

The theoretical framework of this study is premised on the Rational choice model developed by Becker (1968). The model is an economic construct where an individual's decision to commit a crime is a function of the perceived costs and benefits. In this model, all potential criminals have a benefit of crime Z, which includes both the financial and any expected psychological benefits of crime. An individual committing crime faces costs from law-enforcement agencies. The severity of the punishment including fines and jail time is one part of the total cost, and the other part is the probability of getting caught. Therefore, the costs will equal the probability of punishment (pp) times the cost of punishment (CP). Thus, the expected return from crime equal:

$$З - (PP)\,(CP) \tag{1}$$

Applying standard differentiation rule to equation (1), it implies that the number of criminals rises as Z rises and declines as (PP) or (CP) rises. Thus, the individual decision to commit crime is conditional upon the following stipulation:

$$Z - (PP)\,(CP) > 0 \tag{2}$$

3.2. Model specification

Essentially, the economic model of crime is a standard model of decision making when individuals choose between criminal activity and legal activity on the basis of the expected utility from those acts. In this study however, our crime model transcends the usual incentive-induced economic model. It is an adapted multivariate model which captures crime as a function of economic and socio-economic demographic factors (Gaviria and Pages, 2002; Meera and Jayakumar, 1995; Masih and Masih, 1996). Consequently, the economic variables utilized in this study are unemployment and inflation rates (proxied by misery index) and per capita income. These help to measure the impact of economic factors on crime incidence. The socioeconomic-demographic factors included are level of education, and the sex distribution of the population.

Thus, drawing on the theoretical framework and the literature reviewed, we conceptualize the crime determinant model as follows:

$$CI_t = F(MIS_t, EARN_t, EDU_t, MPOP_t) \quad (3a)$$

Operationally, equation (3a) may be expressed in a natural log-linear estimation[1] form as:

$$LnCR_t\alpha_0+\alpha_1L_nMIS_t+\alpha_2I_nEARN_t+\alpha_3LnEDU_t+\alpha_4L_nMPOP_t+U_t \quad (3b)$$

Where:

CR	=	Annually aggregated number of reported crime cases (a proxy for crime incidence)
MIS	=	Misery index (a proxy for unemployment and inflation rates) (See Tang and Lean, 2007)
EARN	=	Per Capita Income (proxy for level of income earnings)
EDU	=	Number of Tertiary Enrolment (proxy for level of education)
MPOP	=	Male population (proxy for sex distribution of the population)
U_t	=	Error Term (Gaussian white noise)
L_n	=	Natural Logarithm

A priori expectation: $\alpha_1, \alpha_4>0; \alpha_2, \alpha_3<0$

Equation (3b) is a static (long-run) model to be estimated with the classical least squares estimation technique. The associated (short-run) error correction model aimed at obtaining the short-run estimates is specified as follows:

$$\Delta LnCR_t=\alpha_0+\alpha_{t-1}\Delta L_nMIS_{t-1}+\alpha_2\Delta L_nEARN_{t-1}+\alpha_3\Delta LnEDU_{t-1}+\alpha_4\Delta L_nMPOP_{t-1}+\alpha_5\Delta ECT_{t-} \quad (3c)$$

Where:
ECT_{t-1} is the one-period lagged value of residual term from the static model (equation 3b), and it is included in the model (3c) as the error correction term. Its coefficient is expected to be negatively signed and statistically significant for it to perform the role of error correction in the model.

3.3. Methodology

This study utilized the method of cointegration and error correction modelling for the investigation. This approach encompasses testing the variables for unit root (in this regard, we utilized the Augmented Dickey-Fuller and Phillip-Person tests) and, if the variables are found to be cointegrated, we shall them estimate an error correction model to capture the short-term dynamic relationship, using the Engle and Granger

[1] Log transformations help to stabilize the variance of a time series, among others (Asteriou and Hall, 2007; Hyndman and Anthanasopoulos 2013).

(1987) two-step procedure. The error correction term in the short-run model indicates the speed of convergence to equilibrium when the equation is shocked or disturbed.

Also, taking into cognizance the relatively lengthy sample size of this study (1981-2015), and in order to avoid producing spurious parameter estimates which may be injurious to policy making, we constructed the structural stability test using the cumulative sum of recursive residual (CUSUM) and the cumulative sum of squares of recursive residual (CUSUMSq).

3.4. The data

The data set for this study comprises annual time series spanning 1981-2015. The variables under consideration are crime rate (CR), Misery Index (MIS), per capita income (EARN), level of Education (EDU) and sex distribution of the population (MPOP). The data for all the variable are obtained from sundry sources including Central Bank of Nigeria Statistical Bulletin, national Bureau of Statistics (NBS),World Development Indications of the World Bank, www.cleeen.org/official crime statistic, among others.

4. RESULTS AND DISCUSSION OF FINDINGS

4.1. Descriptive statistics

Table 1 presents the variables used in the estimation and their features. The Jarque-Bera statistic accepts the null hypothesis of normal distribution at the 5% level of significance for all the variables.

Table 1. Summary Statistics

Variables	Mean	Median	Standard Deviation	Jarque-Bera Statistic	Probability	Obs.
CR	11.9968	12.0459	0.3112	2.2916	0.3179	35
MIS	3.3683	3.3730	0.4915	1.4147	0.4929	35
EDU	1.7046	1.7180	0.5312	1.1243	0.5699	35
MPOP	3.9236	3.9228	0.0027	3.0641	0.2160	35
EARN	6.1143	5.8562	0.6430	2.2960	0.3172	35

Source: Authors' Computation

From the correlation matrix in Table 2, crime rate has a strong negative relationship with EDU (-62%), MPOP (-76%), and EARN (-71%), but a weak positive relationship with MIS (25%). Misery index shows a weak positive relationship with EDU (2%), CR (25) but a weak negative relationship with MPOP (2%) and EARN (20%). Similarly, educational enrolment exhibited a positive relationship with MPOP (94%) and EARN (46%) and MIS (2%), but a negative relationship with CR (-61%).

Both MPOP and EARN exhibited negative relationship with CR and MIS, but a positive relationship with other variables.

Table 2. Correlation Matrix

Variables	CR	MIS	EDU	MPOP	EARN
Crime Rate (CR)	1.0000	0.2516	-0.6153	-0.7659	-0.4104
Misery Index (MIS)	0.2516	1.0000	0.0269	-0.0270	-0.2007
Per Capita Income (EARN)	-0.6153	0.0269	1.000	0.9493	0.4607
Tertiary Enrolment (EDU)	-0.7659	-0.0270	0.9493	1.0000	0.6873
Mare Population (MPOP)	-0.7104	-0.2007	0.4607	0.6873	1.0000

Source: Authors' Computation

4.2. Testing for stationarity

Granger and Newbold (1977) posit that most time variables are non-stationary, and utilizing such non-stationary variables for empirical investigation might produce misleading results. As such, we investigated the time-series properties using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP). the results are presented in table 3. The results reveal that all variables used in this study are I(I) variables, that is stationary after first difference in both the ADF and PP test procedures.

Table 3. ADF and PP Unit Root Tests

Variables	ADF			Phillips-Perron		
	Level	1st Difference	Remark	Level	1st Difference	Remark
CR	-1.6356	-6.4087**	I(1)	-1.5679	-6.6897**	I(1)
MIS	-1.3911	-3.9149*	I(1)	-1.9106	-2.9702*	I(1)
EDU	-2.0263	-6.1979**	I(1)	-2.0470	-5.9752**	I(1)
MPOP	0.6111	-6.2168**	I(1)	-10.1058	3.6731**	I(1)
EARN	-3.3691	-4.6612**	I(1)	-0.6000	-4.6719**	I(1)

*Note: *(**) denote significance at 5% and 1% respectively.*
Source: Authors' Computation

4.3. Testing for cointegration

In a bid to ascertain the existence or otherwise of a stable long-run relationship among the variables under consideration, this study adopts the methodology developed by Johansen (1988), and Johansen and Juselius (1990). This approach is expected to

produce asymptotically optimal estimates since it incorporates a parametric correction, and it does not depend on the method of normalization adopted.

From the cointegration results, both Max-eigen and trace statistics reject the null hypothesis of no cointegration at the 5% level. While Max-eigen indicates the existence of one cointegrating equation, trace statistic shows two cointegrating equation. In the face of such divergences, Johansen and Juselius (1990) recommend the use of trace statistic, since it incorporates all the smallest eigen values. In all, this suggests that a long-run equilibrium relationship exists among the five variables. However, this evidence of long-run relationship does not, in itself, reveal dynamic interrelationship. Such short-run dynamics are captured within an error correction modeling (ECM) framework. Specifically, the ECM helps reveal the speed of convergence to long-run equilibrium in the case of any of the variables in the systems is shocked. Table 4 presents the Johansen co-integration test results.

Table 4. Johansen Co-integration Text Results

Null Hypothesis	Trace Statistic	Critical value at 5%	Max-Eigen Statistic	Critical Value at 5%
$\alpha = 0$	86.5164*	60.0614	44.2504*	30.4396
$\alpha \leq 1$	42.2659*	40.1749	20.5267	24.1592
$\alpha \leq 2$	21.7392	24.2759	13.2442	17.7973
$\alpha \leq 3$	8.4949	12.3209	7.6003	11.2248
$\alpha \leq 4$	0.8945	4.1299	0.8945	4.1299

*Note: α represents at most the number of cointegrating equations and * denotes significance at 5% level.*
Source: Author's Computation

4.4. Dynamic error correction result

Table 5 contains the results of the estimated dynamic error correction model. Following Enders (1995), ordinary least squares (OLS) will give consistent estimates, provided the variable included in the model are stationary.

Results contained in table 5 reveal that the coefficient of the error correction term for the estimated crime rate equation is correctly signed and statistically significant at 1%. The speed of convergence to long-run equilibrium is 76.09%. this suggests that about 76% of the systematic variations in crime rate within the period under consideration is explained by the four explanatory variables in the model, while the remaining 24% can be attributed to other sundry factors not captured in the model.

The coefficient of the misery index is positive and statistically significant, confirming extant findings that the 'twin evil' of unemployment and inflation, as proxied by the misery index, tends to promote crime rate (Elliot and Ellingworth, 1992; Hartung and pessoa, 2000; Khan, Ahmed, Nawaz and Zaman 2015 – for unemployment-crime nexus, and Tang 2004; Adrian, Carmelita and Nestor, 2013 – for

inflation-crime case). This suggests that both the positive motivation effect and the negative opportunity effect of crime exist within the Nigerian economy.

Table 5. Dynamic Error Correction Model. Dependent Variables: DLCR. Sample (Adjusted) 1982-2015

Variables	Coefficient	Standard Error	T-Statistic	Prob
C	0.0076	0.0946	0.0813	0.9360
DLMIS	0.0679	0.0301	2.2547	0.0240
DLMIS(-1)	0.0975	0.0553	1.7625	0.0933
DLEDU	-0.0637	0.0203	-3.1363	0.0029
DLEDU(-1)	0.6372	0.5060	1.2593	0.2224
DLMPOP	-16.1409	496.4528	-0.0325	0.9744
DLMPOP(-1)	-212.5694	455.1002	-0.4670	0.6455
DLEARN	-0.0229	0.1519	-0.1513	0.8812
DLEARN(-1)	-0.0838	0.0331	2.5269	0.0040
ECM(-1)	-0.7609	0.2147	-3.5425	0.0020

R-Squared	*0.6381*
Adjusted R-Squared	*0.4753*
S.E. of Regression	*0.1470*
F-statistic	*3.9198*
Durbin-Watson	*1.972*
Akaike info Criterion	*-0.7345*
Schwarz Criterion	*-0.2675*

Source: Authors' Computation

The coefficient of education was negative and statistically significant at 1% level, confirming extant findings that education helps to raise an individual's skills and abilities, thereby increasing returns to legitimate activities, while raising the opportunity costs of illegal activities. This, ultimately makes people to be risk averse (Buonanno, 2003; Loncherand Moretti, 2003; Lancher, 2007; Iqbal and Jalit, 2010; Khan, et al, 2015). The import of this is that, since low education tends to promote criminal tendencies, designing relevant and effective policies aimed at raising the level of education by the relevant authorities would go a long way in mitigating crime rate.

Furthermore, the coefficient of one-period lagged value of per capita income (a proxy for income earning) was negative and statistically significant at 1% level. Thus, a one percent increase in per capita income (EARN) will cause aggregate crime rates to decline by about 0.08 percent in Nigeria. This negative effect of average income levels on crime rates tends to be at variance with extant findings (Beki, Zeclenberg and Van Mantfort, 1999; Gumus, 2004; and Khan, et al, 2015). Within the Nigerian context, the relatively low average income may cause people to suffer financial hardship which, in turn, may encourage such individuals to commit crimes (Merton, 1957; Cloward and

Ohlin 1960). This suggests that, in the short-run, efforts to reduce crime should include increasing the level of per capita income in the country. Lastly, the coefficient of male population, a proxy for sex distribution of the population, did not have the correct sign, and was statistically insignificant, even at 10% level.

4.5. Stability test

Employing the approach developed by Brown, Durbin and Evans (1975), this study investigated the short-run stability of the parameters in the determinants of crime model using the plots of the cumulative sum of the residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSq).

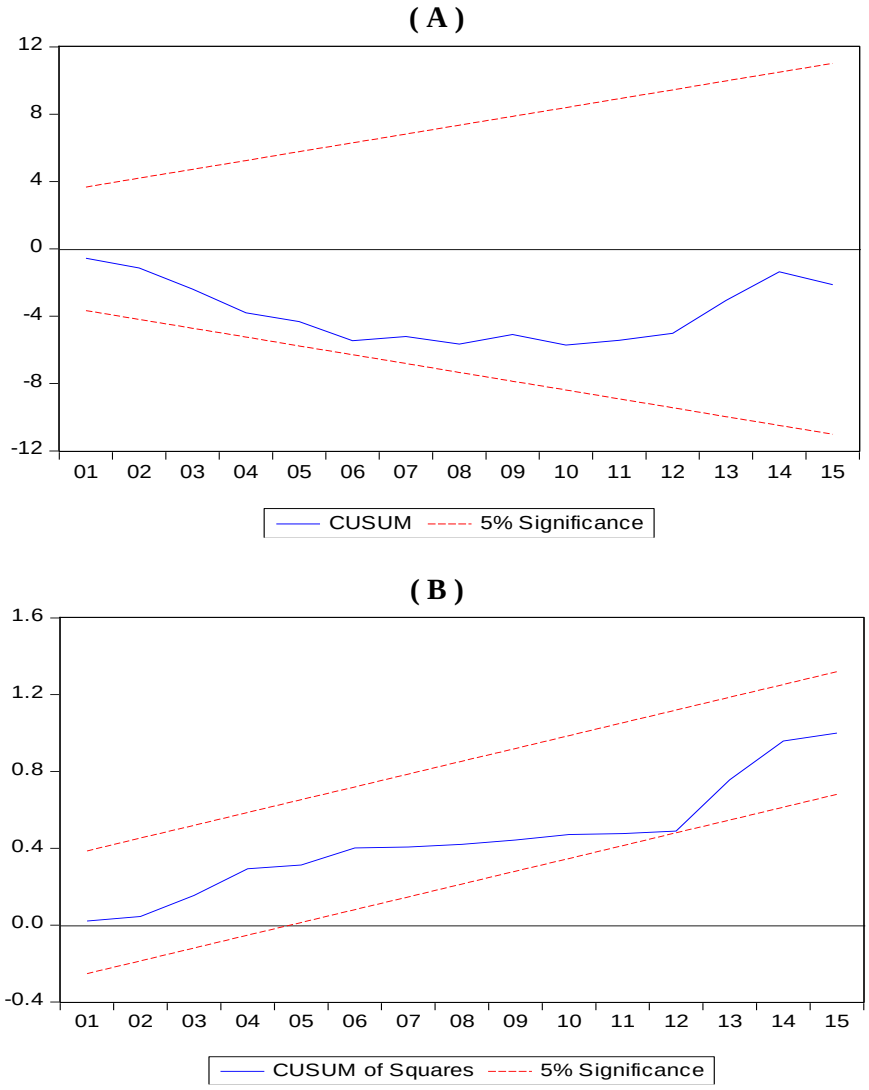

Figure 1. Stability Test using CUSUM and CUSUMsq of residuals

The results from the two tests are presented in figures 1(A) and 1(B) respectively. The existence of parameter instability is established if the CUSUM of the residuals and the CUSUM of squares of the residuals go outside the bands represented by the two critical lines (dotted lines). From the graphs presented in figures (1A) and (1B), both the CUSUM and CUSUMsq of residuals remain within the 5 percent critical line throughout the whole period, thus indicating parameter stability throughout the period of estimation.

5. CONCLUSION AND POLICY RECOMMENDATIONS

The study examined the determinants of crime in Nigeria within the context of Johansen cointegration and a dynamic error correction framework, applying annual data from 1981 to 2015. Results from the study reveal that misery index (a proxy for inflation and unemployment) is positive and statistically significant, while the age structure of the Nigerian society as proxied by the male population within the crime-prone years of 15 to 25, was negative and insignificant.

However, the level of education is negative and statistically significant, suggesting that education not only make people risk averse, but also alter their preferences in indirect ways, a development that may affect their decision to adopt criminal behaviour. Within the Nigerian context, increase in educational enrolment may help to reduce street urchins and crime perpetrators as the school also help to indicate moral values alongside academic learning. The one-period lagged value of average income was negative and statistically significant, indicating that any appreciable increase in the average income (say, minimum wage) in any year, has the tendency of lowering the aggregate crime rate in the subsequent year(s).

In view of the foregoing findings, we make the following specific policy recommendations. First, the relevant authorities should design and implement policy measures aimed at combating the twin macroeconomic evils of unemployment and inflation and ultimately reduce the rising crime rates. Such efforts should be complemented by removing aggregate supply bottlenecks. According to the supply side economists, the problem of unemployment and inflation especially in a developing nation like Nigeria are due largely to constraints on supply.

Second, our empirical finding tends to suggest that, low education is a prime determinant of criminal behaviour within the Nigerian context. Therefore, the authorities concerned should design effective and proper policies aimed at further increasing the level of education and schooling with a view to taming the rising crime rate in the country. Finally, the negative relationship between per capita income (PCI) and crime seems to indicate that as PCI increases on the average in Nigeria, the well-being of every Nigeria is expected to increase and by extension, reduce the incentive to commit crime.

In this regard, the present administration's resolve to diversify the productive base of the Nigerian economy into such sectors as agriculture, etc. with a view to raising the revenue trajectory of the nation should be sustained. Such improved revenue profile, when accompanied with proper income distribution framework, will

go a long way in raising the average income level and also help stem the rising crime rate in the country.

REFERENCES:

[1]. Adrian, M.; Carmelita, C.; Nestor, N. (2013) *Crime and inflation rates in the Philippines: A cointegration analysis*, International Journal of Economics Finance and Managements 2(5), pp. 380-385

[2]. Aminu, U.; Manu, D.; El-Maude, J.G.; Kabiru, M. (2013) *Relationship between crime level, unemployment, poverty, corruption and inflation in Nigeria: An empirical analysis*, Global Advanced Research Journal of Management and Business Studies, 2(8), pp. 411-422

[3]. Asteriou, D.; Hall, S.G. (2007) *Applied Economics*, Palgrave Macmillan Hampshire.

[4]. Becker, G.S. (1968) *Crime and punishment: An economic approach*, Journal of Political Economy, 76, pp. 169-217

[5]. Beki, C.; Zeelenberg, K.; Van Montfort, K. (1999) *An analysis of the crime rate in the Netherlands*, British Journal of Criminology, 39(3), pp. 401-415

[6]. Blackmore, F.L.E. (2003) *A panel data analysis of crime in South Africa*, South Africa Journal of Economic Management Sciences 6(3), pp. 439-458

[7]. Brown, R.L.; Durbin, J.; Evans, M. (1975) *Techniques for testing the constancy of regression relationships overtime*, Journal of the Royal Statistical Society, 37, pp. 149-163

[8]. Buonanno, P. (2003) *The socioeconomic determinants of crime: A review of literature*, Working paper series: Dipartimentodeglistudi di Milano Bicocca, n. 63/2003. http://works.bepress.com/pado-buonnano/14

[9]. Cloward, R.A.; Ohlin, L.E. (1960) *Delinquency and Opportunity – A Theory of Delinquent Gangs*, New York: Free Press

[10]. Edmark, K. (2005) *Unemployment and crime: Is there a connection?*, Scandinavian Journal of Economics, 107(2), pp. 353-373

[11]. Ehrlich, I. (1973) *Participation in illegitimate activities: A theoretical and empirical investigation*, The Journal of Political Economy, 18(3), pp. 307-322

[12]. Elliot, C.; Ellingworth, D. (1992) *The relationship between unemployment and crime: A cross-sectional analysis employing the British crime survey 1992*, International Journal of Power, 16(6/7), pp. 81-82

[13]. Enders, W. (1995) *Applied Econometrics time series*, New York: John Wiley and Sons. Inc.

[14]. Engle, R.F.; Granger, C.W.J. (1987) *Cointegration and error correction: Representation, estimation, and testing*, Econometrica, 55, pp. 391-407

[15]. Gaviria, A.; Pages, C. (2002) *Patterns of crime victimization in Latin American cities*, Journal of Development Economics, 67, pp. 181-203

[16]. Gillani, S.Y.M.; Rehman, H.U.; Gill, A.R. (2009) *Unemployment, poverty, inflation and crime nexus: Cointegration and causality analysis of Pakistan*, Pakistan Economic and Social Review, 47(1), pp. 79-98

[17]. Granger, C.W.J.; Newbold, P. (1977) *The time series approach to econometric model building*, in: Sims, C.A., (ed) New Methods in Business Cycle Research: Proceeding from a conference, Federal Reserve Bank of Minneapolis

[18]. Gumus, E. (2004) *Crime in urban areas: An empirical investigation*, Akdeniz I.I. B.F. Dergisi, 4(7), pp. 98-109

[19]. Halicioglu, F. (2012) *Temporal causality and the dynamics of crime in Turkey*, MPRA Paper no. 41794, Retrieved on 10-10-2016 pp. 1-22

[20]. Hartung, G.; Pessoa, S. (2000) *Demographic factors as determinants of crime rates*, Online available at: www.abep.nepo.unicamp.br/.../docs/sempop07_ 1062.pdf

[21]. Hyndman, R.J.; Athanasopoulos, G. (2013) *Forecasting: principles and practice*, Otexts: Melbourne, Australia. http://otexts.org/fpp/

[22]. Iqbal, M.M.; Jalil, H.H. (2010) *Urbanization and crime: A case study of Pakistan*, A papar presented at the 26th Annual General meeting of PSDE, Pakistan Institute of Development Economics, Islamabad, Pakistan

[23]. Johansen, S. (1988) *Statistical analysis of cointegrating vectors*, Journal of Economic Dynamics and Control, 12, pp. 231-254

[24]. Johansen, S.; Juselius, K. (1990) *Maximum likelihood estimation and inference on cointegration with applications to the demand for money*, Oxford Bulletin of Economics and Statistics, 52, pp. 169-210

[25]. Khan, N.; Ahmed, J.; Nawaz, M.; Zaman, K. (2015) *The socio-economic determinants of crime in Pakistan: New evidence on an old debate*, Arab Economics and Business Journal 10, pp. 73-81

[26]. Kilishi, A.A.; Mobolaji, H.I.; Usman A.; Yakubu, A.T.; Yaru, M.A. (2014) *The effect of unemployment on crime in Nigeria: A panel data analysis*, Journal of Economics, Management and Trade, 4(6), pp. 880-895

[27]. Lancher, L. (2007) *Education and crimes: A review of literature*, University of Western Ontario, Dec.

[28]. Lobont, O.R.; Nicolescu, A.C.; Moldovan, N.C.; Kuloglu, A. (2017) *The effect of socioeconomic factors on crime rates in Romania: A macro-level analysis*, Economic Research – EkonomskaIstrazivanja, 30(1), pp. 91-111

[29]. Loncher, T.; Moretti, E. (2003) *The effect of education on crime: Evidence from prison inmates, arrest, and self-reports*, American Economic Review, 94(1), pp. 155-189

[30]. Masih, A.M.M.; Masih, R. (1996) *Temporal causality and the dynamics of different categories of crime and their socioeconomic determinants: Evidence from Australia*, Applied Economics 28, pp. 1093-1104

[31]. Meera, A.K.; Jayakumar, M.D. (1995) *Determinants of crime in a development country: A regression* model, Applied Economics, 27, pp. 455-460

[32]. Merton, R. (1975) *Social theory and social structure*, New York: Free Press

[33]. Omotor, D.G. (2010) *Demographic and socio-economic determinants of crimes in Nigeria: A panel data analysis*, Journal of Applied Business and Economics, 11(1) Pp. 181-195

[34]. Raphael, S.; Ebmer, W.R. (2001) *Identifying the effect of unemployment on crime*, The Journal of Law and Economics, 44, pp. 259-283

[35]. Tang, C.F. (2009) *The linkages among inflation, unemployment and crime rates in Malaysia*, International Journal of Economics and Management, 3(1), pp. 50-61

[36]. Tang, C.F.; Lean, H.H. (2007) *Will inflation increase crime rate? New evidence from bounds and modified Wald tests*, Global Crime, 8(4), pp. 311-323

[37]. Teles, V.K. (2004) *The Effect of Macroeconomic Policies on Crime*, Economics Bulletin, vol. 11(1), pp. 1-9

Year	GDP/Per Capita	Unemployment	Inflation
1980	871.14	6.4	
1985	334.14	6.1	7.43
1990	321.66	3.5	7.36
1995	335.06	1.9	7.02
2000	377.50	13.1	6.61
2005	804.15	11.9	17.86
2010	1437.04	21.1	13.17
2015	1482.33	26.4	9.01
2016	1510.26	14.2	13.25

Sources: Central Bank of Nigeria Statistical Bulletin (Various Issues); National Bureau of Statistics (2016)