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MODELLING THE EFFECT OF POLICE MOTIVATING FACTORS ON EFFECTIVE CRIME MANAGEMENT IN NIGERIA

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ABSTRACT: This study investigates the relationship between police motivating factors' and the crime rate in Nigeria. The fixed effect panel data model with geopolitical zones and states as dummy variables results indicated the significance of motivating factors aside from logistics and insurance with multiple R-squared values of 76.65%. The random effect panel data model showed every motivating factor was significant with multiple R-squared values of 53.81%. Therefore, based on multiple R squared values, the fixed effect panel data model explained the variations in crime rate better—random effect study. Conclusively, police motivating factors have a significant impact on the crime rate in Nigeria.

KEYWORDS: Crime management, Estimation techniques, Panel data, Crime modelling, Police Motivating factors.

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INTRODUCTION

The development of modern police forces and legal systems has led to crime control (Oikhala [21]). Notwithstanding, crime rates have continued to rise and fall over the years, often in response to social and economic changes (Gokmenoglu *et al.* [9]). In the 20th century, the world saw an increase in organized crime as criminal groups began to operate across borders and use sophisticated methods to carry out their activities (Griffiths & Norris [11]; Van Dijk *et al*. [25]). The rise of the internet and digital technology has also led to the rise of brand-new criminal behaviours such as cybercrime and identity theft (Curtis & Oxburgh [6]). According to David and Donna [7] and Kayira [15], crime remains a major challenge for societies around the world despite governments and law enforcement authorities constantly coming up with new tactics and technologies to prevent and combat crime, but the problem persists, and new forms of crime continue to emerge.

In the Nigerian context, Okolie-Osemene [22] states that not only have criminal activities continued to soar astronomically over the past few years, but it has also equally grown in sophistication. The conclusion of Greenberg [10], who developed the Crime-Unemployment model, and Ordu and Nnam [23], who posited that more police officers on the streets would decrease most sorts of crime, nationally failed in Nigeria's situation. As well, a hypothesis was put forth by Liska and Bellair [17] that racial composition has a considerable impact on the variation in violent crime rates between 1980 and 1990 but has a negligible impact on rate variations over the preceding three decades. Therefore, a critical review of Nigerian crime determinants based on the works of Omotor [20], İmrohoroğlu *et al*. [13], Kuhe [16], Adekoya and Abdul-Razak [2], Igbinedion and Ebomoyi [12], Oyelade [24], Adeyemi *et al.* [1], Ajide [3], Nyen and Ejue [19], and Alabi and Abubakar [4] essentially indicated education, unemployment rate, population density, index, gross national income (GNI), the proportion of the male population (PMP), age 18-35 years, and policing system age distribution of states, population growth rates, gender (the proportion of men or women in the labour force), urbanization, racial diversity, immigration, and population density are all significant factors. Despite identifying these factors, crimes of several forms continue to rise in Nigeria. But in another vein, police motivation that should have served as an effective strategy to improve crime control and management in Nigeria has been limited by several factors, as documented in the works of Aniekwu [5], Karimu [14], Eke [8], Oikhala [21] and Ndubueze *et al.* [18].

Despite these shortcomings, this study will analyse how well-laid police motivating factors can be an effective crime management tool in Nigeria. In line with the preceding, this study intends to investigate how carefully factored police motivating factors, including police strength, logistics, insurance, training, salary, and promotion affect the rate of crime in Nigeria. Time and cross-sectional datasets based on the above factors will be analysed using panel data estimation techniques based on mixed effects models consisting of Random Effect (RE) and Fixed Effect (FE).

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MATERIALS AND METHODS

Model Specification

Panel data, a subset of longitudinal data, involves observations over multiple periods for the same subjects. The model specification explains variations across time and individuals, ranging from Fixed-effects to Random-effects models. The model is specified as

$$Y = f(x_1, x_2, \dots, x_k) + \varepsilon \quad (1)$$

where Y is the response variable, $x_1, x_2, \dots, x_k$ are the explanatory variables and ε is the error term with a mean of zero and variance σ^2, i.e., $\varepsilon \sim N(0, \sigma^2)$.

The Linear panel data regression model can be expressed as

$$Y_{it} = \alpha_i + \beta X'_{it} + \varepsilon_{it}, i = 1,2, \dots, N; t = 1,2, \dots, T \quad (2)$$

The error term is defined as

$$\varepsilon_{it} = U_{it} + V_{it} \quad (3)$$

where U_{it} is the individual-specific error that does not vary over time, V_{it} is the idiosyncratic error which varies across time and individuals.

The model in Equation (2) can be rewritten as

$$Y_{it} = \beta' X_{it} + (\alpha_i + U_{it}) + V_{it} \quad (4)$$

Pooled Ordinary Least Squares (POLS)

POLS treats the data as a simple cross-section and ignores the panel structure. It disregards the individual entity effects, α_i and estimates the model as

$$y_{it} = \beta' X_{it} + u_{it} \quad (5)$$

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where $u_{it} = \alpha_i + \varepsilon_{it}$. The POLS estimator of β is obtained by minimizing the sum of squared residuals and this gives

$$I\hat{\beta} = (X'X)^{-1}(X'y) \quad (6)$$

Fixed-Effects Estimation Technique

Fixed effect is used when the entity-specific effects, α_i are correlated with the explanatory variables X_{it}. This is defined as

$$y_{1t} - \underline{y_i} = \left(\beta' X_{1t} - \beta' \underline{X_i}\right) + \left(\varepsilon_{1t} - \underline{\varepsilon_i}\right) \quad (7)$$

The FE estimation of β is obtained by minimizing the sum of squared residuals of the demeaned model and this gives

$$\beta_{FE} = \left[\left(X - \underline{X}\right)'\left(X - \underline{X}\right)\right]^{-1}\left(X - \underline{X}\right)'\left(Y - \underline{Y}\right) \quad (8)$$

Random Effects Estimation Technique

A random effect is used when the entity-specific effects X_i are uncorrelated with the explanatory variables X_{1t}. The Random equation model is expressed as

$$y_{1t} = \alpha + \beta' X_{1t} + U_i + \varepsilon_{1t} \quad (9)$$

where α is the average entity effects, $U_i = \alpha_i - \alpha$ is the entity-specific deviation from the average. The Random effect of the estimator of β is obtained by the Generalized Least Squares (GLS).

Mixed-Effect Models

The basic form of a mixed-effects model is written as

$$Y_{ij} = \beta_0 + \beta_1 * X_{ij} + u_i + \varepsilon_{ij} \quad (10)$$

where Y_{ij} is the dependent variable for subject i at time j, X_{ij} is an independent variable for subject i at time j, β_0 and β_1 are fixed effects (the intercept and the slope of the regression line, respectively), u_i is a random effect for subject i, and ε_{ij} is the error term for subject i at time j. The mixed-effects model is given as

$$Y_{ij} = \beta_0 + \beta_1 * X_{1ij} + \beta_2 * X_{2ij} + \ldots + \beta_p * X_{pij} + (u_{0i} + u_{1i} * X_{1ij} + u_{2i} * X_{2ij} + \ldots + u \quad (11)$$

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RESULTS AND DISCUSSION

The efficiency and performance of the Fixed/Random effect models were ascertained using crime data for the six (6) Geo-political zones and the thirty-six (36) states including the Federal Capital Territory (FCT) in Nigeria from 2004 to 2019. The explanatory variables are police strength [POS], insurance [INS], logistics [LOS], training [TRN], promotion [PRO] and salary [SAL]

The fixed-effect model result is displayed in Table 1 and geo-political zones were used as dummy variables. The model obtained is given as

$$CRM_{it} = 1.027POS + 0.00019INS + 0.000115LOS + 0.7457TRN + 0.5361PRM - 0.00000476SAL \quad (12)$$

The R-square value of 0.6278 indicates that about 62.78 percent of the total variation in crime rate is explained by the variations in police strength (POS), insurance (INS), logistics (LOS), training (TRN), promotion (PRM), salary (SAL), North Central, North East, North West, South East, South-South and South West. The F value and corresponding p-value of 81.53 and < 2.2e-1 respectively indicate that the model is statistically significant.

Table 1: Fixed Effect Model with Geo-political Zones (regions) as Dummy Variables

	Estimate	Std. Error	t value	Pr(>|t|)
POS	1.027e+00	8.938e-02	11.486	< 2e-16 ***
INS	1.891e-04	4.524e-05	4.179	3.38e-05 ***
LOS	1.256e-04	7.203e-05	1.744	0.08165
TRN	7.457e-01	1.583e-01	4.710	3.10e-06 ***
PRM	5.361e-01	1.763e-01	3.041	0.00246 **
SAL	-4.765e-06	1.902e-06	-2.505	0.01251 *
factor (Region)North Central	-6.080e+03	6.361e+02	-9.558	< 2e-16 ***
factor (Region)North East	-4.870e+03	6.122e+02	-7.955	9.45e-15 ***
factor (Region)North West	-6.836e+03	6.138e+02	-11.138	< 2e-16 ***
factor (Region)South East	-5.436e+03	6.599e+02	-8.237	1.17e-15 ***
factor (Region)South South	-6.837e+03	6.772e+02	-10.095	< 2e-16 ***
factor (Region)South West	-4.658e+03	7.866e+02	-5.922	5.46e-09 ***

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Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1				
Residual standard error: 5047 on 580 degrees of freedom				
Multiple R-squared: 0.6278, Adjusted R-squared: 0.6201				
F-statistic: 81.53 on 12 and 580 DF, p-value: < 2.2e-16				

The regression coefficient for police strength in Table 1 indicates a positive significant effect of police strength on crime rate. The standard error of 0.08938 indicates that there is an 8.939% chance that the true coefficient is zero. This implies that for every additional police strength, the crime rate increases by 1.027. The regression coefficient for insurance (β_2=1.891e-04, p<0.000) indicates that there is a positive significant effect of insurance on the crime rate. The standard error of 0.0000452 indicates that there is a 0.00452% chance that the true coefficient is zero. This implies that for every additional insurance, the crime rate increases by 0.0001981. The regression coefficient for logistics (β_3=1.256e-04, p=0.08165) indicates that there is a positive insignificant effect of logistics on the crime rate. The standard error of 0.00007203 indicates that there is a 0.007203% chance that the true coefficient is zero. This implies that for every additional logistics, the crime rate increases by 0.0001256. The regression coefficient for training (β_4=7.457e-01, p<0.000) indicates that there is a positive significant effect of training on the crime rate. The standard error of 0.1583 indicates that there is a 15.83% chance that the true coefficient is zero. This implies that for every additional training, the crime rate increases by 0.7457. The regression coefficient for promotion (β_5=5.361e-01, p=0.00246) indicates that there is a positive significant effect of promotion on the crime rate. The standard error of 0.1763 indicates that there is a 17.63% chance that the true coefficient is zero. This implies that for every additional promotion, the crime rate increases by 0.5361. The regression coefficient for salary (β_6=-4.765e-06, p=0.01251) indicates that there is a negative significant effect of salary on the crime rate. The standard error of 0.000001902 indicates that there is a 0.0001902% chance that the true coefficient is zero. This implies that for every additional salary, the crime rate decreases by 0.000004765.

The regression coefficient for north central (β=-6.080e+03, p<0.000) indicates that there is a negative significant effect of north central on the crime rate. The regression coefficient for the northeast (β=-4.870e+03, p<0.000) indicates that there is a negative significant effect of the northeast on the crime rate. The regression coefficient for the northwest (β=-5.436e+03, p<0.000) indicates that there is a negative significant effect of the northwest on the crime rate. The regression coefficient for the southeast (β=-5.436e+03, p<0.000) indicates that there is a negative significant effect of the southeast on the crime rate. The regression coefficient for south-south (β=-6.837e+03, p<0.000) indicates that there is a negative significant effect of south-south on the crime rate. The regression coefficient for southwest (β=-4.658e+03, p<0.000) indicates that there is a negative significant effect of the southwest on the crime rate.

Table 2 is used to show the result of the fitted fixed effect model with states as dummy variables. The model obtained is given as

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$$CRM_{it} = 0.6061POS + 0.0000738INS - 0.000293LOS + 0.3549TRN + 0.3823PRM - 0.00000484SAL \quad (13)$$

The R-square value of 0.7565 indicates that about 75.65 percent of the total variation in crime rate is explained by the variations in police strength (POS), insurance (INS), logistics (LOS), training (TRN), promotion (PRM) and salary (SAL) in Abia, Abuja, Adamawa, Akwa-Ibom, Anambra, Bauchi, Bayelsa, Benue, Borno, Cross River, Delta, Ebonyi, Edo, Enugu, Gombe, Imo, Jigawa, Kaduna, Kano, Katsina, Kebbi, Kogi, Kwara, Lagos, Nasarawa, Niger, Ogun, Ondo, Osun, Oyo, Plateau, Rivers, Sokoto, Taraba, Yobe and Zamfara. The F-value and corresponding p-value of 39.67 and < 2.2e-16 respectively indicate that the model is statistically significant. The regression coefficient for police strength (β_1=6.061e-01, p<0.000) indicates that there is a positive significant effect of police strength on crime rate. The standard error of 0.08674 indicates that there is an 8.67% chance that the true coefficient is zero. This implies that for every additional police strength, the crime rate increases by 0.06061. The regression coefficient for insurance (β_2=7.385e-05, p=0.06469) indicates that there is a positive insignificant effect of insurance on the crime rate. The standard error of 0.00003989 indicates that there is a 0.003989% chance that the true coefficient is zero. This implies that for every additional insurance, the crime rate increases by 0.00007385. The regression coefficient for logistics (β_3=-2.934e-04, p=0.00021) indicates that there is a positive significant effect of logistics on the crime rate. The standard error of 0.00007863 indicates that there is a 0.007863% chance that the true coefficient is zero. This implies that for every additional logistics, the crime rate decreases by 0.0002934. The regression coefficient for training (β_4=3.549e-01, p=0.01024) indicates that there is a positive significant effect of training on the crime rate. The standard error of 0.1377 indicates that there is a 13.77% chance that the true coefficient is zero. This implies that for every additional training, the crime rate increases by 0.3549. The regression coefficient for promotion (β_5=3.823e-01, p=0.00983) indicates that there is a positive significant effect of promotion on the crime rate. The standard error of 0.1475 indicates that there is a 14.75% chance that the true coefficient is zero. This implies that for every additional promotion, the crime rate increases by 0.3823. The regression coefficient for salary (β_6=-4.840e-06, p=0.00240) indicates that there is a negative significant effect of salary on the crime rate. The standard error of 0.000001587 indicates that there is a 0.0001587% chance that the true coefficient is zero. This implies that for every additional salary, the crime rate decreases by 0.00000484.

The regression coefficient for Kano (β=3.991e+03, p<0.000) indicates that there is a positive significant effect of Kano on the crime rate. The regression coefficient for Lagos (β=3.288e+04, p<0.000) indicates that there is a positive significant effect of Lagos on the crime rate. The regression coefficient for Oyo (β=3.961e+03, p=0.00789) indicates that there is a positive significant effect of Oyo on the crime rate.

The non-significance of logistics in the fixed effect method could be attributable to the disinterestedness of most officers in matters concerning logistics. This is deplorably so because the logistics often distributed are meagre, seldom sufficient and capture less than thirty (40%) of the members of the Force.

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Table 2: Fixed Effect Model with States as Dummy Variable

Coefficients	Estimate	Std. Error	t value	Pr(>|t|)
POS	6.061e-01	8.674e-02	6.988	8.12e-12 ***
INS	7.385e-05	3.989e-05	1.851	0.06469.
LOS	-2.934e-04	7.863e-05	-3.731	0.00021 ***
TRN	3.549e-01	1.377e-01	2.576	0.01024 *
PRM	3.823e-01	1.475e-01	2.591	0.00983 **
SAL	-4.840e-06	1.587e-06	-3.050	0.00240 **
factor(States)Abia	-4.947e+02	1.160e+03	-0.426	0.67001
factor(States)Abuja	-1.318e+03	1.422e+03	-0.927	0.35425
factor(States)Adamawa	-1.836e+01	1.165e+03	-0.016	0.98744
factor(States)Akwa Ibom	-1.592e+02	1.385e+03	-0.115	0.90853
factor(States)Anambra	2.142e+02	1.241e+03	0.173	0.86296
factor(States)Bauchi	-9.380e+01	1.200e+03	-0.078	0.93770
factor (States)Bayelsa	-4.223e+02	1.199e+03	-0.352	0.72479
factor (States)Benue	4.959e+01	1.263e+03	0.039	0.96869
factor (States)Borno	-5.662e+02	1.292e+03	-0.438	0.66139
factor (States)Cross River	-2.726e+02	1.329e+03	-0.205	0.83761
factor (States)Delta	2.582e+03	1.361e+03	1.897	0.05841
factor (States)Ebonyi	-3.668e+02	1.171e+03	-0.313	0.75421
factor (States)Edo	-1.051e+03	1.241e+03	-0.847	0.39750
factor (States)Ekiti	-6.410e+02	1.156e+03	-0.555	0.57936
factor (States)Enugu	4.585e+01	1.245e+03	0.037	0.97064
factor (States)Gombe	-6.504e+02	1.109e+03	-0.586	0.55781
factor (States)Imo	5.284e+02	1.259e+03	0.420	0.67490
factor (States)Jigawa	-1.560e+03	1.125e+03	-1.387	0.16609

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factor (States)Kaduna	-1.455e+03	1.650e+03	-0.882	0.37830
factor (States)Kano	3.991e+03	1.432e+03	2.787	0.00551 **
factor (States)Katsina	-9.775e+02	1.259e+03	-0.776	0.43793
factor (States)Kebbi	-8.120e+02	1.181e+03	-0.687	0.49210
factor (States)Kogi	-1.392e+03	1.167e+03	-1.193	0.23348
factor (States)Kwara	-2.618e+02	1.158e+03	-0.226	0.82119
factor (States)Lagos	3.288e+04	3.293e+03	9.985	< 2e-16 ***
factor (States)Nassarawa	-5.902e+02	1.284e+03	-0.460	0.64586
factor (States)Niger	-1.174e+03	1.281e+03	-0.917	0.35959
factor (States)Ogun	6.406e+02	1.683e+03	0.381	0.70358
factor (States)Ondo	6.188e+02	1.294e+03	0.478	0.63280
factor (States)Osun	4.089e+02	1.202e+03	0.340	0.73381
factor (States)Oyo	3.961e+03	1.485e+03	2.667	0.00789 **
factor (States)Plateau	3.900e+02	1.139e+03	0.343	0.73208
factor (States)Rivers	-1.955e+02	1.366e+03	-0.143	0.88624
factor (States)Sokoto	4.440e+02	1.365e+03	0.325	0.74508
factor (States)Taraba	6.065e+01	1.198e+03	0.051	0.95964
factor (States)Yobe	-6.206e+02	1.142e+03	-0.543	0.58707
factor (States)Zamfara	-7.234e+02	1.169e+03	-0.619	0.53640
Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1				
Residual standard error: 4195 on 549 degrees of freedom				
Multiple R-squared: 0.7565, Adjusted R-squared: 0.7375				
F-statistic: 39.67 on 43 and 549 DF, p-value: < 2.2e-16				

Table 3 is used to show the one-way (individual) effect within model estimation results. The model obtained is given as

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$$CRM_{it} = 1.0267POS + 0.000189INS + 0.000125LOS + 0.7457TRN + 0.536PRM + 0.00000476SAL \quad (14)$$

The R-square value of 0.4905, which is the coefficient of multiple determination, indicates that about 49.05 percent of the total variation in crime rate is explained by the variations in police strength (POS), insurance (INS), logistics (LOS), training (TRN), promotion (PRM) and salary (SAL). The F-value and corresponding p-value of 93.06 and < 2.2e-16 respectively indicate that the model is statistically significant. The regression coefficient for police strength (β_1=1.067e+00, p<0.000) indicates that there is a positive significant effect of police strength on crime rate. The standard error of 0.08935 indicates that there is an 8.935% chance that the true coefficient is zero. This implies that for every additional police strength, the crime rate increases by 1.0267. The regression coefficient for insurance (β_2=1.8906e-04, p<0.000) indicates that there is a positive significant effect of insurance on the crime rate. The standard error of 0.00004524 indicates that there is a 0.004542% chance that the true coefficient is zero. This implies that for every additional insurance, the crime rate increases by 0.00018906. The regression coefficient for logistics (β_3=1.2563e-04, p=0.0816) indicates that there is a positive insignificant effect of logistics on the crime rate. The standard error of 0.00007202 indicates that there is a 0.007202% chance that the true coefficient is zero. This implies that for every additional logistics, the crime rate increases by 0.0001256. The regression coefficient for training (β_4=7.4568e-01, p<0.000) indicates that there is a positive significant effect of training on the crime rate. The standard error of 0.1583 indicates that there is a 15.83% chance that the true coefficient is zero. This implies that for every additional training, the crime rate increases by 0.7456. The regression coefficient for promotion (β_5=5.361e-01, p=0.00246) indicates that there is a positive significant effect of promotion on the crime rate. The standard error of 0.17628 indicates that there is a 17.45% chance that the true coefficient is zero. This implies that for every additional promotion, the crime rate increases by 0.5361. The regression coefficient for salary (β_6=-4.7654e-06, p=0.0125) indicates that there is a positive significant effect of salary on the crime rate. The standard error of 0.000001902 indicates that there is a 0.00019% chance that the true coefficient is zero. This implies that for every additional salary, the crime rate decreases by 0.00000.

Table 3: One Way (Individual) Effect within Model

Coefficients	Estimate	Std. Error	t-value	Pr(>|t|)
POS	1.0267e+00	8.9385e-02	11.4858	< 2.2e-16 ***
INS	1.8906e-04	4.5241e-05	4.1790	3.380e-05 ***
LOS	1.2563e-04	7.2028e-05	1.7442	0.081652.
TRN	7.4568e-01	1.5831e-01	4.7101	3.102e-06 ***
PRM	5.3610e-01	1.7628e-01	3.0411	0.002463 **
SAL	-4.7654e-06	1.9021e-06	-2.5053	0.012508 *

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Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '
Total Sum of Squares: 2.8992e+10
Residual Sum of Squares: 1.4771e+10
Multiple R-Squared: 0.49051
Adj. R-Squared: 0.48085
F-statistic: 93.0653 on 6 and 580 DF, p-value: < 2.22e-16

Table 4 is used to display the random effect model estimation result. The model obtained is given as

$$CRM_{it} = -5992 + 1.023POS + 0.000193INS + 0.000141LOS + 0.7587TRN + 0.5411PRM + 0.00000488SAL \quad (15)$$

The R-square value of 0.5381, which is the coefficient of multiple determination, indicates that about 53.81 percent of the total variation in crime rate is explained by the variations in police strength (POS), insurance (INS), logistics (LOS), training (TRN), promotion (PRM) and salary (SAL). The Chi-square value and corresponding p-value of 681.593 and < 2.2e-16 respectively indicate that the model is statistically significant.

The regression coefficient for police strength (β_1=-5.922e+03, p<0.000) indicates that there is a positive significant effect of police strength on the crime rate. The standard error of 0.08923 indicates that there is an 8.923% chance that the true coefficient is zero. This implies that for every additional police strength, the crime rate increases by 1.0236. The regression coefficient for insurance (β_2=1.0236e-04 p<0.000) indicates that there is a positive significant effect of insurance on the crime rate. The standard error of 0.00004553 indicates that there is a 0.0045% chance that the true coefficient is zero. This implies that for every additional insurance, the crime rate increases by 0.000019. The regression coefficient for logistics (β_3=1.9353e-04, p<0.000) indicates that there is a positive insignificant effect of logistics on the crime rate. The standard error of 0.00007083 indicates that there is a 0.00708 chance that the true coefficient is zero. This implies that for every additional logistics, the crime rate increases by 0.0001416. The regression coefficient for training (β_4=7.5869e-01, p<0.000) indicates that there is a positive significant effect of training on the crime rate. The standard error of 0.1596 indicates that there is a 15.96% chance that the true coefficient is zero. This implies that for every additional training, the crime rate increases by 0.7586. The regression coefficient for promotion (β_5=5.4113e-01, p=0.002378) indicates that there is a positive significant effect of promotion on the crime rate. The standard error of 0.17809 indicates that there is a 17.890% chance that the true coefficient is zero. This implies that for every additional promotion, the crime rate increases by 0.5411. The regression coefficient for salary (β_6=-4.8898e-06, p=0.0125) indicates that there is a positive significant effect of salary on the crime rate. The standard error

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of 0.00000192 indicates that there is a 0.00019% chance that the true coefficient is zero. This implies that for every additional salary, the crime rate decreases by 0.00000488.

Table 4: Random Effect Model

Coefficients	Estimate	Std. Error	z-value	Pr(>|z|)
(Intercept)	-5.9220e+03	4.4367e+02	-13.3478	< 2.2e-16 ***
POS	1.0236e+00	8.9233e-02	11.4713	< 2.2e-16 ***
INS	1.9353e-04	4.5531e-05	4.2505	2.133e-05 ***
LOS	1.4165e-04	7.0835e-05	1.9998	0.045522 *
TRN	7.5869e-01	1.5960e-01	4.7539	1.996e-06 ***
PRM	5.4113e-01	1.7809e-01	3.0384	0.002378 **
SAL	-4.8898e-06	1.9209e-06	-2.5455	0.010912 *
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 '' 1				
Total Sum of Squares: 3.294e+10				
Residual Sum of Squares: 1.5214e+10				
R-Squared: 0.53813, Adj. R-Squared: 0.53339				
Chisq: 681.593 on 6 DF, p-value: < 2.22e-16				

CONCLUSION

This study aimed to investigate the impact of police motivating factors on the crime rate in Nigeria using fixed and random effect panel data regression estimation models. The fixed effect models with geopolitical zones and states as dummy variables, and one-way individual effect within model results indicated that most of the motivating factors were significant, apart from logistics and insurance for the models with geopolitical zones and states as s variables, respectively. The multiple R-squared values for these ranged from 0.49051 to 0.6278, indicating that 49.05% to 62.78% of the variations in crime rate were explained by the motivating factors. The random effect model showed that all motivating factors were significant, with the Chi-square statistic and p-value indicating a statistically significant relationship between the motivating factors and crime rate. The fixed effect model indicated a multiple R squared value of 0.7565 accounting for 75.65 of variations in crime rate over a random effect study. Conclusively, the results from the study indicated that police motivating factors, such as salary, insurance, promotions, police strength, training and logistics have significant impacts on crime rate. The negative relationship between these factors and the crime rate suggests that when police officers are adequately motivated, they are more effective in controlling and preventing crime. This highlights the importance of investing in the welfare,

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training, and resources of the police force to enhance their capacity to combat crime, thereby contributing to a safer society.

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