Asian Journal of Empirical Research
Volume 13, Issue 2 (2023): 41-50.

http://www.aessweb.com/journals/5004

Good governance and poverty alleviation in the CEMAC sub-region: A fixed effect model with driscoll-kraay standard errors technique

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Article History
Received: 9 May 2023
Revised: 26 June 2023
Accepted: 4 July 2023
Published: 31 July 2023

Keywords
CEMAC
Corruption
Governance
Household consumption expenditure
Political stability
Poverty alleviation.

ABSTRACT
Good governance is paramount for the government of each country to reduce poverty and achieve their growth objectives. However, due to corruption, political instability, and government ineffectivesness, the quality of governance indicators has fail in most countries expecially those in the Central African Economic and Monetary Community (CEMAC). Thus, the objective of this study was to examine the effect of good governance on poverty reduction in the CEMAC sub-region using World Bank data from 1996 to 2021. Due to multicollinearity and parsimonious model, four governance indicators were examine in the study; voice and accountability (vacc), government effectiveness, corruption, and political stability while household consumption expenditure (HCE) was use as a measure of poverty allevation. The study face the problem of cross-sectional dependence and heteroscedasticity. Hence, it employs the fixed effect model with Driscoll-Kraay standard errors regression. The results indicate that vacc and government effectiveness have a positive and significant impact on poverty reduction while corruption and political stability have a negative effect. This indicates that good governance is vital in reducing poverty and boosting the livelihood of the population in CEMAC sub region. The study recommends that CEMAC member countries should step up the quality of their governance indicators such as eradication of corruption, effectiveness in governance, and adopts results based financing.

Contribution/Originality: The paper present the first quantitative evaluation of governance indicators and their effect on poverty alleviated in the CEMAC sub-region. A key ingredient is also the use of household consumption expenditure as a measure of poverty alleviation in panel analysis.

DOI: 10.55493/5004.v13i2.4831
ISSN(P): 2306-983X/ ISSN(E): 2224-4425

How to cite: Ewane, E. B. (2023). Good governance and poverty alleviation in the CEMAC sub-region: A fixed effect model with driscoll-kraay standard errors technique. *Asian Journal of Empirical Research, 13*(2), 41–50. 10.55493/5004.v13i2.4831

1. BACKGROUND

The nexus between good governance and poverty alleviation is not new but remains a subject of discussion that will hardly wear out in empirical literature as indicators of good governance are diverse. The Copenhagen World Social Summit in 1995 acknowledged poverty as a major hazard to the future of humanity (Anyang, 2001). Hence, poverty reduction and inclusive growth is necessary to reach the United Nations Sustainable Development Goals (Ferreira, Salvucci, & Tarp, 2023). poverty is a global issue as nearly half of the world's population depends on less than $2.50 a day (Shah, 2013). The African continent has the majority of poor countries and has been considered the poorest continent in the world for several decades despites abundant natural resources (Joshua, 2017).

The poverty situation in the CEMAC region is even more precarious as 45% of the majority of children and adults suffer from extreme poverty while living on less than $1 a day (Noula, Deffo, & Zoatsa, 2020). The living standard, poor health care, water, sanitation, and education depicts the nature of poverty in these countries. Governance indicators such as corruption and accountability are key setbacks to poverty alleviation in the region. The Figure 2 shows the corruption estimates for CEMAC member countries where the values range from 0 to -2. (Cooray, 2009) actual estimates range from -2.5 to +2.5 with higher values signifying good governance. All country's estimates from the figure are below zero indicating poor governance which hinders consumption and hence poverty reduction. The growth rate in HCE as a measure of poverty reduction is not significant except for Central Africa Republic (CAR) which witness a significant growth rate in HCE in 2018 reaching up to 49.8% (see Figure 1).

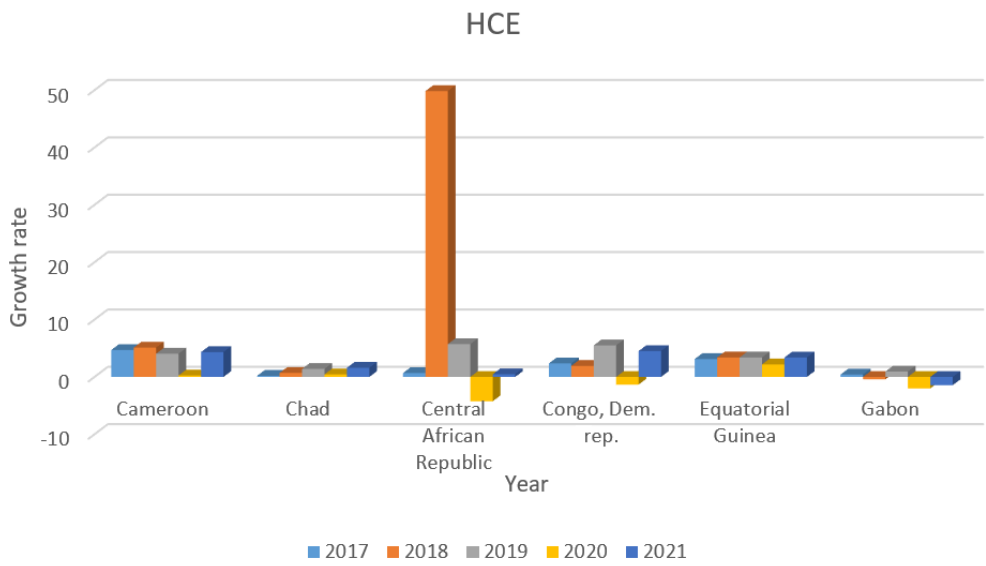

Figure 1. Household consumption expenditure for CEMAC member countries.

The 2020 United Nation development program (UNDP) report also indicates that the most developed CEMAC country according to the human development index (HDI) is Gabon with HDI of 0.706 while Chad is the least with HDI of 0.394(see Table 1).

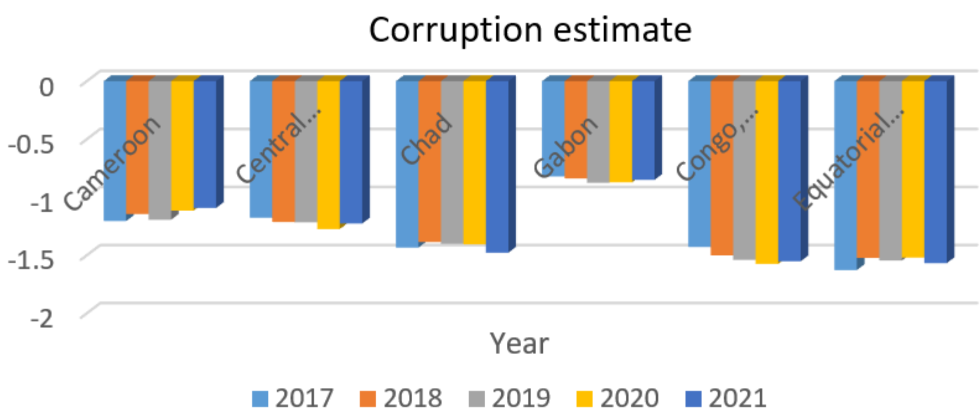

Figure 2. Corruption estimate for CEMAC member countries.

Most of the countries have rich mineral wealth like gold, uranium, deposits of oil, natural gas, diamonds, and manganese but for lack of private investment and technical expertise, most of these natural resources have not been exploited aside from oil and timber which is the second largest community export product. With the exception of the CAR, crude petroleum alone accounts for 86% of community export, 61% of Congo's gross domestic product (GDP), 50% of Gabon, 40% of Chad, and nearly 10% of Cameroon (WTO, 2011).

Table 1. UNDP HDI for CEMAC countries 2021.

Country	HDI	Category
Gabon	0.706	High HDI
Cameroon	0.576	Medium HDI
Equatorial guinea	0.596	Medium HDI
Congo	0.571	Medium HDI
Central Africa Republic	0.404	Low HDI
Chad	0.394	Low HDI

The key question is why these countries remain very poor despite abundant natural resources. Perhaps the government of these countries have failed in the quality of their governance due to the self-interest motive of government officials which has exacerbated poverty. Good governance is essential in driving out poverty and increasing the livelihood of the population. However, the performance of governance quality in the CEMAC member countries are far fetch (Bouanza & Ngassa, 2021). Indicators of governance have also performed poorly in these countries compared to their counterparts (Kaufmann, Kraay, & Mastruzzi, 2010). The persistence of poor performance in governance indicators in CEMAC member countries comes as a result of political leaders, administrators, bureaucrats, and parliamentarians whose motives are self-interest (Noula et al., 2020). In this region, there is budget indiscipline which leads to poor budget execution due to political interference in the budget implementation. Hence, the poor budget execution of the government of these countries increases the poverty rate as executors snip a percentage into their private pockets (Ewane & Elvis, 2023). The budget execution does not also confirm to set priorities of the governments poverty reduction strategy. Hence, the cost of construction is usually more expensive than one can ever envisage. For instance in Chad, classroom construction is four times more costly than in other countries while Cameroon has dilapidating health conditions but spends about $50 per capita annually on health (Devarajan & Singh, 2003). The infrastructural maintenance cost of these countries is sometimes more costly than the cost of first-hand construction. In Cameroon and Congo, only about a quarter of contracts go through the procurement system (Devarajan & Singh, 2003). Kenny (2007) indicates that the major barrier related to procurement and construction quality in Cameroon is corruption.

Though the CEMAC countries are endowed with abundant natural resources, the inhabitants have not benefited to their full capacity. Thus, this research aims to examine the effect of Kaufmann, Kraay, and Mastruzzi (2006) governance indicators on poverty alleviated in the CEMAC sub-region. The paper contributes to empirical literature by examining some key indicators of governance and how they affect poverty alleviation which is absent in the CEMAC sub region. A key ingredient is also the use of household consumption expenditure as a measure of poverty alleviation in panel analysis.

2. LITERATURE REVIEW

2.1. Theoretical Literature

This study borrows the idea of Cooray (2009) whose study rests on the augmented neoclassical model written by Solow (1956) and inspired the empirical studies of Mankiw, Romer, and Weil (1992) which is popularized as the Mankiw-Romer-Weil (MRW) model. The function, which embodies the quality of governance is of the Cobb-Douglass production equation which is of the form;

$$y_t = k_t^{\alpha} H_t^{\beta} (A_t L_t)^{1-\alpha-\beta} (\text{g}(\text{t}) e^{\mu\theta})^{y} \quad (1)$$

Where y_t is real output per worker, K is the physical capital stock, H is human capital stock per worker, L represent supply of labor, A reflects technology level, and t refers to the time in years. $(1-\alpha-\beta)$ is the elasticity of income per unit of effective work. The government size is g(t), which is measured by government capital stock per worker, and θ measures the government quality. In steady state, L which depends on technological progress and n which is labour force growth rate incrase based on government size and both have an exogenous growth rate. Capital stock (Physical and human) rate of depreciation is δ while S^k, S^g and S^h are the income proportions invested in human, private, and public capital respectively. The output per capita in a steady state can be express in log-linear form as follows;

$$\text{In}\ [\text{y(t)}] = b_0 + b_1 \text{In}[\frac{s^k}{n+\partial+\varphi}] + b_2 \text{In}[\frac{s^g}{n+\partial+\varphi}] + b_3 \text{In}[\frac{s^h}{n+\partial+\varphi}] + b_4 \emptyset \quad (2)$$

Equation 2 indicates that the steady state of an economy strickly depends on the proportion of incomes invested by the economy on human, private and public capital where b_1, b_2, and b_3 are the respective coefficients and b_4 is the error term.

The output per worker growth rate in the transition to a steady state can be expressed as follows;

$$\text{Iny(t)-Iny(1)} = (1-e^{-\pi t})[\text{In}(y^{\partial}) - Iny(1)] \quad (3)$$

From the Equation 3, y(1) is the initial level of output per worker and y^{∂} is the income level per worker in a steady-state while π is the convergence speed defined as $\pi=(1-\alpha-\beta-\gamma)(n+\partial+\varphi)$ (Barro & Sala-i-Martin, 1992).

To obtain a transition model that can be estimated, y(1) is subtracted from either sides of the Equation 3 and substituting for y^{∂}.

$$\text{In y(t)-Iny(1)} = b_0 + b_1 \text{In}[\frac{s^k}{n+\partial+\varphi}] + b_2 \text{In}[\frac{s^g}{n+\partial+\varphi}] + b_3 \text{In}[\frac{s^h}{n+\partial+\varphi}] + b_4 \emptyset + b_5 \text{Iny(1)} + \mu \quad (4)$$

Equation 4 reveals that income growth is a function of factors that determines steady state and the level of initial income. Thus, the per capita income growth rate depends on the accumulation of S^k, S^g, and S^h and good governance which strongly influence household consumption expenditure and hence poverty reduction. This indicates that countries with good governance will congregate to a higher level of steady-state per capita income and a faster rate of economic growth (Hulton, 1996) as explained in Cooray (2009).

2.2. Empirical Literature

The empirical nexus between governance measures and poverty alleviation is inconclusive (Sillah, 2016). The heterogeneous relationship could be attributed to the measurement of governance reliability (Evans & Ferguson, 2013) and the time length of the governance indicators on poverty alleviation (Grindle, 2004). However, many empirical studies have found a positive link between governance and poverty. A research carried out by the World Bank (2008) indicates that countries with more advanced levels of governance can increase their national output and reduce the rate of infant mortality by 75%. Sillah (2016) reveals that good governance measures like corruption control and responsiveness contributes to poverty alleviation. Sebudubudu (2010) found that accountability and government responsiveness are paramount in transforming the economy and reducing poverty in Botswana. Likewise, Nguyen, Giang, Tran, and Do (2021) find a positive but nonlinear relationship between governance and per capita incomes in Vietnam using fixed effect regression. To them, good governance performance improves income distribution and reduces poverty. Similarly, Sumarto, Suryahadi, and Arifianto (2004) found that the advert effect of governance undermines the efforts to decrease poverty in Indonesia. They concluded that regions that experience good governance witness a reduction in poverty more than those with poor governance. Equally, Yusuf and Malarvizhi (2013) using autoregressive distributive lag (ARDL) model found that governance integrates with poverty in Nigeria.

In the same line, Shah (2023) found that governance quality positively and significantly affect poverty reduction in a panel of six SAARC countries between 2002 and 2019. Similarly, Jindra and Vaz (2019) used a multilevel Probit model to investigate the nexus between governance quality and poverty reduction in 71 countries from 2009–2014. The results reveal that government effectiveness positively affect poverty reduction. Likewise Dossou, Ndomandji Kambaye, Bekun, and Eoulam (2023) in a tourism–poverty relationship from 2003 to 2005 in Latin America reveal that poverty reduction is influence by the quality of governance. Also, Jamil, Yaping, Ud Din, and Nazneen (2022) using 29 countries from 2004 to 2016 found governance quality to alleviate poverty. Equally, Acheampong, Shahbaz, Dzator, and Jiao (2022) using 43 SSA countries from 1990 to 2017 found that an effective system of governance is essential to reduce energy poverty and close the income inequality gap. Workneh (2020) use a random effect models in a sample of 34 countries in sub-Saharan Africa to examine how gender inequality and governance affects poverty reduction. The results reveal that good governance has a positive impact on poverty reduction. This supports the findings of Nguyen et al. (2021) who reveal that improvement in governance indicators and public administration boost income distribution in Vietnam.

Other researchers have found governance indicators to increase poverty. Chetwynd, Chetwynd, and Spector (2003) indicate that corruption is a key factor that aggravates poverty. Similarly, Abdae-Karanke (2014) found corruption and lack of participation to increase the poverty rate in many Sub-Saharan African countries. In addition, Sillah (2016) found that countries that are corrupt and not accountable witness a rise in their infant mortality and poverty. Sachs et al. (2004) argues that governance reforms are not sufficient to remove countries that are trap in poverty in the early stage of development. Equally, Khan (2007) reveals that to achieve the objectives of good governance, a country's fiscal and structural constraints may be compromised deviating efforts of other policies, which are effective in alleviating poverty. Cockcroft et al. (2008) found that Corruption impairs service delivery, which affects the poor who do not have the means to afford services of the private sector. Ochi, Saidi, and Labidi (2023) found a non-linear relationship between governance quality and poverty reduction in 57 South Asian and sub-Saharan African countries from 2010–2019. They also indicate that a negative relationship exist between governance quality and extreme poverty above the threshold level of 0.2. Zhao (2021) found tourism and institutional quality to have a negative and significant effect on both absolute and relative measures of poverty in 29 Chinese provinces.

Some empirical studies found contradictory results between countries and income level. Aloui (2019) found that government effectiveness positively and significantly affect poverty reduction in Central and Eastern Africa but negatively and significantly affect West Africa. Similarly, Jindra and Vaz (2019) found that in middle-income countries, good governance has a positive effect but has no correlation with low-income countries.

3. DATA AND METHODOLOGY

The study makes use of data from world development indicators (WDI) using Panel estimation to control for individual country heterogeneity and to provide further evidence on reliable estimation (Baltagi, 2005). The analysis centered on six countries in the CEMAC sub-region for 22 years (1996 to 2021). The choice of data was based on the earliest governance indicators which starts in 1996 while end period of 2021 is based on latest governance indicators. It should be noted that from 1996 to 2002, the indicators have a difference of two years each while from 2003 onward it has a difference of one year. Hence, it has a period of 23years for six countries giving 138 observations. The six governance indicators were created by Kaufmann et al. (2006) but only four will be used in this study due to multicollinearity and parsimonious model. That is voice and accountability,political stability,corruption estimates, and government effectivesness with values ranging from -2.5 to +2.5. Higher values indicates better governance (Kaufmann et al., 2006) as cited in Cooray (2009). Household consumption expenditure is used in this study to capture poverty alleviation. Large consumption fluctuations can make households fall into poverty. Hence, maintaining stable levels of consumption is paramount in reducing poverty. Perrelli, Bellon, and Pizzinelli (2020) found that households exit poverty as their consumption levels rise. Gounder (2012) also confirms that household consumption's determinants are robust in reducing poverty. This indicates that household consumption expenditure is a good measure of poverty reduction.

3.1. Model Specification

The following function is developed to estimate the link between good governance and poverty alleviation.

HCE=f(gov eff, corrupt, vacc, and polstable)

Where HCE is household consumption expenditure a measure of poverty alleviation; gov eff is government effectiveness; vacc is voice and accountability; polstable is political stability. The econometric transformation of the model is given thus;

$$HCE_{i,t}=\varphi_i + \partial_t + B_1\, gov\, eff_{i,t} + B_2\, corrupt_{i,t} + B_3\, vacc_{i,t} + 4\, polstable_{i,t} + \mu_{i,t} \quad (5)$$

From Equation 5, HCE is a function of government effectiveness,corruption,voice and accountability, and political stability where; φ_i capture the unobserved country-specific effects and ∂_t time specific effects, $\mu_{i,t}$ is the error term.

When T and N are small, the general methods of moment(GMM), cross-sectional augmented distributed lag (CS-ARDL), generalized least squares (GLS), and maximum likelihood estimation (MLE), which have asymptotic properties can not be applied. Hence, only least squares estimation which has known and good small-sample properties such as the pooled OLS, fixed, and random effects are appropriate. Past studies have revealed that when the number of time periods is greater than the number of cross sections (T>N), the method is appropriate (Ceesay, Fanneh, & Tsenkwo, 2019; Pandey, Kiran, & Sharma, 2023; Sriyana, 2015).

However, the decision between the fixed and random effect will be based on the Hausman test while the F-test that all u_i=0 will be used to decide if there is panel effect or poolability.

The fixed effect (FE) model is better relevant in evaluating the variables effects that differ over time by exploring the nexus between the outcome and predictor variables within an entity. When the relationship between the fixed effect and the explanatory variable is not equal to zero, the model is always consistent. That is

$$\text{Cov}\,(u_i, x_{it}) \neq 0$$

The model assumes that since each entity is different, there should be no correlation between its error term and the constant. The fixed effect model is presented in Equation 6.

$$\bar{y}_{it} = \beta \bar{x}_{it} + u_i + \bar{\mu}_{it} \quad (6)$$

Where

- u_i is the each entity intercept.
- $\bar{y}_{it}$ is the regressant with, i = entity and t = time.
- $\bar{x}_{it}$ represents regressors.
- β is the coefficient of regressors.
- $\bar{\mu}_{it}$ is the error term.

The FE model controls for all time-invariant differences between the individuals. Hence, the estimated coefficients of the fixed-effects models cannot be biased because of omitted time-invariant characteristics (Torres-Reyna, 2007).

The random effects (RE) model, unlike the FE model assume that the unobserved country-specific factors (u_i) are uncorrelated with the explanatory variables (x_{it}) for all periods allowing time-invariant variables to play a role as explanatory variables (Jarju, Nyarko, Adams, Haffner, & Odeniran, 2016). (see Equation 7).

$$\text{Cov}\,(u_i | x_{it})=0, \text{ for } t=1,2\ldots..,N \quad (7)$$

The Equation 7 indicates that the covariance between the error term and explanatory variables must be equal to zero.

The vital discrepancy between the fixed and random effects model is "whether the unobserved individual effect represents elements that are correlated with the explanatory variables in the model not whether these effects are stochastic or not" (Greene, 2008).

The general specification of the random effect model is given in Equation 8.

$$y_{it}=B_0 + Bx_{it} + u_{it} + v_{it} \quad (8)$$

Where; v_{it} is the within error entity and μ_{it} is the between error entity. All other definitions are define just like in Equation 6. However, there should be no correlation between the predictors and entity's error term.

The Hausman test which test the null hypothesis that the preferred model has RE is used in deciding between the RE and FE. Thus, the null hypothesis is accepted if the p-value of the test is greater than 0.05 indicating the RE model as the most appropriate otherwise the FE model is ideal.

It will also be of paramount interest to compare between RE and simples ordinary least square (OLS). Hence, the Breusch-Pagan Lagrange multiplier(LM) test which test the null hypothesis of no panel effect is utilized in the study.When the p-value is less than 0.05, the null hypothesis is rejected indicating the presents of panel effects.

Baltagi (2005) reveals the issue of cross sectional dependence in macro panel (over 20-30 years). Hence, Hoechle (2007) suggests that in the presence of autocorrelation, heteroscedasticity, and cross sectional dependence, the use of Driscoll and Kraay standard errors becomes the most suitable model. Driscoll and Kraay (1998) indicates that there will be inconsistency in standard error estimates if the model fails to take into account cross sectional dependence.

4. STATIONARITY TEST, DESCRIPTIVES STATISTICS AND SERIAL CORRELATION

Conducting unit root test to ascertain stationarity is vital for the used of non stationary data results in spurious regression (Gujarati, 2004). Due to cross sectional dependence in Table 2, both the first and second generation unit root tests were conducted in the study. Appendix 3 presents the Levin, Lin, and Chu (2002)(LLC) and Im, Pesaran, and Shin (2003)(IPS) of the first generation and cross sectional augmented IPS(CIPS) of Pesaran (2007) and the Pesaran cross section average of lagged levels and first-differences of the individual series (*PESCADF)* of Pesaran (2003) of the second generation reveals that some variables are stationary at levels while others are stationary after first difference. PESCADF is a second generation unit root test applicable in heterogenous panels with cross-section dependence were the standard Dickey Fuller (DF) or augmented Dickey Fuller(ADF) regressions alongside the cross section averages of lagged levels and first-differences of the individual series (CADF statistics) are augmented to eliminate cross sectional dependence (Piotr, 2006). The presence of cross section dependence as indicated in Table 2 makes the PESCADF,IPS, CIPS, and LLC tests suitable in this study. Also, one key assumption in panel data anlysis is that they should be no autocorrelation among the variables. The thresholds between coefficients can signal the strength of the correlation either weak, moderate, or strong correlation in a negative or positive direction (Gujarati, 2004). If the coefficients lie below 0.5(-0.5), it indicates a weak correlation, when it lies between 0.5 (-0.5) and 0.8 (-0.8), it signals moderate correlation and above 0.8 (-0.8), it indicate strong autocorelation. The correlation matrix table in Appendix 2 presents no evidence of strong serial correlation among the variables as all values are below 0.7. In addition, to gives a descriptive analysis of the variables used in the study, the summary statistics in Appendix 1 reveals a description of the avarage values, minimum and maximum values, and the dispersion among the observations. HCE has the highest average value of 28.01 and the highest maximum value of 30.41 but political stability has the least mean value of -1.01 while corruption has the lowest value of -1.628.

5. RESULTS AND DISCUSSIONS

The results in Table 2 reveals the Panel data estimation test. The Hausman test p-value is less than 0.05 rejecting the null hypothesis. This indicates that the FE model is the most appropriate. The LM test for the choice between FE and simple OLS also indicates the presence of panel effects rejecting the application of simple OLS in this study. In addition, the F-test that all u_i=0 in Table 3 is significant indicating that all countries effects are equal to 0. Hence, poolability is rejected in favour of fixed effect. Thus, the fixed effect model is the ideal technique to apply in this study. However, the outcome of cross sectional independence and heteroskedasticity test make Driscoll and Kraay standard errors regression suitable for the study (Knight, 2014; Mehmood & Mustafa, 2014). Thus, the analysis of this study will center on Driscoll-Kraay standard errors regressions.

Table 2. Panel data estimation test.

Test	P-values
Hausman test	0.000
Breusch Pagan L M test for comparing RE and simple OLS	0.000
Breusch-Pagan LM test of independence	0.000
Pesaran's test of cross sectional independence	0.000
Wald test for heteroskedasticity	0.000

The outcome in Table 3 reveal that the FE and FE with Driscoll-Kraay standard errors regression are very similar except for the R-square results which reveal a significant change. The FE with Driscoll-Kraay standard errors regression which is the purpose of this study reveals that vacc and government effectiveness positively and significantly affect poverty reduction. These results are true with that of Sebudubudu (2010). Corruption and political stability negatively affect poverty reduction. The results are in line with a priori expectations except for political stability which was expected to positively affect poverty alleviation. This is contrary to the findings of Wusqo and Ihsan (2022) who affirm that *political stability* strongly influenced *household consumption* pattern *but consistent with the study of* Sillah (2016) *who consider corruption to be detrimental to poverty alleviation.* The R-square results of 21.1% indicate that variation in poverty alleviation is explained by governance indicators while 78.9% is explained by the error term.

Table 3. Fixed effect with Driscoll-Kraay standard errors regression.

Variables	FE	FE(Driscoll-Kraay standard errors)
Gov eff	1.849*** (0.562)	1.849** (0.551)
Polstable	-0.401* (0.209)	-0.400*** (0.138)
Vacc	0.666** (0.504)	0.666** (0.494)
Corrupt	-1.299* (0.707)	-1.299*** (0.693)
Constant	29.218*** (0.611)	29.216*** (0.579)
Observations	138	138
Number of groups	6	6
F-test that all u_i=0	0.000	Not applicable
R-squared	0.035	0.212

Note: *** denote 1% significant level, ** denote 5%, and * denote 10%.
Standard errors in parentheses.

6. CONCLUSION AND RECOMMENDATION

Good governance is indispensable for poverty alleviation but the nature of the governance is even more supreme to ensure poverty reduction. Most countries in the CEMAC sub-region have experienced a rise in poverty over time due to poor governance. Thus, this study examines how good governance affects poverty reduction in the CEMAC sub region. The outcome of the cross sectional independence and heteroskedasticity test make Driscoll and Kraay standard errors regression suitable for the study. The results indicates that vacc and government effectiveness positively and significantly affect poverty reduction while corruption and political stability has a negative effect. Based on this conclusion, the study recommends that CEMAC member countries should initiate strategies to stop corruption and improve on the quality of their governance indicators such as increasing the quality of result base financing, improvement in project monitoring and evaluation, and accountability to create an impact on poverty reduction. In addition, they should ensure their economy is stable as political stability strongly influence the pattern of *household consumption of a country.*

Funding: This research is supported by University of Buea (Grant number: 105467).
Institutional Review Board Statement: The Ethical Committee of the University of Buea, Cameroon has granted approval for this study (Ref. No. 065).
Transparency: The author states that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.
Data Availability Statement: Upon a reasonable request, the supporting data of this study can be provided by the Enongene Betrand Ewane.
Competing Interests: The author declares that there are no conflicts of interests regarding the publication of this paper.

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APPENDIXES

Appendix 1. Summary statistics.

Variable	Obs.	Mean	Std. dev.	Min.	Max.
logHCE	138	28.106	1.328	22.419	30.404
Corruption	138	-1.222	0.247	-1.628	-0.520
Gov effe	138	-1.223	0.368	-1.887	-0.283
Ps	138	-1.006	0.925	-2.848	0.640
Vacc	138	-1.264	0.348	-1.999	-0.391

Appendix 2. Correlation matrix table.

Variables	LogHFCE	Corrupt	Polstab	Vacc	Gov eff
LohHFCE	1.000				
Corrupt	0.057	1.000			
Polstab	0.015	0.463	1.000		
Vacc	0.226	0.679	0.121	1.000	
Gov eff	0.242	0.604	0.650	0.487	1.000

Appendix 3. Unit root test.

First generation unit root test							Second generation unit root test				
Test type	**Variables**	**Test statistics at levels**	**P-values**	**Test statistic at first difference**	**P-value**	**Decision**	**Test types**	**Variable**	**Statistic at levels**	**Statistics at first difference**	**Decision**
IPS	logHCE	1.515	0.935	-5.114	0.000	I(1)	CIPS	logPCE	-1.236	-3.787	I(1)
	corrupt	-2.569	0.005	---	---	I(0)		corrupt	-2.215	-4.465	I(1)
	Gov eff	-3.611	0.000	---	---	I(0)		Gov eff	-2.560	---	I(0)
	polstab	-0.612	0.270	-7.564	0.000	I(1)		polstab	-2.901	---	I(0)
	vacc	-3.303	0.001	---	---	I(0)		VAC	-1.999	-3.550	I(1)
LLC	logHCE	-1.179	0.119	-3.131	0.001	I(1)	*PESCAD*F	logHCE	-1.607	-2.354	I(1)
	corrupt	-2.666	0.003	---	---	I(0)		corrupt	-2.354	----	I(0)
	Gov eff	-4.789	0.000	---	---	I(0)		Gov eff	-2.688	----	I(0)
	polstab	-0.962	0.168	-7.139	0.000	I(1)		polstab	-2.654	----	I(0)
	vacc	-4.107	0.000	---	---	I(0)		vacc	-2.841	----	I(0)
							5% CV= -2.33				