Institutional Quality and Sustainable Development: Empirical Evidence from Anglophone West African Countries

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ABSTRACT

This study examines the relationship between institutional quality and sustainable development outcomes in four Anglophone West African countries consisting of Ghana, The Gambia, Nigeria, and Sierra Leone, over the period 1996 – 2024. Utilising a balanced panel of 116 country-year observations and employing three complementary estimation strategies, pooled fixed effects with Driscoll-Kraay standard errors, the Pooled Mean Group (PMG) estimator of Pesaran, Shin, and Smith (1999), and a Dynamic Fixed Effects (DFE) robustness check. The study tests whether all six dimensions of the World Bank's Worldwide Governance Indicators (WGI) systematically influence SDG Index scores. Panel unit root tests confirmed integration of order one for all series; Pedroni and Kao cointegration tests establish a stable long-run equilibrium, justifying the error-correction framework. The PMG results reveal that government effectiveness ($\hat{\theta} = 0.287$, $p < 0.001$) and rule of law ($\hat{\theta} = 0.261$, $p < 0.001$) are the dominant long-run drivers of sustainable development performance. The speed-of-adjustment coefficient ($\hat{\varphi} = -0.312$, $p < 0.001$) implies that approximately 31% of deviations from the long-run equilibrium are corrected annually, which is consistent with the gradual, path-dependent nature of institutional change. A Hausman test ($\chi^2 = 8.43$, $p = 0.208$) confirms the PMG over the unrestricted Mean Group estimator. Cross-sectional dependence, assessed via the Pesaran (2004) CD test, is addressed through Driscoll-Kraay corrections. The findings provide robust empirical support for the proposition that institutional quality is not merely ancillary to SDG progress but constitutive of it. Policy implications point to the primacy of state capacity building, anti-corruption reform, and regulatory institution development as long-run prerequisites for accelerating sustainable development in the sub-region.

Keywords: Institutional quality; Sustainable Development Goals; SDG Index; Government effectiveness; Rule of law

JEL Classification: O10, O43, P48, Q01, H11, C33

INTRODUCTION

The question of whether institutions drive development outcomes or whether development generates demand for better institutions has occupied the centre of political economy and development economics for three decades. The foundational contributions of North (1990), Acemoglu, Johnson, and Robinson (2001), and Rodrik, Subramanian, and Trebbi (2004) established institutions as the primary determinant of long-run economic performance, eclipsing the roles of geography and trade openness in cross-country growth regressions. Within the evolving sustainable development paradigm, however, the institutions–development nexus carries added complexity. The 2030 Agenda for Sustainable Development (United Nations, 2015) demands simultaneous progress across economic, social, and environmental dimensions, a multidimensional challenge for which governance quality is not merely a facilitating factor but an all-important enabling precondition.

The adoption of the Sustainable Development Goals (SDGs) in September 2015 crystallised this recognition at the level of global policy architecture. SDG 16 which calls for peaceful, just, and strong institutions, is unique in the SDG framework in that it is simultaneously a goal in its own right and a cross-cutting enabler of all other goals. Halle, Jensen, and Lim (2016) argue that institutional quality determines whether the

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foundational SDG commitment to 'leave no one behind' is operationalised or remains an aspirational rhetoric, particularly in fragile and conflict-affected states. More recently, Sachs et al. (2023) document that the 17 SDGs require 'deep transformations' in governance, finance, and technology, and that countries lacking effective institutions consistently fail to translate development finance into measured progress. Against this backdrop, the relationship between institutional quality, operationalised through the World Bank's Worldwide Governance Indicators (WGI) and composite SDG performance merits rigorous empirical investigation.

Sub-Saharan Africa, and West Africa in particular, presents both the most urgent and the most analytically challenging context for this inquiry. Despite possessing substantial natural resource endowments, a rapidly growing demographic dividend, and deepening integration into global value chains, the sub-region remains in the bottom quartile of the global SDG Index (Sachs et al., 2023). The Sustainable Development Report (2024) records that no sub-Saharan African country is on track to achieve the SDGs by 2030, with the largest gaps concentrated in SDGs 1 (no poverty), 2 (zero hunger), 3 (good health), 6 (clean water), 7 (clean energy), and 16 (peace and justice). Within this context, governance quality or its absence is increasingly identified as the binding constraint on SDG progress (Asongu & Nwachukwu, 2019; Fosu & Gafa, 2020; Ahlerup, Baskaran & Bigsten, 2020).

Anglophone West Africa comprising Ghana, Nigeria, Sierra Leone, and The Gambia offers a particularly valuable comparative unit of analysis. These four countries share a common British colonial heritage, English as the official language, and membership in the Economic Community of West African States (ECOWAS), providing a degree of institutional and linguistic homogeneity that reduces omitted-variable concerns in cross-country analysis. At the same time, they exhibit dramatic heterogeneity in governance trajectories. Ghana is widely regarded as the sub-region's most consolidated democracy, having undergone multiple peaceful electoral transfers since 1992 (Gyimah-Boateng, 2015; Lindberg, 2006). Nigeria, the continent's largest economy combines vast development potential with chronic governance deficits, insurgency in the north-east, and pervasive corruption (Nwosu & Orji, 2020; Olayungbo & Olayemi, 2021). Sierra Leone has navigated a post-conflict reconstruction trajectory following its 1991–2002 civil war (Hanlon, 2005; Conteh, 2020) and The Gambia emerged from more than two decades of authoritarian rule with a democratic transition in January 2017 (Saine, 2009; Perfect, 2016), constituting a natural quasi-experiment in institutional change. This within-group heterogeneity in governance trajectories against a backdrop of structural similarity renders the four-country panel an unusually informative laboratory for identifying the institutional determinants of sustainable development.

Despite a growing body of literature on governance and development in Africa, several significant gaps persist. First, the use of the composite SDG Index as opposed to individual economic or social indicators as the dependent variable remains sparse, limiting the ability to link governance quality to the comprehensive, multidimensional conception of sustainability embedded in the 2030 Agenda. Furthermore, most studies either employ single-country case studies or broad pan-African samples that do not adequately account for the distinctive institutional trajectories and regional specificities of West Africa. Also, the post-2015 period, during which countries have been formally implementing the SDG framework has not been comprehensively analysed for this sub-region. Additionally, few studies exploit the full time-series depth ($T = 29$) available from the WGI dataset, which is critical for panel cointegration methods and long-run identification. Finally, the interaction between cross-sectional dependence, a near-universal feature of closely integrated regional panels and institutional effect estimation has been inadequately addressed.

This study addresses these gaps through four methodological contributions. First, it constructs a balanced panel of 116 country-year observations covering 1996–2024, yielding $T = 29$ sufficient for meaningful panel cointegration estimation. Next, it employs the PMG estimator of Pesaran, Shin, and Smith (1999), which explicitly distinguishes between short-run heterogeneous dynamics and homogeneous long-run equilibrium relationships, thereby avoiding the slope-heterogeneity bias that afflicts pooled OLS and even within-group fixed effects estimators in dynamic panels. Furthermore, it addresses cross-sectional dependence through the Driscoll-Kraay (1998) correction in the fixed effects specification and through the CIPS second-generation unit root test in the pre-estimation diagnostics. Moreover, it benchmarks the PMG results against the unrestricted Mean Group (MG) estimator using a Hausman-type test, providing formal evidence on the validity of slope-homogeneity restrictions.

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THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Theoretical Foundations: Institutions and Development

The theoretical case for institutions as the primary determinant of long-run development outcomes is multi-stranded and deeply rooted in the political economy tradition. North's (1990) seminal framework defines institutions as the 'rules of the game, the formal and informal constraints that structure human interaction and distinguishes between institutions as rules and organisations as players operating within those rules. In North's framework, the institutional matrix shapes the incentive structures facing economic actors, thereby determining whether productive, redistributive, or destructive activities dominate in an economy. Crucially, institutional change is path-dependent. Once a society locks into a particular institutional equilibrium, the self-reinforcing dynamics of complementary institutions, network effects, and elite interests make fundamental reform costly and slow.

Acemoglu, Johnson, and Robinson's (2001) colonial origins hypothesis provides the most influential empirical instantiation of North's theoretical framework. Exploiting variation in European settler mortality as an instrument for institutional quality, the authors demonstrate that the primary channel through which colonial history affects long-run income is through its persistent effect on institutional quality, specifically on property rights protection and constraints on executive power. The implication is stark, clearly indicating that, inclusive institutions that protect property rights and enforce contracts generate the investment incentives necessary for sustained growth, whereas extractive institutions concentrate rents among elites and undermine broad-based development. Acemoglu and Robinson (2012) extend this framework in 'Why Nations Fail', arguing that the fundamental distinction between successful and unsuccessful nations is the presence or absence of inclusive political and economic institutions.

Rodrik, Subramanian, and Trebbi (2004) provide arguably the most comprehensive empirical test of the relative contributions of institutions, geography, and integration (trade) to cross-country income differences. Using settler mortality and distance from the equator as instruments, they find that institutions 'trump' geography and trade in explaining income variation, a result that has proved remarkably robust across alternative specifications and datasets. The mechanism through which institutions operate, in their framework, includes property rights protection, rule enforcement, political stability, regulatory quality, and voice/accountability, which corresponds closely to the WGI dimensions used in the current study.

Within the sustainable development context, the institutional framework is complicated by the multidimensional nature of the SDG agenda. Achieving the SDGs requires not merely economic growth but also reductions in inequality, universal access to health and education, environmental sustainability, and institutional accountability outcomes that place qualitatively different demands on governance than growth alone. Fukuda-Parr, Greenstein, and Stewart (2012) argue that governance quality mediates the translation of development finance into human development outcomes, with rule of law and control of corruption the most robust governance predictors of MDG attainment in low-income countries. Halle et al. (2016) extend this argument to the SDG era, emphasising that SDG 16 (peace, justice, and strong institutions) is both an end in itself and the foundational precondition for all other goals. More recently, Sachs et al. (2019) propose a 'six transformations' framework for SDG achievement, in which institutional transformation covering, governance, justice, and accountability, is explicitly identified as one of the six priority domains.

GOVERNANCE DIMENSIONS AND SUSTAINABLE DEVELOPMENT: A STRAND-BY-STRAND REVIEW

Gov Ernment Effectiveness and State Capacity

State capacity which is the ability of government to formulate and implement policies, deliver public services, and maintain institutional credibility, is the proximate mechanism through which governance translates into development outcomes. Besley and Persson (2011) model state capacity as a public good that enables the government to raise revenue, enforce law, and deliver services, in their framework, low state capacity is a 'development trap' from which escape requires coordinated investment in fiscal and legal institutions. In

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue VI June 2026

another perspective, Page and Pande (2018) posits that when local governance is weak public spending fails to improve social or human capital. Fukuyama (2013) distinguishes state capacity (the scope and strength of government functions) from state autonomy (independence from private capture), arguing that both are necessary for effective governance. The WGI Government Effectiveness indicator captures this dimension through perceptions of public service quality, civil service independence, and policy implementation credibility.

In the sub-Saharan African context, state capacity constraints have been extensively documented as the binding constraint on public goods provision, health and education delivery, and infrastructure investment (Mustapha & Whitfield, 2009; Booth & Cammack, 2013). Fosu and Gafa (2020) demonstrate that government effectiveness is a statistically significant predictor of HDI improvements in Africa, controlling for GDP per capita, trade, and aid. Godfrey, Asongu, and Nwachukwu (2022) find that state capacity heterogeneity across African countries substantially explains the divergence in SDG progress observed since 2015. For the Anglophone West African countries under study, the divergence in government effectiveness between Ghana which consistently scores in the 45–55th percentile range of WGI and Nigeria and Sierra Leone which typically score below the 20th percentile closely mirrors their divergent SDG trajectories, a correspondence that motivates the current empirical investigation.

Rule of Law and Contract Enforcement

Rule of law constitutes the foundational legal infrastructure for private investment, contract enforcement, property rights protection, and social order. In the development economics literature, rule of law is frequently identified as the governance dimension most directly linked to investment rates, financial deepening, and long-run growth (Kaufmann, Kraay & Zoido-Lobatón, 1999; Keefer & Knack, 1997). Acemoglu et al. (2019) documented that historical variation in legal institutions, rooted in colonial rule-of-law traditions explains a substantial fraction of contemporary cross-country variation in economic outcomes in sub-Saharan Africa.

For sustainable development specifically, rule of law is the institutional foundation for environmental law enforcement, social protection systems, labour rights, and equitable resource allocation (Bonanomi, 2015; Botchway, 2021). In fragile states like Sierra Leone and, to a lesser extent, The Gambia under authoritarian rule, the erosion of rule of law was associated not merely with economic underperformance but with systematic exclusion of poor and marginalised populations from public services, land rights, and legal recourse. This is precisely the conditions that SDG 16 and the 'leave no one behind' principle are designed to address. Anyanwu and Erhijakpor (2014) find rule of law to be among the most robust governance predictors of human development outcomes across African countries. Asongu, Nnanna, and Acha-Anyi (2020) with Haggard and Tiede (2020) confirm this finding for a broader African panel, demonstrating that rule of law exerts the largest elasticity among WGI dimensions in explaining SDG-related health outcomes.

Control of Corruption

Mauro's (1995) seminal finding that corruption is negatively correlated with investment rates and growth rates across countries launched a vast empirical literature on the developmental costs of corruption. The mechanisms are well-theorised since corruption raises the effective cost of investment through 'grease payments', distorts public expenditure allocation toward rent-extractable sectors (infrastructure, defence) and away from social expenditures (health, education), and undermines tax compliance and domestic revenue mobilisation (Gupta, Davoodi & Tiongson, 2000; Tanzi & Davoodi, 1997).

In the SDG context, corruption is particularly damaging to social goals. Gupta, Davoodi, and Tiongson (2000) demonstrate that higher corruption is associated with lower public health and education spending, weaker service delivery outcomes, and greater inequality in access to social services. For West Africa, a region in which domestic revenue mobilisation has consistently failed to reach the 20% of GDP threshold recommended by the African Union, the anti-corruption dimension of governance carries direct fiscal implications for SDG financing. Okafor (2017) documents that in Nigeria, corruption-related losses in oil revenue alone constitute a multiple of total social spending, rendering corruption control an existential prerequisite for SDG progress. More recently, Cooray and Schneider (2023) use a global panel to confirm that control of corruption has

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independent, statistically significant effects on SDG achievement after controlling for GDP and institutional quality more broadly. Piliegini, M., & Sacchi, A. (2021) refreshes Tanzi and Davoodi (1997) and Gupta et al. (2000) framework, showing that corruption persistently skews fiscal resources away from human development goals.

Political Stability and Conflict

Political instability and conflict represent the most acute form of institutional failure, directly destroying human capital, physical capital, and social trust while diverting resources from development to security. The conflict-development literature, anchored by Collier and Hoeffler (2004) and extended by Blattman and Miguel (2010), documents the severe and persistent development costs of civil conflict: GDP contractions, capital flight, destruction of infrastructure, and displacement of populations that take decades to reverse. For Sierra Leone which experienced one of West Africa's most devastating civil conflicts (1991–2002) the legacy of conflict in terms of institutional destruction and human capital loss remains visible in its SDG scores nearly two decades after the peace agreement.

Beyond outright conflict, political instability including coup risk, executive turnover through unconstitutional means, and terrorism depresses investment, distorts fiscal policy toward short-term political survival rather than long-run development, and undermines the credibility of governance institutions. Asongu and Nwachukwu (2019) find that political stability has heterogeneous effects on sustainable development across income groups and governance environments in Africa, with the development-enhancing effects of stability stronger in low-income, resource-dependent contexts precisely the conditions characterising the four countries in the current study. Ahlerup, Baskaran, and Bigsten (2020) demonstrate that political institutions significantly moderate the growth–poverty nexus in sub-Saharan Africa, suggesting that stability's development dividend operates partly through its effects on distributional outcomes. Furthermore, Mueller and Techasunthornwat (2020) explained how localized political instability blocks broad infrastructural and environmental resource tracking.

Regulatory Quality

Regulatory quality which entails the ability of governments to formulate and implement policies and regulations that promote private sector development, influences sustainable development primarily through investment climate effects, structural transformation, and the mobilisation of private finance for development. Sound regulatory frameworks reduce transaction costs, enable market entry and exit, protect property rights, and provide the legal infrastructure for financial intermediation and foreign direct investment (Asiedu, 2006; World Bank, 2020). In the SDG era, regulatory quality has assumed additional importance through its role in enabling green investment, clean energy adoption, and environmental compliance, which constitute important channels through which SDGs 7, 9, 13, and 15 are directly impacted.

A distinctive feature of regulatory quality's institutional effects and one that motivates the choice of a long-horizon panel in the current study is that its developmental dividends are characteristically slow to materialise. Regulations shape investment decisions, business formation, and structural change over multi-year horizons, rather than affecting short-run fiscal or social outcomes. This temporal pattern has important methodological implications. Studies that employ short panels or cross-sectional designs are likely to underestimate the developmental returns to regulatory institution-building. The current study's 29-year panel is specifically designed to capture these long-run effects, and the divergence between the short-run insignificance and long-run significance of regulatory quality in the PMG results directly confirms this theoretical prediction.

Voice, Accountability, and Democratic Governance

The relationship between democracy and development has been extensively contested in the political economy literature (Acemoglu et al., 2019; Przeworski et al., 2000). The WGI Voice and Accountability dimension captures a related but distinct concept which relates to the extent to which citizens can participate in selecting their government and enjoy freedom of expression, freedom of association, and free media. In the SDG context, this dimension is directly relevant to SDG 16 (strong institutions), SDG 5 (gender equality, through

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue VI June 2026

women's political participation), and SDG 10 (reduced inequalities, through inclusive political representation of marginalised groups).

Gyimah-Boateng (2015) documents that Ghana's consistently higher voice and accountability scores, relative to its Anglophone West African neighbours, reflect the consolidation of multi-party competition, free media, and civil society since 1992, which are results of institutional features that have supported more inclusive development policy and better targeting of social programmes. Perfect (2016) traces the consequences of The Gambia's near-zero voice and accountability scores under Yahya Jammeh's authoritarian rule for development outcomes, including systematic exclusion of opposition-aligned communities from public resources. The country's democratic transition in 2017 produced a measurable upward shift in voice and accountability scores and, with some lag, in SDG-related governance outcomes.

Empirical Evidence: Africa-Specific Studies

Within the Africa-specific empirical literature, several recent studies provide important context for the current investigation. Asongu and Nwachukwu (2019) examine governance and sustainable development in Africa using a sample of 48 countries and find heterogeneous effects across governance dimensions and country income groups, with institutional quality effects stronger in low-income and resource-dependent countries, a finding that underscores the relevance of the current four-country focus. Fosu and Gafa (2020) demonstrate that governance quality significantly moderates the growth–poverty reduction relationship in sub-Saharan Africa, confirming that the development dividend from growth is conditional on institutional quality.

For West Africa specifically, Olayungbo and Olayemi (2021) investigate the governance-growth nexus in Nigeria using time-series methods and find that government effectiveness and rule of law are the dominant institutional drivers of growth over the long run. Conteh (2020) documents the institutional reconstruction process in Sierra Leone and finds that improvements in rule of law and control of corruption since 2002 are closely associated with post-conflict SDG gains in health and education. For The Gambia, Perfect (2016) and, more recently, researchers affiliated with the Institute for Peace and Security Studies (IPSS) document the institutional legacy effects of the Jammeh era on current governance capacity.

In the broader sub-Saharan African literature, recent contributions have addressed methodological challenges relevant to the current study. Ahlerup, Baskaran, and Bigsten (2020) employ system GMM to address endogeneity in the governance-growth nexus, finding robust positive effects of institutional quality on growth even after instrumenting for governance. Cooray and Schneider (2023) use a global panel to demonstrate that the six WGI dimensions have distinct, separable effects on SDG achievement, with government effectiveness and rule of law exhibiting the largest elasticities, consistent with the current study's findings. Godfrey, Asongu, and Nwachukwu (2022) apply the PMG estimator to a broad African panel and find cointegration between governance indicators and HDI, establishing the appropriateness of the long-run cointegrating framework employed in the current study.

Several gaps in the existing literature, however, remain unaddressed. Most existing studies employ HDI, GDP per capita, or individual MDG/SDG indicators as the dependent variable, rather than the composite SDG Index Score, which captures the full multidimensional breadth of the 2030 Agenda. Studies using the SDG Index are predominantly cross-sectional (Sachs et al., 2022, 2023), precluding dynamic identification of governance effects. The Anglophone West African sub-sample of four countries sharing linguistic, colonial, and institutional histories that reduce between-group heterogeneity, has not been the subject of a dedicated panel study over the full WGI time series. Finally, the interaction between cross-sectional dependence, slope heterogeneity, and long-run governance effects has been inadequately addressed in the sub-regional literature. The current study addresses each of these gaps.

DATA AND MEASUREMENT

Sample and Time Period

This study analyses a balanced panel of four Anglophone West African countries, Ghana (GHA), The Gambia

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue VI June 2026

(GMB), Nigeria (NGA), and Sierra Leone (SLE) over the period 1996 to 2024. The sample selection is motivated by five criteria: (i) linguistic and colonial homogeneity, with all four countries sharing English as the official language and a common British colonial heritage; (ii) regional institutional membership, with all four being ECOWAS member states; (iii) signatory status to the MDG and SDG frameworks; (iv) availability of continuous WGI data from 1996 onwards; and (v) within-group heterogeneity in governance trajectories, which is necessary for identification of institutional effects in a small-N panel.

The analytical window of 29 years (1996–2024) is deliberately chosen to maximise the time-series dimension of the panel, which is critical for three reasons. First, T = 29 substantially enhances the power of panel unit root and cointegration tests relative to the shorter panels (T = 10–15) typical of previous sub-regional studies. Moreover, the extended horizon captures multiple institutional transitions within the sample including Ghana's democratic consolidation, Sierra Leone's post-conflict reconstruction, The Gambia's 2017 democratic transition, and Nigeria's alternating electoral cycles, providing within-country variation in governance quality that is necessary for causal identification. Furthermore, the long horizon enables detection of the slow-materialising developmental effects of regulatory and legal institution quality, which the PMG results confirm to be empirically significant only over multi-decade horizons.

Dependent Variable: SDG Index Score

The dependent variable is the Sustainable Development Report's SDG Index Score (Sachs et al., 2023, 2024), which provides a composite, normalised score ranging from 0 to 100 measuring countries' overall performance across all 17 SDGs and their associated indicators. A higher score reflects greater proximity to achieving the SDGs. The SDG Index is constructed by the Sustainable Development Solutions Network (SDSN) and has been published annually since 2016, with backdated estimates available to 2000. Consequently, regressions utilising the SDG Index Score are restricted to the 2000–2024 sub-period (T = 25), yielding 100 country-year observations.

The SDG Index is selected as the dependent variable in preference to individual SDG indicators or the Human Development Index (HDI) for three reasons. First, it captures the full multidimensional breadth of the 2030 Agenda, encompassing economic, social, and environmental dimensions, rather than privileging any single development dimension. Also, as a composite index, it reduces measurement noise relative to individual indicators, which are subject to data gaps and imputation in low-income country contexts. Furthermore, its direct correspondence to the 2030 Agenda makes findings from this study directly relevant to policy discussions on SDG implementation in West Africa.

Measurement Considerations: The SDG Index in the West African Context

The SDG Index provides a valuable composite measure of multidimensional progress but carries measurement challenges in low-income country contexts that merit explicit discussion. The index combines many underlying indicators drawn from disparate data sources; for several indicators, particularly environmental and institutional measures, the Sustainable Development Solutions Network (SDSN) imputes missing values using interpolation, regional averages, or model-based methods. These imputations can reduce signal variation and, depending on the pattern of missingness, may bias regression coefficients.

To assess potential measurement concerns for our four countries, we computed the extent of missingness in the 2024 SDG dataset. As expected, data gaps are larger for environmental goals (e.g., SDGs 13–15) and for governance-related indicators (SDG 16) than for basic health and education outcomes. Where imputation is extensive, the constructed country index is necessarily more informed by regional or model-based priors than by country-specific observations.

To probe sensitivity to imputation, a restricted SDG index was constructed using only those indicators that are complete for all four countries across the sample period (primarily core social and economic indicators. Re-estimating the FE and PMG models on this restricted index yields broadly similar long-run conclusions for the dominant governance dimensions (government effectiveness and rule of law), though standard errors

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue VI June 2026

increase slightly because the restricted index contains fewer items and hence less cross-year variation. These robustness results are reported in Table 1

Table 1: Robustness Check — Full SDG Index vs. Restricted SDG Index, PMG Long-Run Coefficients (2000–2024)

Variable	Full Index Coeff.	Full Index SE	Restricted Index Coeff.	Restricted Index SE	Direction Consistent?	Significance Preserved?
Control of Corruption	0.201***	0.061	0.178**	0.073	Yes	Yes
Government Effectiveness	0.287***	0.065	0.261***	0.079	Yes	Yes
Political Stability	0.154**	0.063	0.141*	0.076	Yes	Marginal
Rule of Law	0.261***	0.072	0.238***	0.087	Yes	Yes
Regulatory Quality	0.138**	0.068	0.094	0.083	Yes	No

Notes: Restricted SDG Index uses only indicators with complete non-imputed data for all four countries over 2000–2024, primarily covering core social and economic indicators (SDGs 1–5). ***, **, * denote significance at 1%, 5%, 10%. Direction Consistent = coefficient has same sign in both specifications. Significance Preserved = coefficient retains the same or stronger significance tier.

Source: Authors' computations.

This estimate increases the confidence in the main findings of the study. However, the study emphasizes that SDG aggregate scores should be interpreted as imperfect but useful summary statistics, and that future work linking governance to more narrowly defined target- or indicator-level outcomes would be a valuable complement.

Independent Variables: Worldwide Governance Indicators

Institutional quality is operationalised through the six dimensions of the World Bank's Worldwide Governance Indicators (WGI) (Kaufmann, Kraay & Mastruzzi, 2010; World Bank, 2024), which provide annual percentile rank estimates for over 200 countries and territories. Each indicator is expressed as a percentile rank ranging from 0 to 100, with higher values indicating better governance outcomes. The six governance dimensions are: (i) Control of Corruption (CC); (ii) Government Effectiveness (GE); (iii) Political Stability and Absence of Violence/Terrorism (PS); (iv) Rule of Law (RL); (v) Regulatory Quality (RQ); and (vi) Voice and Accountability (VA). The WGI data cover the full 1996 – 2024 period, yielding 116 country-year observations.

While the WGI have been subject to methodological critique, particularly regarding the perception-based construction of indicators, potential time-inconsistency arising from revisions to underlying surveys, and aggregation across heterogeneous data sources (Thomas, 2010; Langbein & Knack, 2010), they remain the most comprehensive, annually updated, cross-country panel of governance quality available for the study period. The construction methodology has been consistent since 1996, enabling comparisons across both time and countries. Where measurement error in governance indicators is a concern, its principal effect is to attenuate estimated coefficients toward zero (classical errors-in-variables bias), suggesting that the estimated governance effects reported below are likely to represent lower bounds on the true institutional effects.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue VI June 2026

Descriptive Statistics

Table 2 presents descriptive statistics for all variables computed over the full panel. The data reveal substantial variation in governance quality both within and across countries. Across the full 116 country-year observations, control of corruption averages 31.28 (SD = 16.14), government effectiveness 25.39 (SD = 16.23), and rule of law 30.77 (SD = 17.16), all well below the global median of 50, confirming the systemic governance deficit in the sub-region. Ghana consistently records the highest scores on all six governance dimensions, with mean government effectiveness of approximately 44 and mean rule of law of approximately 50, approaching the global median. Nigeria records persistently low scores, with political stability approaching 2.42 in some years. The SDG Index Score averages 53.61 (range: 44.98 to 63.13) over 100 country-year observations, with Ghana leading at 63.13 in 2024 and Nigeria recording the sample minimum of 44.98 in 2000.

Variable	Obs.	Mean	Std. Dev.	Min	Max	Source
SDG Index Score	100	53.61	4.93	44.98	63.13	SDSN (2024)
Control of Corruption	116	31.28	16.14	0.53	58.85	WB WGI (2024)
Government Effectiveness	116	25.39	16.23	1.62	57.92	WB WGI (2024)
Political Stability	116	33.87	19.57	2.42	74.07	WB WGI (2024)
Rule of Law	116	30.77	17.16	4.48	61.06	WB WGI (2024)
Regulatory Quality	116	27.77	13.86	5.43	54.98	WB WGI (2024)
Voice & Accountability	116	36.28	15.91	7.00	67.49	WB WGI (2024)

Table 2: Descriptive Statistics (Full Panel, 1996–2024). WGI variables cover 1996–2024 (N = 4, T = 29, 116 observations). SDG Index Score covers 2000–2024 (100 observations). All WGI expressed as percentile ranks (0–100); higher = better governance. Sources: World Bank WGI (2024); SDSN Sustainable Development Report (2024).

ECONOMETRIC METHODOLOGY

Model Specification

The baseline empirical model takes the following form:

$$SDG_{it} = \alpha_i + \beta_1 CC_{it} + \beta_2 GE_{it} + \beta_3 PS_{it} + \beta_4 RL_{it} + \beta_5 RQ_{it} + \beta_6 VA_{it} + \varepsilon_{it} \quad (1)$$

where SDG_{it} is the SDG Index Score for country i in year t; CC_{it}, GE_{it}, PS_{it}, RL_{it}, RQ_{it}, and VA_{it} represent the six WGI governance dimensions; α_i is the country-specific fixed effect capturing unobserved time-invariant heterogeneity; and ε_{it} is the idiosyncratic error term. The subscript i ranges over the four countries and t covers 2000–2024 for the SDG regression (T = 25) and 1996–2024 for pre-estimation diagnostics (T = 29).

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue VI June 2026

Unit Root Tests

All series are examined for stationarity prior to estimation. Given the small cross-sectional dimension (N = 4) and the moderate time dimension (T = 29), the study employs three panel unit root tests. The Levin, Lin, and Chu (2002) LLC test imposes a common unit root process across panels. The Im, Pesaran, and Shin (2003) IPS test allows for individual unit root processes, accommodating cross-country heterogeneity in persistence. Because the four countries share common regional shocks in terms of commodity price cycles, the Ebola epidemic (2014–2016), the COVID-19 pandemic (2020–2021), and ECOWAS-level policy harmonisation. Therefore, cross-sectional dependence (CSD) is likely, which reduces the power of first-generation unit root tests. The Pesaran (2007) CIPS test a second-generation test that explicitly accounts for cross-sectional dependence by augmenting the standard ADF regression with cross-sectional averages of lagged levels and first differences is therefore, also applied. The presence of cross-sectional dependence is formally tested using the Pesaran (2004) CD test on regression residuals.

Panel Cointegration Tests

Given the I(1) classification of all series, the existence of a long-run cointegrating relationship is examined using the Pedroni (1999, 2004) panel cointegration tests and the Kao (1999) test. The Pedroni tests include both panel (within-dimension) and group (between-dimension) statistics, providing evidence on whether cointegration holds for the panel as a whole and for individual country pairs. The Kao test provides an additional residual-based check on the cointegrating relationship. The availability of 25 annual observations per country for the SDG regression substantially improves the reliability of these residual-based tests relative to studies using shorter or biennially-sampled panels.

ESTIMATION STRATEGIES

Fixed Effects Estimator with Driscoll-Kraay Correction

The within-group fixed effects (FE) estimator is used as the baseline specification. By demeaning all variables, the FE estimator eliminates country-specific time-invariant heterogeneity (colonial legacy, geographic endowment, cultural norms) that could confound the governance-SDG relationship. Given the detection of cross-sectional dependence in the Pesaran (2004) CD test, standard errors are computed using the Driscoll and Kraay (1998) estimator, which is robust to heteroscedasticity, autocorrelation of arbitrary order, and cross-sectional dependence. This represents an improvement over the clustered standard errors used in the original specification, which are robust to clustering but not to cross-sectional dependence.

Pooled Mean Group Estimator

The PMG estimator of Pesaran, Shin, and Smith (1999) is the study's primary estimator. The PMG estimator addresses three deficiencies of the FE estimator in a dynamic cointegrating panel context. It explicitly models the error-correction dynamics of the cointegrating relationship, distinguishing between short-run heterogeneous adjustment processes and the constrained long-run equilibrium. It also allows country-specific short-run coefficients, speeds of adjustment, and error variances while constraining long-run slope coefficients to be homogeneous, a restriction that is both theoretically motivated (the long-run governance–development relationship should be common across similar countries) and formally testable via the Hausman test. Finally, it is consistent under both slope homogeneity and heterogeneity assumptions, unlike pooled estimators that impose homogeneity on all coefficients.

The PMG error correction specification is:

$$\Delta SDGit = \varphi i(SDGi,t-1 - \theta' Xi,t-1) + \Sigma\, \delta' ij\, \Delta Xi,t-j + \mu i + \varepsilon it \quad (2)$$

where $\varphi i < 0$ is the country-specific error-correction coefficient (speed of adjustment toward the long-run equilibrium), θ is the vector of long-run coefficients constrained to be equal across countries, Xit is the vector of governance regressors, and μi is the country fixed effect. The Hausman test is used to adjudicate between

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue VI June 2026

the PMG and the unrestricted Mean Group (MG) estimator; under the null of long-run slope homogeneity, PMG is asymptotically more efficient than MG.

Dynamic Fixed Effects Estimator

As a robustness check, the Dynamic Fixed Effects (DFE) estimator is applied, which constrains both long-run and short-run coefficients and the speed of adjustment to be equal across countries. Comparison of DFE, PMG, and MG results provides evidence on the sensitivity of findings to slope homogeneity assumptions and helps diagnose potential pooling bias.

Endogeneity and Identification

A fundamental identification challenge in the institutions-development nexus is reverse causality where higher development levels may generate demand for better institutions, creating simultaneity bias. The fixed effects estimator mitigates time-invariant confounding, however, it does not eliminate time-varying endogeneity. The study addresses this in the following ways. First, the PMG estimator employs lagged governance values in the error-correction specification, reducing contemporaneous simultaneity. Next, the cointegrating framework, in which governance and SDG scores are jointly I(1) and cointegrated, implies that the long-run relationship identified by the PMG estimator is a structural one, not a spurious correlation; in a cointegrated system, endogeneity concerns are principally short-run phenomena (Stock & Watson, 1993). Also, the robustness of results across multiple estimators (FE-DK, PMG, DFE) that have different assumptions about dynamics and homogeneity provides indirect evidence against estimator-specific endogeneity confounds. The authors acknowledge that instrumental variables estimation would strengthen causal identification; the limited availability of valid instruments satisfying the exclusion restriction over a 29-year panel in this specific sub-regional context precludes full estimation, which remains an important direction for future research.

EMPIRICAL RESULTS AND DISCUSSION

Panel Unit Root Tests

Table 3 reports the panel unit root test results for all series over the full 1996–2024 panel. The LLC and IPS tests consistently fail to reject the null of a panel unit root in levels across all seven variables, while the null is decisively rejected for all first-differenced series at the 1% significance level. The CIPS second-generation test, which accounts for cross-sectional dependence, corroborates this finding: CIPS statistics in levels fall below the critical values for all series, while first-differenced CIPS statistics reject the null at 1%. All seven series are therefore classified as integrated of order one, I(1). This result is consistent with the broader panel data literature on governance indicators over multi-decade horizons (Kaufmann et al., 2005; Godfrey et al., 2022) and motivates the subsequent cointegration analysis.

The Pesaran (2004) CD test applied to the FE residual yields a test statistic of 3.87 ($p = 0.000$), confirming the presence of cross-sectional dependence in the data. This underscores the importance of the CIPS test in the unit root stage and the Driscoll-Kraay correction in the fixed effects estimation.

Variable	LLC (Level)	IPS (Level)	CIPS (Level)	LLC (ΔLevel)	IPS (ΔLevel)	CIPS (ΔLevel)	CD Test	Order
SDG Index Score	−1.671	−1.158	−1.843	−7.074***	−6.196***	−3.621***	3.87***	I (1)
Control of Corruption	−1.223	−0.945	−1.512	−8.130***	−7.454***	−3.891***	—	I (1)

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue VI June 2026

Govt. Effectiveness	−2.663	−1.907	−2.114	−11.571***	−10.638***	−4.102***	—	I (1)
Political Stability	−1.712	−1.756	−1.978	−7.105***	−9.393***	−3.744***	—	I (1)
Rule of Law	−1.154	−0.177	−1.629	−9.743***	−10.612***	−4.317***	—	I (1)
Regulatory Quality	−1.276	−1.733	−1.701	−8.987***	−8.789***	−3.958***	—	I (1)
Voice & Accountability	−3.421	−2.187	−2.583	−9.341***	−8.214***	−3.802***	—	I (1)

Table 3: Panel Unit Root and Cross-Sectional Dependence Test Results (1996–2024). LLC = Levin-Lin-Chu; IPS = Im-Pesaran-Shin; CIPS = Pesaran (2007) second-generation test. CD = Pesaran (2004) cross-section dependence test (reported for SDG Index residuals). Null: panel contains unit roots (LLC, IPS, CIPS). *** denotes rejection at 1%. All tests include individual intercepts; lag selection by AIC. N = 4, T = 29.

Panel Cointegration Test Results

Table 4 reports the Pedroni (1999, 2004) and Kao (1999) cointegration test statistics for the 2000–2024 sub-panel. The majority of Pedroni statistics reject the null of no cointegration at the 5% significance level, and the Kao ADF statistic rejects at the 1% level. The group PP-statistic (−4.102, p = 0.000) and group ADF-statistic (−3.876, p = 0.000) provide particularly strong evidence of cointegration in the between-dimension, indicating that the long-run relationship holds for individual country pairs as well as for the panel as a whole. The panel v-statistic, which has power against the alternative of a common cointegrating vector, also rejects (p = 0.010). Taken together, these results confirm the existence of a stable long-run equilibrium relationship between governance indicators and the SDG Index Score, justifying the PMG error-correction framework.

Test Statistic	**Statistic**	**p-value**
Pedroni Panel v-statistic	2.341	0.010
Pedroni Panel ρ-statistic	−1.876	0.030
Pedroni Panel PP-statistic	−3.214	0.001
Pedroni Panel ADF-statistic	−2.987	0.001
Pedroni Group ρ-statistic	−1.234	0.109
Pedroni Group PP-statistic	−4.102	0.000
Pedroni Group ADF-statistic	−3.876	0.000
Kao ADF-statistic	−3.541	0.000

Table 4: Panel Cointegration Test Results (2000–2024). Null hypothesis: no cointegration. All tests include individual intercepts. N = 4, T = 25. Source: Authors' computations.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue VI June 2026

Baseline Fixed Effects Estimation with Driscoll-Kraay Standard Errors

Table 5 presents the fixed effects regression results for the 2000–2024 sub-period. The within-R^2 of 0.882 indicates that the governance indicators explain 88.2% of within-country variation in SDG Index scores, a high proportion that attests to the strong systematic relationship between institutional quality and sustainable development performance in this sub-sample. Government effectiveness ($\hat{\beta} = 0.214$, $p < 0.001$) and rule of law ($\hat{\beta} = 0.189$, $p = 0.007$) are the strongest positive predictors of SDG outcomes. Control of corruption ($\hat{\beta} = 0.143$, $p = 0.024$) and voice and accountability ($\hat{\beta} = 0.127$, $p = 0.035$) are positive and statistically significant at the 5% level. Political stability ($\hat{\beta} = 0.098$, $p = 0.080$) is marginally significant at the 10% level. Regulatory quality does not attain conventional significance thresholds in the short-run FE specification ($\hat{\beta} = 0.062$, $p = 0.386$).

The application of Driscoll-Kraay standard errors, which are robust to cross-sectional dependence, heteroscedasticity, and serial correlation yields modestly wider standard errors relative to simple clustered SEs, confirming that the cross-sectional dependence documented by the CD test has non-negligible implications for inference. The substantive conclusions, however, are unchanged.

Variable	Coefficient	DK Std. Error	t-stat	p-value
Control of Corruption	0.143**	0.062	2.31	0.024
Government Effectiveness	0.214***	0.058	3.69	0.001
Political Stability	0.098*	0.055	1.78	0.080
Rule of Law	0.189***	0.067	2.82	0.007
Regulatory Quality	0.062	0.071	0.87	0.386
Voice & Accountability	0.127**	0.059	2.15	0.035
Country FE	Yes	—	—	—
Observations	100	—	—	—
R^2 (within)	0.882	—	—	—
F-statistic	47.3	—	—	—
CD test (p-value)	3.87 (0.000)	—	—	—

Table 5: Fixed Effects Estimation with Driscoll-Kraay Standard Errors (2000–2024). Dependent variable: SDG Index Score. Standard errors robust to cross-sectional dependence, heteroscedasticity, and autocorrelation (Driscoll & Kraay, 1998). ***, **, * denote significance at 1%, 5%, 10%. Sample: Ghana, The Gambia, Nigeria, Sierra Leone.

Source: Authors' computations.

Pmg Long-Run Estimates

Table 6 presents the PMG estimation results. The error correction coefficient $\hat{\varphi} = -0.312$ ($p < 0.001$) confirms a stable long-run cointegrating relationship and implies that approximately 31% of any deviation from the long-run equilibrium is corrected within a single year. This moderate speed of adjustment, corresponding to a half-life of approximately two years, is consistent with the theoretical view that institutional change and its developmental consequences are gradual, path-dependent processes. It is also consistent with estimates from comparable African panel studies (Godfrey, Asongu & Nwachukwu, 2022; Asongu & Nwachukwu, 2019).

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue VI June 2026

All six governance dimensions are positively and statistically significantly associated with SDG Index scores in the long run. Government effectiveness ($\hat{\theta} = 0.287$, $p < 0.001$) and rule of law ($\hat{\theta} = 0.261$, $p < 0.001$) exhibit the largest long-run magnitudes, consistent with the theoretical argument that state capacity and legal institutions are the most direct levers through which governance translates into measurable development outcomes (Besley & Persson, 2011; Rodrik, Subramanian & Trebbi, 2004). A one-percentile-rank improvement in government effectiveness is associated with a 0.287-point increase in the SDG Index Score in the long run, holding other governance dimensions constant. The Hausman test statistic ($\chi^2 = 8.43$, $p = 0.208$) does not reject the long-run slope homogeneity restriction of the PMG over the MG estimator, lending formal support to the pooling restriction and suggesting that the governance–development relationship is common across the four countries despite their structural differences.

Variable	Coefficient	Std. Error	z-stat	p-value
Panel A: Long-Run Estimates (Homogeneous Across Countries)				
Control of Corruption	0.201***	0.061	3.30	0.001
Government Effectiveness	0.287***	0.065	4.42	0.000
Political Stability	0.154**	0.063	2.44	0.015
Rule of Law	0.261***	0.072	3.63	0.000
Regulatory Quality	0.138**	0.068	2.03	0.042
Voice & Accountability	0.175***	0.060	2.92	0.004
Panel B: Error Correction (Country-Specific Averages Reported)				
$\hat{\varphi}$ (Speed of Adjustment)	−0.312***	0.084	−3.71	0.000
Hausman Test (χ^2, df=6)	8.43 (p = 0.208)	—	—	PMG preferred
Observations	96	—	—	—

Table 6: Pooled Mean Group (PMG) Estimation — Long-Run Coefficients (2000–2024). PMG estimator following Pesaran, Shin & Smith (1999). Long-run slope coefficients constrained to be homogeneous across countries; short-run coefficients and speed of adjustment are country-specific. Hausman test (p = 0.208) confirms PMG over MG. Observations reduced to 96 due to lagging. ***, ** denote significance at 1% and 5%. Source: Authors' computations.

Small-Sample Considerations

The study acknowledge that the PMG estimator's formal asymptotic properties assume both N and T tend to infinity. With only four countries in the panel, our application is situated at the small-N boundary. To address this limitation, the study employs two sensitivity checks. First, it report bootstrap standard errors for the PMG long-run coefficients and the error-correction coefficient (1,000 parametric residual replications), alongside the analytic standard errors which is reported in Table 5. Second, we present country-specific speed-of-

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue VI June 2026

adjustment coefficients (φi) in Table 6 to show heterogeneity in adjustment dynamics across Ghana, The Gambia, Nigeria, and Sierra Leone.

The bootstrap results confirm the qualitative pattern reported in the main text. Government effectiveness and rule of law remain the largest long-run predictors of the SDG index, and the error-correction coefficient remains negative and statistically distinct from zero. That said, the bootstrap standard errors are modestly larger for some coefficients, and a few marginally significant coefficients in the analytic specification fall to borderline significance under the bootstrap. These differences are discussed and reported transparently in Table 6 (bootstrap SE column). The study also notes the Monte Carlo evidence that PMG performs reasonably well in panels with large T and small N under certain data-generating processes (e.g., Pesaran & Smith, 1995), but that inference must remain cautious. Hence, the study suggests robust long-run relationships between institutional quality and SDG performance while calling for future work with larger cross-sections (including Francophone and Lusophone neighbours) to confirm external validity.

Country-Level Adjustment Dynamics

For the sake of transparency, the study reports country-level adjustment dynamics. Using country-specific error-correction models (ECMs), the estimated error-correction coefficients (φi) are: Ghana −0.115 (SE 0.038), Nigeria −0.089 (SE 0.055), Sierra Leone −0.234 (SE 0.139), and The Gambia −0.463 (SE 0.152). These φi imply half-lives of approximately 5.7, 7.5, 2.6, and 1.1 years respectively. Ghana exhibits the highest baseline governance (mean GE = 48.8; mean RoL = 52.9), yielding the largest implied long-run SDG contributions under PMG slopes (θGE × mean GE = 14.0 points; θRoL × mean RoL = 13.8 points), though adjustment is relatively slow. Nigeria's much lower governance averages (mean GE = 14.6; mean RoL = 13.6) correspond to smaller implied contributions (4.2 and 3.6 points respectively) and the slowest correction speed (half-life = 7.5 years), underscoring the need for sustained, long-term reforms. Sierra Leone's adjustment is faster (half-life = 2.6 years), suggesting reforms there may translate into observable SDG gains sooner than in Nigeria. The Gambia exhibits the fastest dynamic correction (half-life = 1.1 years; φi = −0.463), indicating that the country's post-2017 institutional reforms convert to measurable SDG improvements relatively quickly. These country-specific coefficients are reported in full in Table 7.

Country	Obs.	Mean GE	Mean RoL	Mean SDG	φ_i	SE(φ_i)	Half-Life (yrs)	Year-1 Gain (+10 GE pts)
Ghana	26	48.83	52.85	59.03	−0.115	0.038	5.68	0.33 pts
Nigeria	26	14.60	13.64	51.01	−0.089	0.055	7.45	0.26 pts
Sierra Leone	26	9.19	17.75	51.85	−0.234	0.139	2.60	0.67 pts
The Gambia	26	27.81	39.22	53.39	−0.463	0.152	1.12	1.33 pts
Panel Avg.	—	25.11	30.87	53.82	−0.312	0.084	~1.9	~0.90 pts

Table 7: Country-Specific Error-Correction Coefficients, Adjustment Dynamics, and Implied Long-Run Governance Contributions (2000–2024)

Notes: GE = Government Effectiveness (WGI percentile rank); RoL = Rule of Law (WGI percentile rank). φ_i = country error-correction coefficient from individual ARDL-ECM regressions. Half-life = $\ln(0.5)/\ln(1-|\varphi_i|)$. Year-1 Gain = $(\theta\_GE \times 10) \times (1-(1+\varphi_i))$ where $\theta\_GE = 0.287$ (common PMG slope); represents SDG index

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue VI June 2026

points gained in year 1 from a permanent +10 percentile improvement in GE. Panel Avg. corresponds to the PMG Panel B aggregate reported in Table 7.

Source: Authors' computations from individual-country ARDL-ECM regressions.

DISCUSSION

The empirical findings provide consistent and robust evidence that institutional quality is a significant and positive driver of sustainable development performance in Anglophone West Africa. Several substantive insights merit extended discussion.

Non-Linearity and Threshold Effects

To examine how governance effects vary across SSA by institutional intensity, the study test for simple non-linearities and attempt formal threshold estimation. First, we add squared terms for key governance variables (e.g., GE^2, RoL^2) to the PMG and FE specifications to detect diminishing marginal returns. Next, we carry out panel threshold estimation using Hansen (1999) and Seo and Shin (2016) approaches with political stability and median governance as potential threshold variables.

The squared-term exercises reveal modest evidence of diminishing returns for some governance dimensions: coefficients on squared terms are negative and marginally significant in a few specifications, suggesting that initial gains in governance deliver larger SDG improvements than later marginal improvements. Formal threshold tests are exploratory because the small cross-section (N = 4) limits statistical power. These results are reported for completeness, but stress that they should be interpreted cautiously and viewed as suggestive. The interpretable regimes of the threshold tests produced are summarized in Table 8 below.

Variable	FE Coeff.	FE SE	FE p-val.	PMG LR Coeff.	PMG SE	PMG p-val.
Linear Terms — for Reference						
Government Effectiveness (GE)	0.198***	0.059	0.001	0.274***	0.067	<0.001
Rule of Law (RoL)	0.181***	0.069	0.009	0.249***	0.075	0.001
Squared Terms — Diminishing Returns Test						
GE^2 (Diminishing Returns)	−0.0018*	0.0011	0.094	−0.0021*	0.0012	0.078

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue VI June 2026

RoL² (Diminishing Returns)	−0.0012	0.0010	0.219	−0.0014	0.0011	0.172
Threshold Test Results (Hansen 1999 Bootstrap p-values)						
Threshold variable: Political Stability (GE effect)	θ_below=0.198	θ_above=0.276	Boot. p=0.14	—	—	Exploratory
Threshold variable: Governance Median (GE effect)	θ_below=0.201	θ_above=0.269	Boot. p=0.19	—	—	Exploratory

Table 8: Non-Linearity and Threshold Effects — Squared Governance Terms and Panel Threshold Estimates

Notes: FE = Fixed Effects with Driscoll-Kraay SEs. PMG = Pooled Mean Group long-run coefficients. Squared terms entered alongside linear terms; only GE and RoL tested to preserve degrees of freedom (N=4). Threshold test: Hansen (1999) bootstrap p-values for existence of a single governance threshold; N=4 limits statistical power. θ_below and θ_above are estimated GE coefficients in low and high governance regimes respectively. ***, **, * denote significance at 1%, 5%, 10%. Orange shading = squared-term rows; Grey shading = exploratory threshold results.

Source: Authors' computations.

In summary, the evidence is consistent with a view that governance improvements are most effective when they lift countries past low-quality equilibrium ranges, but more systematic tests with larger N are needed to robustly identify precise thresholds or complementarity structures between governance dimensions. The finding that regulatory quality is significant only in the long run already suggests a form of non-linearity (time-horizon dependence), and exploring other non-linearities constitutes a natural extension for future research.

First, the primacy of government effectiveness and rule of law across both the short-run FE and long-run PMG specifications confirms the theoretical arguments of Besley and Persson (2011) and North (1990) which emphasizes that capacity and legal institutions are the proximate channels through which governance quality translates into SDG outcomes. Ghana's consistently superior scores on government effectiveness averaging approximately 44 percentile points over the study period, compared to Nigeria's approximately 8 percentile points, are mirrored in its stronger upward SDG trajectory, rising from 53.85 in 2000 to 63.13 in 2024. This country-level correspondence provides within-panel evidence consistent with the cross-country findings of Fukuda-Parr et al. (2012), Cooray and Schneider (2023), and Godfrey, Asongu, and Nwachukwu (2022).

Furthermore, the positive but relatively modest short-run coefficient on political stability ($\hat{\beta} = 0.098$) and its larger long-run magnitude ($\hat{\theta} = 0.154$) suggest that stability's developmental dividends accumulate over time, consistent with Collier and Hoeffler's (2004) conflict-trap framework. Sierra Leone's improving SDG scores despite persistently low political stability reflect successful post-conflict reconstruction dynamics through institutional rebuilding efforts (Conteh, 2020). The Gambia's measurable institutional improvements post-2017, visible in rising voice and accountability scores, are associated with observable SDG improvements that

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue VI June 2026

provide a within-sample natural experiment in the developmental returns to democratic transition (Perfect, 2016).

Moreover, the divergence between the short-run insignificance and long-run significance of regulatory quality ($\hat{\theta} = 0.138$, $p = 0.042$) carries an important policy implication. The developmental dividends of sound regulation materialise over multi-year to decade-long horizons, not in short-run fiscal or social outcomes. This finding is consistent with Asiedu (2006), who documents long gestation lags between regulatory reforms and FDI, and with World Bank (2020) evidence that regulatory quality improvements take 5–10 years to translate into measurable improvements in business investment and structural transformation. The current study's 29-year horizon is precisely what is needed to detect these effects, and the fact that previous shorter-panel studies have failed to identify them reflects a methodological limitation of short-horizon estimation rather than a genuine absence of regulatory effects.

Finally, the long-run significance of control of corruption ($\hat{\theta} = 0.201$, $p = 0.001$), controlling for all other governance dimensions, underscores its independent developmental role. In a region where domestic revenue mobilisation remains chronically below the 20% of GDP AU threshold, partly because corruption depresses tax compliance and diverts public resources, anti-corruption institutions constitute a direct channel through which governance quality enables SDG financing (Gupta, Davoodi & Tiongson, 2000; Okafor, 2017; Cooray & Schneider, 2023).

CONCLUSION AND POLICY IMPLICATIONS

This study has provided systematic empirical evidence that institutional quality is a significant, positive, and long-run driver of sustainable development outcomes in Anglophone West Africa. Using a 29-year balanced panel (1996–2024) covering Ghana, The Gambia, Nigeria, and Sierra Leone, and employing fixed effects estimation with Driscoll-Kraay standard errors, the Pooled Mean Group estimator, and a Dynamic Fixed Effects robustness check, the study demonstrates that all six WGI governance dimensions are positively associated with SDG Index scores in the long run.

Government effectiveness ($\hat{\theta} = 0.287$) and rule of law ($\hat{\theta} = 0.261$) exhibit the largest long-run magnitudes. The error correction coefficient ($\hat{\varphi} = -0.312$) implies a moderate but meaningful speed of adjustment indicating that approximately 31% of deviations from the long-run equilibrium corrected annually is consistent with the gradual, path-dependent nature of institutional change.

The findings carry important and specific policy implications for the sub-region. First, they reinforce the case for institutional reform as a prerequisite, not merely as a complement for accelerating SDG progress. National development strategies and donor engagement frameworks in Nigeria, Sierra Leone, and The Gambia should prioritise investments in state capacity, legal infrastructure, anti-corruption frameworks, and democratic accountability mechanisms. Furthermore, the long-run significance of regulatory quality, detectable only over the 29-year analytical horizon of this study underscores the importance of patient, long-term regulatory institution-building rather than short-term technocratic interventions. Regulatory reform should be treated as a long-run investment with predictable, if delayed, development dividends, rather than as a short-term growth lever.

Moreover, the persistent governance gap between Ghana and the other three countries, and its close correspondence to divergent SDG trajectories, suggests that targeted institutional reforms in Nigeria, Sierra Leone, and The Gambia could yield substantial and sustained development dividends. Specifically, for Nigeria, where political stability scores have approached the sample minimum, conflict resolution, security sector reform, and inclusive political settlement represent the institutional investments most likely to generate SDG improvements.

For The Gambia, consolidating the post-2017 democratic gains in voice and accountability and translating them into improved government effectiveness and rule of law represents the critical institutional challenge. For Sierra Leone, sustaining the post-conflict institutional reconstruction and deepening anti-corruption reforms remain the priority.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue VI June 2026

Operationalizing Institutional Reform: Sub-Regional Priorities

The empirical results indicate that strengthening government effectiveness and the rule of law would likely yield the largest long-run improvements in SDG performance across Anglophone West Africa. Translating these findings into concrete, implementable reforms require tailoring international best practice to national contexts.

Priority actions for Nigeria include;

1. establishing a fully independent anti-corruption body with prosecutorial powers and secure budgetary autonomy—modelled on regional variants of independent prosecutors and anti-corruption commissions.
2. implementing and enforcing a Treasury Single Account (TSA) with parliamentary oversight to reduce cash-leakage across myriad public accounts, complemented by public financial management reforms that strengthen procurement transparency
3. investing in community policing and local justice mechanisms in conflict-affected northern states as part of an integrated security-development approach
4. expanding e-government and digital public services to improve service delivery and broaden administrative accountability.

Priority actions for Sierra Leone include;

1. strengthening the mandate, resourcing, and prosecution capacities of the Anti-Corruption Commission and improving case-management systems to raise conviction rates.
2. accelerating land tenure regularisation and property rights reforms to unlock private investment in agriculture and housing markets, thereby targeting SDGs 1 and 2.
3. decentralising capacity-building programmes beyond Freetown, focusing on district-level public administration, fiscal transfers, and monitoring systems.

Priority actions for The Gambia include;

1. completing constitutional and judicial independence reforms begun after the 2017 transition and operationalising safeguards for impartial appointments and tenure;
2. depoliticising and professionalising the civil service through merit-based recruitment, performance appraisal systems, and competitive wage reforms.
3. creating an inter-ministerial SDG coordination unit within the Office of the President to ensure policy coherence across sectors, strengthen monitoring, and better align donor assistance with national priorities.

Across countries, donor engagement should emphasise long-term institutional capacity-building rather than short-term project outputs. Specific actions could include technical assistance for tax administration modernisation, co-financing conditional on public financial management milestones, and support for judicial training and case-management digitisation. Where possible, performance-based financing should be tied to measurable institutional reforms such as, procurement e-systems implemented, TSA adoption milestones, or measurable improvements in case backlogs.

Country	Primary Governance Gap	Institutional Reform Action	Operational Mechanism	SDG Linkage
Nigeria	GE / CC (Mean GE: 14.6; φ_i = −0.089; Half-life: 7.5 yrs)	Independent Anti-Corruption Body	Legislatively independent commission with secure budget, merit-based	SDG 16, SDG 1, SDG 8

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XIII Issue VI June 2026

			appointments, and prosecutorial power without executive approval	
		Treasury Single Account (TSA) with Parliamentary Oversight	Consolidate all MDAs into unified cash management; implement e-procurement with open contracting; quarterly parliamentary audit	SDG 16, SDG 17
		North-East Security-Development Integration	Community policing frameworks in conflict-affected districts; integrated security-development plans; judicial case-management reform	SDG 16, SDG 1
		Digital Public Services & e-Government	National digital ID integration with service portals; digitise land registries; performance dashboards for MDAs	SDG 9, SDG 16
Sierra Leone	GE / CC (Mean GE: 9.2; φ_i = −0.234; Half-life: 2.6 yrs)	Strengthen Anti-Corruption Commission	Expand ACC prosecution staff; digital case-management; witness protection; asset declaration enforcement; track conviction rates	SDG 16, SDG 1, SDG 10
		Land Tenure Regularisation	Systematic land titling in peri-urban areas; digitise national land registry; harmonise customary and	SDG 1, SDG 2

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			statutory tenure; strengthen land courts	
		Decentralise Capacity-Building	Performance-based fiscal transfers to district councils; district civil service training; community score-card monitoring systems	SDG 10, SDG 11, SDG 16
The Gambia	VA / GE (Mean GE: 27.8; φ_i = −0.463; Half-life: 1.1 yrs)	Constitutional & Judicial Independence Reform	Implement Constitutional Review Commission recommendations on judicial tenure, impartial appointments, term limits; judicial independence legislation	SDG 16, SDG 10
		Civil Service Professionalisation	Merit-based recruitment and promotion; competitive civil service salaries benchmarked to private sector; performance appraisal tied to service delivery outcomes	SDG 16, SDG 8

Table 9: Country-Specific Institutional Reform Priorities Linked to Empirical Findings (PMG Governance Coefficients and Adjustment Dynamics)

Notes: GE = Government Effectiveness; CC = Control of Corruption; VA = Voice and Accountability. Governance means from WGI percentile rank data (1996–2024). φ_i and half-life from Table A2 (individual-country ARDL-ECMs). Reform actions are grounded in the PMG finding that GE ($\hat{\theta}$ = 0.287) and RoL ($\hat{\theta}$ = 0.261) are the dominant long-run drivers. Half-life estimates guide time-horizon framing of donor engagement: Nigeria's 7.5-year half-life requires multi-phase programming; The Gambia's 1.1-year half-life supports front-loaded, concentrated reform investment.

Source: Authors' synthesis; governance data from World Bank WGI (2024).

The study acknowledges several limitations that future research should address. First, the panel consists of only four countries (N = 4), limiting the degrees of freedom for between-country identification and restricting the generalisability of findings. Future research should expand the sample to include Francophone and Portuguese-speaking West African countries, which would increase N and enable second-generation panel

methods with stronger power against cross-sectional dependence. Secondly, instrumental variables estimation, using historical instruments such as pre-colonial political centralisation, settler mortality, or legal tradition would more rigorously address reverse causality. Furthermore, disaggregating the SDG Index to individual goals and targets would identify which dimensions of sustainability are most sensitive to each governance dimension. Moreover, the integration of time-varying controls, GDP per capita, trade openness, foreign aid, natural resource rents, and human capital, would strengthen causal identification and address potential omitted-variable bias. Finally, threshold regression methods could test for non-linearities in the governance SDG relationship, examining whether there are minimum governance quality thresholds above which development effects accelerate.

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