

## Asymmetric Effects of Governance on International Migration in Africa: A Regional Analysis

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### Abstract

*This study assesses the asymmetric effects of governance on net migration across five African regions using panel data from 1996 to 2023. Grounded in neoclassical migration theory, push-pull frameworks, and institutionalist perspectives, the research applies dynamic non-stationary heterogeneous panel estimators where Mean Group(MG) estimator was found to be more efficient based on the results of the Hausman test. The study also tests for heterogeneity, causality, and long-run equilibrium relationships. Findings from the study confirm that governance, population growth, unemployment, and income differentials significantly predict migration flows, though with region-specific dynamics. The study also found that negative governance shocks (deterioration in governance such as institutional decay) exert stronger and more immediate effects on reducing net migration (or increasing net out-migration) than positive governance reform, especially in fragile states. Demographic pressures and unemployment remain consistent long-run drivers of outward migration, particularly in Eastern and Western Africa, while income convergence reduces migration incentives. The study recommends that policymakers should implement regionally tailored, governance-driven reforms that promote institutional accountability, manage demographic pressures through education and health investments, create inclusive jobs via labor-intensive growth, reduce income disparities with pro-poor macroeconomic policies, and adopt flexible regional migration protocols linked to political stability.*

**Keywords:** Africa, Asymmetric effects, Governance, Institutions, Net migration

## Introduction

International migration has become a defining feature of global development, economic integration, and geopolitical stability in the twenty-first century (Dinbabo et al., 2025; Nzabamwita & Dinbabo, 2022). Migration decisions are shaped by a complex interaction of economic opportunities, demographic change, conflict, environmental stress, and institutional conditions. While classical migration theories primarily explain migration through wage differentials, labour market disequilibria, and human capital considerations (Todaro, 1969; Borjas, 1989), more recent scholarship increasingly recognizes that governance institutions fundamentally influence individuals' decisions to migrate by influencing political security, economic opportunities, public service delivery, and trust in the state.

Growing empirical evidence demonstrates that governance quality is an important determinant of migration. Studies have shown that political stability, government effectiveness, corruption, and institutional quality significantly influence both the magnitude and direction of international migration flows (Ariu et al., 2016; Kwilinski et al., 2022; Bernini et al., 2024; Ghelli et al., 2022). Poor governance often functions as a powerful push factor by weakening economic prospects, reducing state legitimacy, and increasing insecurity, whereas improvements in governance may encourage citizens to remain, return, or engage more productively with their home countries. Earlier studies also identify political violence, human rights abuses, and institutional failure as important drivers of forced migration (Bush, 1996; Rowlands, 1999). Collectively, this literature suggests that migration is not simply an economic phenomenon but also an institutional response to the quality of governance.

However, despite these advances, three important gaps remain in the literature. First, most governance-migration studies continue to assume that governance affects migration symmetrically, implying that improvements and deteriorations exert equal but opposite effects. Such an assumption is inconsistent with the realities of migration decision-making, where institutional collapse often triggers rapid population movements, whereas governance improvements may require considerable time before altering migration expectations or encouraging return migration. Second, although asymmetric modelling approaches have recently been applied to governance and migration relationships in some developing-country settings, relatively little evidence exists for Africa, where governance volatility, institutional diversity, and migration systems differ substantially from those observed elsewhere. Consequently, it remains unclear whether findings from other developing regions are transferable to African contexts. Third, existing cross-country African studies generally treat the continent as a homogeneous unit, overlooking substantial regional differences in governance trajectories, migration regimes, conflict exposure, and economic integration.

These gaps are particularly important because Africa represents one of the world's most institutionally heterogeneous migration systems. The continent hosts more than 40 million international migrants, with over half of these movements occurring within Africa (IOM, 2024; United Nations Department of Economic and Social Affairs, Population Division, 2020). Migration patterns differ considerably across North, West, East, Central, and Southern Africa owing to variations in governance quality, political stability, regional integration, colonial legacies, and socioeconomic structures. Consequently, assuming a common governance-

migration relationship across the continent may obscure important regional dynamics and produce misleading policy conclusions.

Governance comprises multiple dimensions including voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption that evolve differently across countries and over time (Thomas, 2010; Barbazza & Tello, 2014). These institutional dimensions frequently experience sudden deteriorations arising from electoral crises, armed conflict, unconstitutional changes of government, or state fragility, while improvements often emerge gradually through institutional reforms and capacity building. From a theoretical perspective, this suggests that migration responds to governance changes in a fundamentally nonlinear manner. Rather than viewing governance as a static determinant, migration theory should recognise governance as a dynamic institutional process whose positive and negative shocks generate different behavioural responses because migrants respond not only to current institutional conditions but also to expectations regarding future political and economic stability. Accordingly, this study investigates whether improvements and deteriorations in governance exert asymmetric effects on net migration across Africa's five sub-regions (North, West, Central, East, and Southern Africa). Employing a nonlinear panel autoregressive distributed lag (NPARDL) framework estimated using the Mean Group estimator enables the decomposition of governance changes into positive and negative shocks, thereby identifying whether migration responds differently to institutional improvements and institutional decline in both the short and long run.

Unlike previous African studies that either assume symmetric governance effects or analyse Africa as a single aggregate entity, this study advances the governance-migration literature in three important ways. First, it contributes conceptually by extending institutional perspectives on migration to incorporate asymmetric behavioural responses, arguing that migration decisions are shaped not merely by governance quality but by the direction and persistence of institutional change. Second, it provides one of the first continent-wide comparative assessments of asymmetric governance effects across Africa's five sub-regions, thereby demonstrating how regional institutional heterogeneity conditions migration responses. Third, beyond methodological innovation, the findings generate new theoretical insights into why governance deterioration and governance improvement should not be treated as equivalent processes in migration research, thereby offering a more nuanced understanding of migration dynamics in institutionally diverse developing regions.

This study makes three principal contributions to the governance-migration literature. First, it advances migration theory by demonstrating that governance should be conceptualised as a dynamic institutional process rather than a static determinant of migration. The findings show that improvements and deteriorations in governance generate qualitatively different migration responses, supporting the argument that migration decisions depend on the direction and persistence of institutional change rather than simply the level of governance. Second, by analysing Africa's five sub-regions separately, the study reveals substantial regional heterogeneity in the governance-migration nexus, challenging the widespread practice of treating Africa as a homogeneous migration system. This spatially disaggregated perspective contributes new evidence to the growing literature on geographically contingent migration dynamics. Third, although nonlinear modelling has been employed in some governance and migration studies outside Africa, this study demonstrates the value of combining asymmetric

estimation with regional institutional heterogeneity to explain migration patterns in one of the world's most diverse governance environments. The contribution therefore extends beyond methodological innovation by offering a conceptual framework that links institutional asymmetry and regional heterogeneity within migration theory.

From a policy perspective, these contributions are particularly relevant as the African Union's Migration Policy Framework for Africa (MPFA), Agenda 2063, and the African Continental Free Trade Area (AfCFTA) increasingly place governance at the centre of migration management. Policies designed under the assumption that governance improvements automatically reverse migration pressures may overlook the persistence of migration responses following periods of institutional decline. Conversely, failing to anticipate the disproportionate migration consequences of governance deterioration may limit the effectiveness of early warning systems and regional migration governance. By explicitly modelling asymmetric governance effects across Africa's five sub-regions, this study provides evidence that can support more targeted regional migration policies while also contributing to broader migration theory by demonstrating that institutional change is inherently nonlinear and spatially heterogeneous.

The rest of this paper is structured as follows: section 2 presents review of the existing literature, critically engaging with both classical and contemporary theories of migration, and situating governance within this broader scholarly discourse. It identifies key empirical gaps and theoretical debates that justify the current study. Section 3 outlines the methodological framework. Section 4 presents the empirical results and discussion. Finally, Section 5 presents the conclusion and offers policy recommendations tailored to regional realities.

## **Literature Review**

### **Empirical Review**

The relationship between governance and net migration has received growing empirical attention. While early migration studies primarily emphasized economic incentives such as wage differentials, labour market conditions, and income opportunities (Sjaastad, 1962; Todaro, 1969; Borjas, 1989), recent research increasingly recognizes governance as a fundamental determinant of migration decisions. Governance influences migration through multiple institutional channels, including political stability, rule of law, government effectiveness, accountability, and control of corruption, all of which influence economic opportunities, personal security, and confidence in public institutions. Existing empirical evidence consistently demonstrates that governance significantly influences migration outcomes. Ariu et al. (2016), using bilateral migration data for highly skilled migrants, found that institutional quality in both origin and destination countries significantly determines net migration flows. Better governance attracts skilled migrants while weak institutions accelerate human capital outflows through brain drain. Similarly, Giang et al. (2020), applying a gravity model to inter-provincial migration in Vietnam, found that governance quality, particularly transparency, administrative efficiency, and control of corruption, significantly affects migration decisions alongside income differentials. Likewise, Kwilinski et al. (2022), employing Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS) for a panel of countries between 2000 and 2018, reported that corruption, political stability, unemployment, income inequality, and environmental degradation jointly explain international migration flows. Although these studies establish governance as a critical migration

determinant, they generally assume that governance improvements and governance deterioration affect migration symmetrically, an assumption that may overlook the nonlinear nature of migration responses.

A related strand of literature has examined specific governance dimensions, particularly corruption. Bernini et al. (2024) demonstrated that corruption simultaneously functions as a push factor in origin countries and a pull factor in destinations with stronger institutional quality, thereby influencing bilateral migration decisions across European countries. Similarly, Ghelli et al. (2022), using fixed-effects and system Generalized Method of Moments (GMM) estimators for migration from Sub-Saharan Africa to OECD countries between 2000 and 2019, found that rising corruption significantly increases emigration. These findings buttress the importance of institutional quality but remain limited by their linear specification, which assumes that improvements in governance generate effects that mirror governance deterioration. Consequently, they do not examine whether governance deterioration triggers disproportionately larger migration responses than governance improvements.

The governance-migration nexus assumes particular importance in Africa, where migration is characterized by substantial intra-regional mobility alongside increasing extra-continental migration. According to the International Organisation for Migration (2024), more than half of Africa's international migrants reside within the continent, reflecting the importance of regional labour markets, free movement agreements, conflict, environmental change, and governance conditions in shaping migration patterns. The report further documents substantial regional differences in migration dynamics, with West and Central Africa characterized by labour mobility under the ECOWAS Protocol, Eastern Africa experiencing migration linked to conflict, climate change, and regional integration, and North Africa serving as both a destination and transit corridor for irregular migration. Earlier African scholarship similarly emphasized the importance of governance and political instability in influencing migration. Adepoju (1995) identified poverty, economic decline, political instability, environmental stress, and weak governance as principal drivers of migration within and from Sub-Saharan Africa. Likewise, Rowlands (1999) argued that poor governance contributes significantly to emigration from developing countries through institutional deterioration and declining state legitimacy, while Bush (1996) emphasized that political violence, human rights violations, and state repression constitute major governance-induced drivers of forced migration.

Despite substantial advances in the governance-migration literature, several important gaps remain. First, most empirical studies estimate linear or symmetric relationships, implicitly assuming that governance improvements and governance deterioration exert equal but opposite effects on migration. Such an assumption may not adequately capture migration behaviour, particularly in fragile institutional environments where governance collapse may trigger immediate migration while governance improvements generate slower behavioural adjustments. Second, although recent studies have examined governance and migration across Europe, Asia, and other developing regions (Ariu et al., 2016; Giang et al., 2020; Bernini et al., 2024), empirical evidence on asymmetric governance effects in Africa remains extremely limited. Finally, existing African studies largely analyse the continent as a single entity or focus on migration governance institutions rather than quantitatively examining how governance dynamics influence migration across different African sub-regions. It is against this background that the present study contributes to the existing literature.

## Theoretical and Conceptual Framework

**Neo-Classical Migration Theory:** The neoclassical migration theory remains one of the most influential frameworks for explaining international migration. The theory originated with Hicks (1932), who argued that geographical differences in wages and employment opportunities constitute the primary motivation for migration. Lewis (1954) subsequently extended this argument through the dual-sector model, explaining labour migration as the movement of surplus labour from low-productivity agricultural sectors to higher-productivity industrial sectors. Harris and Todaro (1970) further refined the theory by introducing expected income into migration decisions, arguing that migration depends not only on wage differentials but also on the probability of obtaining employment at the destination. Consequently, migration is viewed as a rational response to expected income maximisation rather than actual wage differences. At the microeconomic level, Sjaastad (1962) conceptualized migration as an investment in human capital. Individuals compare the expected lifetime benefits of migration with associated financial, social and psychological costs before deciding whether migration is worthwhile. Borjas (1989) further expanded the neoclassical framework by emphasising the role of individual skills and self-selection in international migration, arguing that migrants respond rationally to expected returns across labour markets. Despite its enduring relevance, the neoclassical model has been criticized for overemphasising economic incentives while paying insufficient attention to institutional, political and social determinants of migration (Arango, 2000). Governance failures, political instability, corruption and weak institutions frequently alter migration decisions even where economic incentives remain unchanged. Consequently, contemporary migration studies increasingly integrate governance variables into the neoclassical framework. In this study, the theory provides the economic foundation for explaining the effects of income differentials, unemployment and demographic pressures on migration, while governance is incorporated as an institutional factor capable of modifying or reinforcing these economic incentives.

**Push-Pull Theory of Migration:** The Push-Pull Theory originated with Ravenstein's (1885, 1889) Laws of Migration and was subsequently formalized by Lee (1966), who argued that migration results from the interaction of adverse conditions in places of origin (push factors) and favourable opportunities in destination areas (pull factors). Push factors include unemployment, poverty, political instability, conflict, environmental degradation and weak governance, whereas pull factors include employment opportunities, security, political stability and better institutional quality. The framework has remained one of the most widely applied migration theories because of its flexibility in incorporating economic, demographic, environmental and institutional determinants of migration. More recent studies have extended the framework by emphasising that migration decisions are influenced by individuals' evaluation of the relative attractiveness of alternative locations rather than any single determinant (Pan & Pan, 2019). Nevertheless, critics argue that the theory treats push and pull factors as independent and generally assumes that their effects are symmetric (de Haas, 2008; Kureková, 2011). Such an assumption implies that improvements in governance reduce migration by the same magnitude that governance deterioration increases it. This study departs from that assumption by arguing that governance-related push factors exhibit inherently asymmetric effects. In fragile institutional environments, governance deterioration may generate immediate migration responses through heightened uncertainty and insecurity. Conversely, governance improvements often require sustained institutional reforms before restoring public confidence and significantly reducing migration pressures. Consequently, the push-pull framework provides the theoretical basis for

hypothesising that governance deterioration exerts stronger migration effects than governance improvements.

**Institutional Migration Theory:** Institutional approaches to migration extend traditional economic theories by emphasising that migration decisions are embedded within broader political, legal and governance structures. Castles, et al. (2020) argue that migration is influenced not only by economic opportunities but also by state institutions, governance quality, migration policies, legal systems and broader political contexts. Weak institutions, limited accountability, political instability and poor public service delivery reduce citizens' confidence in the state and increase incentives to migrate, whereas effective governance enhances social stability and may reduce emigration pressures. Recent governance literature reinforces this perspective. Munck (2008) argues that migration governance reflects broader processes of globalisation and institutional inequality, while Urso and Hakami (2018) demonstrate that regional migration governance through the African Union and Regional Economic Communities increasingly shapes migration management across Africa. More recently, Mudungwe (2025) shows that inadequate investment in migration governance has constrained African countries' capacity to manage migration effectively despite its significant developmental contributions. Similarly, Bakewell and Talleraas (2026) argue that African migration governance increasingly reflects interactions between domestic institutions and external actors, resulting in diverse governance patterns across the continent.

Building on this literature, the present study extends institutional migration theory by introducing an asymmetric perspective. Rather than assuming that governance improvements and governance deterioration produce equal but opposite migration responses, the study argues that institutional decline often generates rapid increases in migration because households respond immediately to heightened political and economic uncertainty. In contrast, governance improvements generally produce more gradual behavioural adjustments because institutional trust and economic confidence accumulate over time. This asymmetric conceptualisation aligns with the nonlinear adjustment framework proposed by Shin, et al. (2014), which demonstrates that positive and negative changes in explanatory variables need not produce equivalent responses.

## Conceptual Framework and Operationalisation

Operationalisation involves translating theoretical concepts into measurable variables suitable for empirical estimation. Guided by the neoclassical, push-pull and institutional migration theories, this study operationalizes net migration as a function of governance, demographic pressure, labour market conditions and income differentials. The dependent variable is net international migration (NM), measured as the annual net migration rate reported by the World Bank. This variable captures the net balance between immigrants and emigrants (Net migration = Immigrants – Emigrants). The principal explanatory variable is governance, measured using the Worldwide Governance Indicators (WGI), comprising voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption. Following the nonlinear autoregressive distributed lag (NARDL) framework of Shin, et al. (2014), governance is not operationalized as dummy variables. Instead, annual changes in the composite governance index are decomposed into cumulative positive and cumulative negative partial sums. Positive partial sums ( $GOV^+$ ) capture cumulative governance

improvements, whereas negative partial sums ( $GOV^-$ ) capture cumulative governance deterioration. This decomposition enables separate estimation of the effects of governance improvements and governance deterioration on migration and constitutes the basis for testing long-run and short-run asymmetry. The remaining explanatory variables reflect the predictions of classical migration theories. Population growth (POPG) proxies demographic pressure consistent with push-pull theory; unemployment (UNE) represents labour market conditions central to neoclassical migration theory; and income differential (DRGDP), measured as the deviation of GDP per capita from the global average, captures expected income differentials as proposed by Harris and Todaro (1970). These variables enter the model symmetrically because the study's primary interest lies in testing the asymmetric effects of governance rather than the asymmetry of all explanatory variables. The empirical analysis employs the nonlinear panel autoregressive distributed lag (NARDL) model estimated using the Mean Group (MG) estimator of Pesaran and Smith (1995).

## Methodology

### Research Design and Data

This study employs a quantitative panel econometric design to investigate the asymmetric effects of governance on net migration across Africa. Annual panel data for 52 African countries covering the period 1996-2023 were obtained from the World Bank's World Development Indicators (WDI) and the Worldwide Governance Indicators (WGI). The analysis is conducted separately for the five African sub-regions (North, West, Central, East and Southern Africa) in order to account for regional institutional heterogeneity. The dependent variable is net international migration. International migration is operationalized using the World Bank's net migration indicator, which measures the difference between immigrants and emigrants and serves as the study's dependent variable. Governance constitutes the main explanatory variable and is measured using the composite Worldwide Governance Indicator (WGI), constructed from the six governance dimensions: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption. Following Kaufmann et al. (2011), the six indicators are aggregated into a single governance index using equal weights. Control variables include population growth (POPG), unemployment (UNE), and income differential (DRGDP), proxied by the deviation of GDP per capita from the global average. These variables were selected because they are well-established determinants of migration in both neoclassical and institutional migration theories. Prior to estimation, the data were subjected to panel unit root tests, cross-sectional dependence tests, slope heterogeneity tests, and panel cointegration tests to establish the statistical properties of the variables and ensure the suitability of the nonlinear panel ARDL framework.

### Construction of Positive and Negative Governance Shocks

To examine asymmetric effects, the governance index was decomposed into positive and negative cumulative changes following the nonlinear ARDL (NARDL) framework proposed by Shin, Yu and Greenwood-Nimmo (2014). Unlike a dummy-variable approach, the decomposition is based on partial sum processes, allowing governance improvements and governance deteriorations to exert separate long-run and short-run effects on migration. First, annual changes in governance

are calculated as  $\Delta GOV_{it} = GOV_{it} - GOV_{it-1}$ . The positive and negative governance changes are then defined as

$$\Delta GOV_{it}^+ = \max(\Delta GOV_{it}, 0)$$

$$\Delta GOV_{it}^- = \min(\Delta GOV_{it}, 0)$$

Where,  $\Delta GOV_{it}^+$  captures only improvements in governance;  $\Delta GOV_{it}^-$  captures only deteriorations in governance. These annual changes are accumulated over time to generate the positive and negative partial sums,

$$\Delta GOV_{it}^+ = \sum_{j=1}^t \max(\Delta GOV_{ij}, 0)$$

$$\Delta GOV_{it}^- = \sum_{j=1}^t \min(\Delta GOV_{ij}, 0)$$

Consequently,  $GOV^+$  measures cumulative governance improvements;  $GOV^-$  measures cumulative governance deteriorations. This decomposition allows increases and decreases in governance to have different magnitudes and adjustment speeds, thereby relaxing the symmetry assumption imposed by conventional linear models.

### Empirical Model Specification

Consistent with the neoclassical migration model, push-pull theory and institutional migration theory, net migration is specified as a function of governance and other macroeconomic determinants:

$$NM_{it} = f(GOV_{it}^+, GOV_{it}^-, POPG_{it}, UNE_{it}, DRGDP_{it}) \quad (1)$$

The linear long-run specification is expressed as

$$NM_{it} = \beta_0 + \beta_1 GOV_{it}^+ + \beta_2 GOV_{it}^- + \beta_3 POPG_{it} + \beta_4 UNE_{it} + \beta_5 DRGDP_{it} + \varepsilon_{it} \quad (2)$$

where

NM = net migration;  $GOV^+$  = cumulative positive governance changes;  $GOV^-$  = cumulative negative governance changes; POPG = population growth; UNE = unemployment; DRGDP = income differential;  $\varepsilon_{it}$  = error term.

### Nonlinear Panel ARDL (NARDL) Specification

The asymmetric relationship is estimated using the nonlinear panel ARDL error-correction representation

$$NM_{it} = \phi_i[NM_{it-1} - \theta_1 GOV_{it-1}^+ - \theta_2 GOV_{it-1}^- - \theta_3 POPG_{it-1} - \theta_4 UNE_{it-1} - \theta_5 DRGDP_{it-1}] + \sum_{j=1}^P \lambda_{1ij} GOV_{it-j}^+ + \sum_{j=1}^P \lambda_{2ij} \beta_2 GOV_{it-j}^- + \sum_{j=1}^P \lambda_{3ij} \beta_3 POPG_{it-j} + \sum_{j=1}^P \lambda_{4ij} \beta_4 UNE_{it-j} + \sum_{j=1}^P \lambda_{5ij} \beta_5 DRGDP_{it-j} + \varepsilon_{it} \quad (3)$$

$\phi_i$  is the error-correction coefficient,  $\theta$  denotes long-run coefficients,  $\lambda$  captures short-run dynamics,  $\Delta$  denotes first differences. A statistically significant and negative error-correction coefficient confirms convergence toward long-run equilibrium following short-run deviations. This specification simultaneously estimates long-run asymmetric effects, short-run asymmetric effects, and adjustment toward equilibrium.

## Estimation Strategy

The nonlinear ARDL model is estimated using the Mean Group (MG) estimator proposed by Pesaran and Smith (1995). The MG estimator estimates a separate NARDL equation for each country before computing the arithmetic average of the estimated coefficients across countries. Accordingly, the MG estimator is not an alternative model to the nonlinear ARDL; rather, it is the estimation technique used to estimate the panel NARDL specification. The nonlinearity arises from the decomposition of governance into positive and negative partial sums, while the MG estimator accommodates parameter heterogeneity across countries. For comparison, the Pooled Mean Group (PMG) estimator of Pesaran, Shin and Smith (1999) was initially estimated. PMG constrains long-run coefficients to be homogeneous while allowing short-run coefficients to vary across countries. A Hausman specification test was subsequently conducted to determine whether this homogeneity assumption was appropriate. The Hausman test rejected the PMG restrictions ( $p < 0.05$ ), indicating that long-run coefficients differ significantly across countries. Consequently, the MG estimator was selected as the preferred estimator because it allows complete heterogeneity in both long-run and short-run parameters, which is particularly appropriate given Africa's substantial institutional, political, and economic diversity.

## Diagnostic and Pre-estimation Tests

To ensure robust estimation, several diagnostic tests were conducted before estimating the nonlinear panel ARDL model. First, Pesaran's (2004) cross-sectional dependence test examined whether shocks in one country spill over to others. Second, Pesaran and Yamagata's (2008) slope heterogeneity test assessed whether slope coefficients differ across countries. Third, second-generation panel unit root tests were applied to determine the order of integration of each variable. Finally, Westerlund's (2007) panel cointegration test confirmed the existence of a long-run equilibrium relationship among the variables. These diagnostic procedures justify the application of the panel NARDL framework, which accommodates variables integrated of order  $I(0)$  and  $I(1)$ , heterogeneous dynamics, and long-run cointegration.

## Research Findings and Interpretation

### *Descriptive Statistics*

From the results in Table 1, the average net migration across Africa is negative(-12.19), suggesting overall emigration outweighs immigration on the continent. The highest outflows are seen in Northern Africa likely driven by conflict and political repression(e.g., Libya, Sudan), while Southern Africa shows the only substantial positive net migration, possibly reflecting its status as a regional destination(e.g., South Africa). The mean of -21.97 for Eastern Africa confirms its role as a high-emigration zone. Skewness and kurtosis values reveal fat-tailed distributions, with extremely high kurtosis in Eastern and Northern Africa suggesting migration events here are highly influenced by rare but large shocks.

All governance indicators have negative means across the continent, revealing systemic governance deficits. Middle Africa scores worst on almost all governance dimensions. In contrast, Southern Africa performs the best, with a positive mean in overall governance index(0.11), and generally near-zero or slightly positive values across indicators, evidence of stronger institutions and political structures. The standard deviations are moderate suggesting some variation across countries, but the most telling figures are the skewness and kurtosis. In contrast, governance skewness in Northern Africa is generally negative, showing the preponderance of low scores with few governance outliers on the higher end.

The population variable(POPG) shows dramatic variation, with Western Africa showing rapid demographic expansion(average of 20.14 million) and Northern Africa even higher(35.26 million), reflecting large populous states like Nigeria and Egypt. Standard deviations are particularly high in Western Africa, driven by substantial population heterogeneity. Unemployment(UNE) shows sharp disparities. Southern Africa reports the highest average unemployment(21.77%). By contrast, Western Africa has relatively low unemployment, but this may mask widespread underemployment and informal labor. The income differential(DRGDP) is high in Eastern Africa, indicating a significant gap between national per capita income and the global average likely acting as a push factor for migration. Interestingly, Western Africa has the highest income differential, yet lowest unemployment, suggesting income inequality, not just labor conditions, drives emigration. High skewness and kurtosis across variables, especially in migration and governance, reflect non-normal data distributions, which further justifies the choice of non-linear panel ARDL models to assess asymmetric effects.

### *Panel Unit Root Tests Results*

The results of the panel unit root tests summarized in Table 2 indicate that the majority of variables used in the study namely Net Migration(NM), Governance Index(GOV), Unemployment(UNE), and Income Differential(DRGDP) are non-stationary at their levels, but become stationary after first differencing. This pattern is consistent across multiple testing methodologies, including Harris-Tzavalis(HT), Breitung(B), Levin-Lin-Chu(LLC), Im-Pesaran-Shin(IPS), Fisher-type(FT), Hadri(H), and the more robust CADF/CIPS tests that account for cross-sectional dependence. The Governance index(GOV) also shows strong unit root characteristics at level across tests, but consistently achieves stationarity at first difference. Other socio-economic indicators like UNE and DRGDP follow a comparable trend, transitioning from

non-stationary to stationary after differencing, thus justifying their treatment as I(1) processes in the panel estimation framework. This pattern holds true across the regional disaggregations as well. In Eastern, Middle, Western, Northern, and Southern Africa, the variables fail to reject the null hypothesis of unit roots at levels but show strong evidence of stationarity post-differencing. The Hadri test, which tests for stationarity directly, often rejects the null of stationarity at level, further confirming these results. The CADF/CIPS statistics reinforce the need for differencing. These results validate the application of dynamic non-stationary heterogeneous panel estimation methods such as nonlinear panel ARDL models, which are well-suited for handling mixed orders of integration and capturing asymmetric relationships.

### ***Panel Causality Tests Results***

The results of the panel causality tests presented in Table 3 show that across the full African sample, governance significantly Granger-causes migration at the 1% level under both tests, implying that deteriorations or improvements in governance quality are strong predictors of migration flows. In addition, the reverse causality from migration to governance is also present, though less robust, suggesting a feedback mechanism in which persistent emigration might influence institutional evolution, especially through diaspora engagement or political pressure. Regionally, this bidirectional causality is strongest in Eastern and Western Africa.

Population growth exerts a powerful influence on migration with strong bidirectional causality confirmed across all models and regions. This suggests that demographic pressure not only drives migration but is also shaped by it, potentially through remittance-fueled fertility choices, urbanisation, or family reunification patterns. Similarly, unemployment Granger-causes migration in most regions particularly in Eastern, Western, and Northern Africa validating the hypothesis that poor labor market conditions are key push factors. However, effect of migration on unemployment is mixed and only significant in select regions like Middle and Northern Africa. Income differential also significantly predicts migration in almost all the regions in Africa, while the reverse relationship was significant in all regions. From above, the results show that governance, demographic pressures, and economic disparities are significant predictors of migration, with varying strengths across regions. These results confirm the presence of complex, regionally differentiated migration drivers and justify the emphasis on governance asymmetries and region-specific policy responses.

### ***Panel Cointegration Test Results***

The panel cointegration test results presented in Table 4 show net migration(NM) and its key determinants. The Kao test results are overwhelmingly significant across all its test variants. For the full panel and all five regions, the Modified Dickey-Fuller, Dickey-Fuller, and Augmented Dickey-Fuller statistics all reject the null hypothesis of no cointegration at the 1% critical level. These results suggest that despite regional variations, a stable long-term relationship exists among migration and governance. The Pedroni test which allows for heterogeneity in the cointegration vector, supports these findings, though with some regional variation. The Phillips-Perron and Augmented Dickey-Fuller tests are significant for the full panel and most regions. However, cointegration is weaker in Northern Africa and Southern Africa. The Westerlund test, which evaluates cointegration based on error-correction dynamics, presents mixed results. Nonetheless, the strong Pt values for the full panel and Eastern Africa suggest that at least a subset

of countries demonstrates strong adjustment toward long-run equilibrium. Taken together, the results from all three testing approaches confirm that migration in Africa is not merely a short-run response to shocks in governance or economic conditions, but is anchored in long-term structural relationships.

### ***Cross-Sectional Dependence and Slope Heterogeneity Analysis***

Cross-sectional dependence arises when economic or institutional shocks affecting one country also influence others in the panel. Similarly, slope heterogeneity refers to the variation in parameter estimates across cross-sectional units, challenging the validity of pooled models that assume identical effects across countries. These issues are examined in Table 5 using Pesaran's CD test, average correlation coefficients, and the Pesaran and Yamagata(2008) slope heterogeneity test. The results reveal substantial cross-sectional dependence in several variables. For governance(GOV), the CD statistic for the full panel is highly significant(6.64), indicating that governance shocks in one country are likely to affect others possibly due to regional spillovers in political instability, shared legal institutions, or continental initiatives such as the African Union governance frameworks. Similarly, population growth(POPG) and income differential(DRGDP) show very strong cross-sectional dependence across all regions suggesting that demographic pressures and economic disparities are regionally synchronized. Unemployment(UNE) also shows widespread interdependence where labor market shifts and macroeconomic shocks are likely to spill over due to porous borders and integrated informal sectors. In contrast, Net Migration(NM) exhibits weak or negative cross-sectional dependence, with insignificant or negative CD statistics in several regions, suggesting that migration patterns are more country-specific and less synchronized. Regarding the slope heterogeneity, the Pesaran and Yamagata test strongly rejects the null of homogeneity for all variables, with the adjusted delta statistic for the full panel and across all the subregions indicating that the effects of migration determinants vary widely across countries. This supports the use of flexible panel estimators such as Mean Group model that accommodate differential country-specific relationships.

### ***Hausman Test Results***

The Hausman test results presented in Table 6 are used to determine whether the Pooled Mean Group(PMG) or the Mean Group(MG) estimator is more appropriate for modeling the long-run and short-run dynamics of net migration and its determinants across Africa's subregions. The null hypothesis of the Hausman test states that the differences in coefficients between PMG and MG estimators are not systematic, implying that PMG(assuming long-run homogeneity) is preferred if the null is not rejected. The results indicate that across all subregions, there are systematic differences in long-run coefficients, and the assumption of homogeneous long-run relationships does not hold. Therefore, the Mean Group(MG) estimator is preferred.

### ***Asymmetric Effects of Governance on Net Migration among African Countries by Regions***

From the results on Eastern Africa as presented in Tables 7 and 8, the long-run dynamics of net migration are significantly shaped by the asymmetric effects of governance, as demonstrated by the highly significant and negative error correction terms across all countries in the region. These values indicate a strong tendency for any deviations from the migration equilibrium to be swiftly

corrected. Positive governance improvements(GOV\_pos) contribute meaningfully to reductions in net migration over time in countries such as Burundi(228.8), Eritrea(151.2), Madagascar(159.2), and Somalia(523.2). This suggests that strengthening governance through improved accountability, transparency, and institutional performance can enhance public trust and reduce emigration pressures. Conversely, negative governance shocks (GOV\_neg) significantly reduce net migration, indicating greater net out-migration in countries such as Burundi, Eritrea, Malawi, Mozambique and Somalia. These findings support the theoretical expectations outlined in the conceptual framework and are consistent with empirical evidence from Ghelli et al.(2022) and Bernini et al.(2024), which emphasize that deteriorating governance conditions especially in fragile or conflict-affected states serve as strong push factors for migration.

In the short run, the asymmetric effects of governance persist but are more country-specific. Positive governance shocks significantly influence reductions in net migration in the short term in Madagascar(83.48), Malawi(70.27), Mozambique(151.1), and Zimbabwe(246.9), while negative shocks exert upward pressure in Burundi(-333.6), Eritrea(-54.09), Madagascar(-16.53), Mozambique(-68.75), and Zimbabwe(93.84), reflecting the population's immediate response to bad governance such as political instability, lack of rule of law, among others. In addition, population growth is associated with lower net migration, consistent with greater net out-migration in countries like Eritrea(-45.36), Ethiopia(-19.79), Kenya(-20.82), Rwanda(-12.74), Tanzania(-12.74), Uganda(-17.83), Zambia(-28.01), and Zimbabwe(-57.11) supporting the demographic pressure theory of Adepoju(1995). However, in the short run, the effect of population growth turns negative or insignificant in some countries. In the long run, unemployment drives up emigration as evident by the negative estimated coefficients in Eritrea(-8.435), Ethiopia(-141.2), Kenya(-32.09), Somalia(-38.13), Uganda(-40.05), and Zimbabwe(-22.59), while in the short run, there are negative effects of unemployment on net migration flows in Ethiopia(-112.4), Kenya(-70.71), Rwanda(-5.216), and Uganda(-52.72). This implies that lack of employment opportunities is associated with reductions in net migration, consistent with greater net out-migration. The income differential(DRGDP) also plays a sound role, with negative long-run effects of income differential on migration in countries such as Ethiopia(-340.7) and Tanzania(-159.1), but negative long-run effects in Eritrea(-8.057), Ethiopia(-340.7), Rwanda(-42.66), Somalia(-83.73), Tanzania(-159.1), Uganda(-164.8), Zambia(-61.39), and Zimbabwe(-21.73), reinforcing that migration decisions are shaped by both domestic economic realities and relative global positioning.

In Middle Africa as presented in Table 9, the error correction terms are significantly negative across nearly all countries, indicating strong convergence toward long-run equilibrium following short-run disturbances. In the short run, governance deterioration(GOV\_neg) is a potent push factor, significantly increasing outmigration from Cameroon(-610.7) and the Sao Tome and Principe(-3.182), as expected. This aligns with the theoretical expectation that poor governance erodes institutional quality, fuels insecurity, and compels individuals to seek safer or more stable environments elsewhere. In contrast, positive governance shocks(GOV\_pos) generally lack statistically significant short-run influence, with the exception of the Republic of Congo(185.6), suggesting that while reform may be desirable, it takes longer to restore trust and incentivize return migration or reduce outflows. In the long run, governance in Middle Africa exhibits asymmetric effects on net migration, where negative governance shocks significantly reduce net migration, suggesting greater net out-migration particularly in Cameroon(-442.8) and the Central

African Republic(-358.5), while positive governance improvements show significant impact on net migration in Chad(170.4) and Republic of Congo(125.3).

Population growth(D.POPG) exerts a uniformly significant and positive short-run effect on net migration across all Middle African countries. However, the long-run relationship reveals that higher population growth is significantly associated with lower net migration(that is, more outmigration) in all countries(except for Central African Republic), matching the expectation that persistent demographic pressure is associated with declining net migration, indicating higher net out-migration in long-run. Regarding unemployment(UNE), the direction and significance vary where unemployment significantly reduces net migration in Cameroon(-9.343), Congo DR(-65.83), and Equatorial Guinea(-1.837), suggesting migration as a response to job scarcity. However, in Chad(25.53), a positive coefficient hints at structural labor market barriers that might prevent migration despite joblessness. The income differential(DRGDP), a key economic driver, displays a largely negative short-run and long-run effects on net migration, particularly in Congo DR(-141.8), the Republic of Congo(-24.62), and Equatorial Guinea(-0.664 in short run; -0.413 in long run), where closer alignment of domestic and global income reduces migration pressure, echoing the predictions of Harris-Todaro and neo-classical models. Thus, the results validate theoretical expectations that governance failures, rapid population growth, high unemployment, and income inequality all contribute variably to migration across Middle Africa.

In Northern Africa as presented in Table 10, the results show that improvements in governance(D.GOV\_pos) has significant positive influence on net migration in the short-run and long-run in Algeria(229.2 and 424.4 respectively), aligning with a priori expectations that better governance conditions help retain populations. The results also show that deteriorations in governance(D.GOV\_neg) has significant negative influence on net migration in the short-run in Libya(-163.3), and the negative effect of the bad governance on net migration in the long-run in Algeria(-342.5) and Libya(-129.5). The results confirm the asymmetric hypothesis that negative shocks have stronger and more immediate migratory consequences than positive ones. In terms of demographic effects, population growth(D.POPG) has divergent short-run implications. It significantly reduces net migration in Egypt(-634.9), Libya(-2,057), and Sudan(-1,987), possibly reflecting strain-induced push factors that propel outward migration. In the long run, Population growth(POPG) consistently shows significant negative effects on net migration in Libya(-11.91) and Sudan(-20), suggesting that high population pressure continues to push individuals to migrate over time. Unemployment(UNE) is significant only in Egypt(-124.8), where it negatively affects net migration, indicating that labour market constraints are associated with lower net migration, consistent with greater net out-migration. Unemployment and income differentials(DRGDP) show weaker or mixed effects across countries, though in Libya, a significant negative DRGDP(-3.456) suggests that convergence in income levels reduces the motivation to migrate, which is consistent with neoclassical models of economic migration.

From the results on Southern Africa as presented in Table 11, the significantly negative error correction terms across all five countries confirm the presence of strong and rapid adjustments back to long-run equilibrium after initial deviations. This supports the theoretical expectation that migration imbalances tend to self-correct over time. Positive governance improvements reduce net migration in Namibia(32.11), Lesotho(27.30), and South Africa(5,024) in the long run, supporting a priori expectations that good governance retains populations. Negative governance shocks increase outward migration in South Africa in both short-run(-2,738) and long-run(-2,081).

However, in other countries (Botswana [-1.079] and Eswatini [0.433]), governance coefficients are insignificant. Short-run and long-run coefficients of population are negative and highly significant across most countries, including Botswana (-1,255 in short-run; -24.03 in long-run), Lesotho (-1,269; -63.86), Namibia (-965.4; -24.41), and South Africa (-1,788; -15.58). This validates theoretical predictions that high fertility and youth bulges increase migration due to resource constraints and employment saturation. Statistically significant in Eswatini (-0.507), Lesotho (-5.210), and Botswana (-0.364), where higher unemployment leads to increased outward migration. The income differential behaves as expected in Lesotho (-5.603) and Namibia (-6.691), where improved domestic income reduces migration (negative and significant coefficients). Thus, Southern African migration is shaped primarily by demographics and governance quality, with clear evidence that population pressure and governance failures are strong drivers of migration. Structural economic factors like income and employment show country-specific effects.

The results of the panel Mean Group (MG) estimation for Western African countries as presented in Tables 12 and 13 reveal significant and negative error correction terms across most nations indicating a strong tendency to adjust back to long-run equilibrium following short-term shocks. Positive governance shocks (GOV\_pos) are associated with increased net migration in the long run in Liberia (92.70), Nigeria (661.8), and Sierra Leone (91.08), with a notable short-run positive effect observed in Liberia (96.20). This suggests that improvements in governance are associated with higher net migration, consistent with improved migration balances through greater migrant retention and/or increased return migration. Conversely, negative governance shocks (GOV\_neg) generally do not trigger strong immediate migration responses in the short run, with the exception of Togo (-42.33). However, in the long run, deteriorating governance conditions significantly increase net migration in countries such as Guinea (-57.14), Liberia (-129.3), and Mali (-327.2), showing the destabilising impact of poor institutional quality over time.

Population growth (D.POPG) exhibits significantly negative effects on net migration in the short run across several Western African countries, including Cabo Verde (-807.0), Guinea (-1,721), Liberia (-2,030), Mali (-243.6), Mauritania (-1,247), Niger (-305.9), Nigeria (-104.6), Senegal (-1,100), and Sierra Leone (-2,052). This suggests that demographic pressures are associated with declining net migration, indicating greater net out-migration. In the long run, the negative impact of population growth persists in Cabo Verde (-22.37), Liberia (-35.63), and Sierra Leone (-12.80), indicating sustained demographic strain as a push factor. Unemployment largely aligns with a priori expectations, exerting outward migration pressure in the long run in countries such as Cabo Verde (-0.882), Liberia (-6.950), Mali (-14.90), Senegal (-24.08), and Sierra Leone (-6.507). In the short run, unemployment is associated with reductions in net migration, consistent with greater net out-migration in Ghana (-5.093) and Mauritania (-5.374), while showing a positive association with net migration in Côte d'Ivoire (34.95), The Gambia (0.362), and Senegal (12.11) potentially reflecting short-term labor market adjustments or return migration dynamics. Income differentials consistently exhibit a negative influence on net migration in both the short and long run. In the long run, this effect is significant in Cabo Verde (-2.433), Guinea (-23.75), Liberia (-10.75), Mauritania (-11.19), Niger (-31.60), and Nigeria (-98.45), while in the short run it is evident in Cabo Verde (-1.997), Gambia (-1.114), Ghana (-37.05), Guinea (-29.53), and Sierra Leone (-24.41). These findings conform to the theoretical expectation that higher domestic income reduces the incentive to emigrate. Collectively, these results explain the fact that migration tends to intensify under conditions of economic deterioration and moderates when income prospects at home improve relative to opportunities abroad.

## Discussion of Findings

The principal objective of this study was to examine whether governance improvements and governance deterioration exert asymmetric effects on net international migration across Africa's five sub-regions. The findings provide strong support for this proposition by demonstrating that governance deterioration generally exerts a stronger and more immediate influence on net migration than governance improvements, although the magnitude and significance of these effects differ across regions. This result extends the existing governance-migration literature by showing that migration responses to institutional change are nonlinear rather than symmetric. The findings are broadly consistent with Ariu et al. (2016), who established that institutional quality significantly influences migration decisions, and with Giang et al. (2020), who found that governance dimensions such as transparency, administrative effectiveness and corruption influence migration alongside economic factors. Similarly, the results corroborate Kwilinski et al. (2022), who identified political stability, corruption and governance quality as significant determinants of migration. However, unlike these earlier studies, which estimated symmetric relationships, the present study demonstrates that governance deterioration and governance improvements do not produce equal but opposite effects on net migration. In particular, the stronger effects associated with governance deterioration suggest that institutional decline generates immediate behavioural responses, whereas governance improvements require sustained reforms before translating into noticeable changes in migration patterns.

The results also reinforce earlier African studies that identified weak governance as an important driver of migration while providing greater empirical precision regarding regional differences. The stronger influence of governance deterioration in several countries, particularly within Eastern, Central and parts of Western Africa, is consistent with Adepaju's (1995) argument that political instability, institutional weakness and economic decline constitute major drivers of migration within and from Africa. Likewise, the findings support the observations of Bush (1996) and Rowlands (1999), who argued that political violence, declining state legitimacy and poor governance encourage migration from developing countries. The evidence further complements the corruption-focused studies of Bernini et al. (2024) and Ghelli et al. (2022), confirming that institutional deterioration contributes to adverse migration outcomes, while extending their conclusions by demonstrating that governance improvements do not necessarily reverse migration dynamics with equal speed or magnitude.

## Conclusion and Policy Recommendations

### *Conclusion*

This study demonstrates that the determinants of net international migration vary considerably across Africa. This explains the importance of accounting for regional heterogeneity when analysing migration dynamics. Across the five African sub-regions (Northern, Southern, Eastern, Western, and Central Africa), the results indicate that both short-run shocks and long-run structural factors influence net migration, although the magnitude and statistical significance of these relationships differ across countries and regions. The predominantly negative and statistically significant error-correction terms indicate that, where long-run relationships exist, short-run deviations tend to adjust towards equilibrium over time, suggesting that net migration responds to underlying socioeconomic and institutional conditions.

A key finding of the study is that governance affects net migration asymmetrically. In many countries, governance deterioration exhibits a stronger and more immediate association with changes in net migration than governance improvements. However, the magnitude and persistence of these effects are not uniform across all African sub-regions, reflecting differences in institutional quality and migration systems. Population growth emerged as an important long-run driver of net migration, particularly in Eastern, Southern and Western Africa, while unemployment remained a significant determinant in countries with limited labour market absorption capacity. The results also provide evidence that narrowing income differentials may reduce migration pressures in some countries, including Lesotho, Namibia, Cabo Verde and Guinea, although these relationships vary across the continent. Thus, these findings suggest that migration outcomes in Africa are shaped by the interaction of institutional quality, demographic change and economic conditions, with the relative importance of these factors differing across regions. Accordingly, the policy recommendations presented in the next section are directly informed by these empirical findings and advocate regionally differentiated governance and development strategies that recognise Africa's institutional and socioeconomic diversity.

### ***Policy Recommendations***

The empirical findings indicate that negative governance shocks exert stronger effects on migration than governance improvements, with particularly pronounced impacts in fragile states and parts of Central, Eastern and Western Africa. Governments, Regional Economic Communities (RECs) such as ECOWAS, IGAD and ECCAS, and the African Union (AU) should therefore prioritise governance reforms that strengthen transparency, rule of law, public accountability and anti-corruption institutions. Revitalising the African Peer Review Mechanism (APRM) to include migration-related governance indicators would provide an innovative mechanism for monitoring governance performance and identifying countries at risk of governance-induced migration. Successful implementation, however, will require sustained political commitment, institutional capacity and adequate financial support from continental and development partners.

The finding that population growth contributes to long-run migration pressures suggests the need for integrated demographic and human capital policies across the continent. National governments should align population policies with investments in education, healthcare, skills development and employment creation, particularly in rapidly growing regions of Eastern and Western Africa. Ministries responsible for planning, youth and population should collaborate with organisations such as UNFPA, the World Bank and development partners to expand reproductive health services, female education and rural economic diversification. Financing constraints and uneven institutional capacity across countries should be addressed through coordinated regional and international support.

Consistent with the empirical evidence that unemployment significantly increases migration, particularly in Southern and Western Africa, governments should implement labour-intensive industrialisation strategies that expand employment opportunities in agriculture, manufacturing, digital services and green industries. Employment programmes should be spatially targeted towards migration-prone areas and complemented by youth entrepreneurship funds, vocational training and public-private partnerships. The African Development Bank (AfDB), International Labour Organisation (ILO) and national employment agencies should support these initiatives

while recognising that fiscal limitations and weak labour market institutions may constrain implementation in several countries.

The results also demonstrate that income differentials remain an important long-run determinant of migration, supporting policies that promote inclusive economic transformation and income convergence. Governments should pursue macroeconomic policies that enhance productivity, reduce inequality and improve household incomes while encouraging productive diaspora investment through remittance-backed financial instruments and investment incentives. Ministries of Finance, Central Banks and regional development finance institutions should coordinate these policies within broader inclusive growth strategies, recognising that achieving sustained income convergence will require long-term macroeconomic stability and substantial public investment.

Finally, the heterogeneous effects observed across Africa's five sub-regions imply that migration governance should be region-specific rather than uniform. For example, ECOWAS can continue strengthening free movement arrangements while fragile parts of Central and Eastern Africa may require greater emphasis on governance reforms, conflict prevention and institutional strengthening before deeper mobility integration. Similarly, implementation of the AU Free Movement Protocol should remain sufficiently flexible to accommodate varying governance capacities across member states. In addition, African governments should strengthen national migration information systems and governance databases by improving the quality, frequency and harmonisation of migration and governance statistics through collaboration with the AU, IOM, UNECA and national statistical offices. Better data systems will enhance evidence-based policymaking, facilitate monitoring of governance-related migration dynamics and improve future empirical research on migration across the continent.

## **Declarations**

### **Author Contributions**

All authors contributed substantially to the intellectual content and approved the final manuscript for publication.

### **Conflicts of Interest**

The authors declare no conflict of interest.

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## Appendices

**Table 1: Descriptive Statistics**

| Variable               | NM       | GOV   | CC    | GE    | PS    | RQ    | RL    | VA    | WS    | POPG   | UNE   | DRGDP |
|------------------------|----------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|
| <b>All</b>             |          |       |       |       |       |       |       |       |       |        |       |       |
| Observations           | 1456     | 1456  | 1456  | 1456  | 1456  | 1456  | 1456  | 1456  | 1456  | 1456   | 1456  | 1456  |
| Mean                   | -12.19   | -0.70 | -0.64 | -0.78 | -0.60 | -0.74 | -0.73 | -0.66 | 33.38 | 20.55  | 9.12  | 7.15  |
| Standard deviation     | 94.67    | 0.60  | 0.62  | 0.59  | 0.90  | 0.61  | 0.62  | 0.71  | 22.33 | 30.16  | 7.45  | 2.92  |
| Minimum                | -1350.00 | -2.51 | -1.85 | -2.44 | -3.31 | -2.55 | -2.59 | -2.23 | 5.16  | 0.08   | 0.32  | -8.54 |
| Maximum                | 1367.70  | 0.90  | 1.70  | 1.02  | 1.28  | 0.90  | 1.04  | 0.97  | 89.06 | 227.88 | 35.36 | 11.33 |
| Skewness               | -0.40    | 0.10  | 0.78  | 0.29  | -0.36 | -0.19 | 0.00  | 0.20  | 0.73  | 3.25   | 0.97  | -2.14 |
| Kurtosis               | 73.64    | 2.99  | 3.40  | 2.94  | 2.59  | 3.15  | 2.74  | 2.32  | 2.37  | 16.48  | 2.93  | 8.99  |
| <b>Eastern Africa</b>  |          |       |       |       |       |       |       |       |       |        |       |       |
| Observations           | 448      | 448   | 448   | 448   | 448   | 448   | 448   | 448   | 448   | 448    | 448   | 448   |
| Mean                   | -21.97   | -0.77 | -0.67 | -0.85 | -0.68 | -0.85 | -0.80 | -0.79 | 26.79 | 20.99  | 7.11  | 7.66  |
| Standard deviation     | 95.76    | 0.60  | 0.60  | 0.63  | 0.87  | 0.66  | 0.63  | 0.65  | 13.81 | 23.61  | 6.69  | 3.38  |
| Minimum                | -473.01  | -2.51 | -1.85 | -2.44 | -3.31 | -2.55 | -2.59 | -2.23 | 7.51  | 0.08   | 0.60  | -8.54 |
| Maximum                | 1367.70  | 0.78  | 1.70  | 0.90  | 1.28  | 0.68  | 0.76  | 0.63  | 62.12 | 128.69 | 27.71 | 11.33 |
| Skewness               | 6.55     | -0.13 | 1.04  | 0.19  | -0.46 | -0.65 | -0.43 | -0.38 | 0.49  | 2.09   | 1.81  | -2.93 |
| Kurtosis               | 102.61   | 3.82  | 4.72  | 3.47  | 3.09  | 2.86  | 3.49  | 2.22  | 2.06  | 7.95   | 5.22  | 11.61 |
| <b>Middle Africa</b>   |          |       |       |       |       |       |       |       |       |        |       |       |
| Observations           | 252      | 252   | 252   | 252   | 252   | 252   | 252   | 252   | 252   | 252    | 252   | 252   |
| Mean                   | 8.26     | -1.05 | -1.09 | -1.13 | -0.80 | -1.09 | -1.16 | -1.05 | 25.78 | 15.42  | 10.19 | 6.70  |
| Standard deviation     | 87.64    | 0.46  | 0.46  | 0.37  | 0.93  | 0.40  | 0.44  | 0.57  | 19.25 | 22.19  | 6.82  | 3.12  |
| Minimum                | -777.83  | -2.00 | -1.65 | -1.88 | -2.85 | -2.10 | -1.92 | -2.00 | 5.16  | 0.14   | 0.68  | -3.82 |
| Maximum                | 496.83   | 0.15  | 0.40  | -0.20 | 1.15  | 0.34  | 0.27  | 0.56  | 66.73 | 105.79 | 22.20 | 11.18 |
| Skewness               | -2.46    | 0.49  | 1.73  | 0.06  | -0.15 | 0.74  | 0.87  | 1.18  | 0.90  | 2.20   | 0.24  | -1.29 |
| Kurtosis               | 38.57    | 2.93  | 5.44  | 2.44  | 2.00  | 4.23  | 3.80  | 4.15  | 2.48  | 7.47   | 1.53  | 4.31  |
| <b>Northern Africa</b> |          |       |       |       |       |       |       |       |       |        |       |       |
| Observations           | 168      | 168   | 168   | 168   | 168   | 168   | 168   | 168   | 168   | 168    | 168   | 168   |

|                        |          |       |       |       |       |       |       |       |       |        |       |       |
|------------------------|----------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|
| Mean                   | -48.82   | -0.75 | -0.71 | -0.61 | -0.98 | -0.81 | -0.67 | -1.09 | 64.20 | 35.26  | 14.23 | 5.15  |
| Standard deviation     | 141.40   | 0.59  | 0.47  | 0.60  | 0.88  | 0.67  | 0.58  | 0.54  | 14.77 | 28.15  | 4.58  | 3.25  |
| Minimum                | -1350.00 | -2.00 | -1.58 | -1.98 | -2.67 | -2.30 | -1.88 | -1.98 | 33.22 | 4.99   | 7.33  | -4.55 |
| Maximum                | 441.62   | 0.24  | 0.28  | 0.68  | 0.83  | 0.19  | 0.22  | 0.30  | 89.06 | 114.54 | 29.77 | 10.81 |
| Skewness               | -4.81    | -0.39 | -0.33 | -0.24 | -0.17 | -0.37 | -0.33 | 0.48  | -0.15 | 1.18   | 0.92  | -1.62 |
| Kurtosis               | 45.87    | 2.07  | 2.16  | 2.34  | 2.04  | 1.94  | 1.86  | 2.84  | 2.50  | 3.70   | 4.00  | 5.29  |
| <b>Southern Africa</b> |          |       |       |       |       |       |       |       |       |        |       |       |
| Observations           | 140      | 140   | 140   | 140   | 140   | 140   | 140   | 140   | 140   | 140    | 140   | 140   |
| Mean                   | 15.11    | 0.10  | 0.23  | -0.03 | 0.23  | 0.07  | 0.02  | 0.05  | 69.02 | 12.07  | 21.77 | 5.46  |
| Standard deviation     | 127.72   | 0.42  | 0.42  | 0.49  | 0.55  | 0.49  | 0.40  | 0.76  | 8.68  | 20.68  | 4.54  | 2.02  |
| Minimum                | -879.24  | -0.66 | -0.73 | -1.08 | -0.75 | -0.76 | -0.88 | -1.53 | 59.42 | 0.99   | 15.79 | 2.55  |
| Maximum                | 641.15   | 0.90  | 1.24  | 1.02  | 1.20  | 0.90  | 0.67  | 0.86  | 85.87 | 63.21  | 35.36 | 10.60 |
| Skewness               | -0.69    | 0.07  | 0.30  | -0.40 | 0.31  | 0.00  | -0.30 | -1.06 | 0.78  | 1.55   | 0.77  | 0.52  |
| Kurtosis               | 24.39    | 1.80  | 2.35  | 2.03  | 1.66  | 1.64  | 2.08  | 2.59  | 2.10  | 3.50   | 3.53  | 2.44  |
| <b>Western Africa</b>  |          |       |       |       |       |       |       |       |       |        |       |       |
| Observations           | 448      | 448   | 448   | 448   | 448   | 448   | 448   | 448   | 448   | 448    | 448   | 448   |
| Mean                   | -8.72    | -0.65 | -0.60 | -0.80 | -0.52 | -0.65 | -0.68 | -0.39 | 21.56 | 20.14  | 4.67  | 8.19  |
| Standard deviation     | 45.48    | 0.49  | 0.54  | 0.45  | 0.83  | 0.40  | 0.54  | 0.59  | 12.18 | 39.73  | 3.29  | 1.31  |
| Minimum                | -250.96  | -1.88 | -1.60 | -1.81 | -2.73 | -1.86 | -1.93 | -1.55 | 5.34  | 0.43   | 0.32  | 5.48  |
| Maximum                | 281.48   | 0.56  | 1.16  | 0.34  | 1.22  | 0.27  | 1.04  | 0.97  | 61.49 | 227.88 | 14.69 | 11.02 |
| Skewness               | -0.07    | 0.29  | 1.14  | 0.24  | -0.35 | -0.35 | 0.32  | 0.37  | 1.35  | 3.67   | 1.20  | 0.09  |
| Kurtosis               | 12.85    | 2.78  | 4.59  | 2.38  | 2.51  | 2.91  | 2.91  | 2.46  | 4.56  | 15.89  | 3.51  | 2.09  |

Note: NM=Net migration (in thousands), CC=Control of Corruption (index), GE=Government Effectiveness (index), PS=Political Stability and Absence of Violence/Terrorism (index), RQ=Regulatory Quality (index), RL=Rule of Law (index), VA=Voice and Accountability (index), Overall Governance Index (Weighted index), POPG=Population (in millions), UNE=Unemployment (as percent of total labor force), DRGPD=Income differential of the real per capital income measured by the difference between GDP per capita (constant 2015 US\$), and World GDP per capita (constant 2015 US\$)

**Table 2: Panel Unit Root Test Results**

| Panel Unit - Root Tests | NM         | D.NM        | GOV        | D.GOV       | POPG        | D.POPG      | UNE        | D.UNE       | DRGDP       | D.DRGDP     |
|-------------------------|------------|-------------|------------|-------------|-------------|-------------|------------|-------------|-------------|-------------|
| All                     |            |             |            |             |             |             |            |             |             |             |
| HT                      | 0.3694***  | -0.2853***  | 0.9241     | 0.0647***   | 1.0209      | 0.9187      | 0.9149     | 0.1989***   | 0.9708      | -0.2216***  |
| B                       | -2.4044*** | -8.8656***  | 1.2544     | -19.0132*** | 31.6334     | 11.4790     | 2.171      | -18.4995*** | 19.7172     | -23.8842*** |
| LLC                     | -7.9122*** | -19.2739*** | -2.1792**  | -15.0254*** | 1.9542      | -3.7993***  | -0.067     | -17.9508*** | 4.348       | -20.1012*** |
| IPS                     | -8.3599*** | -20.8183*** | 0.6535     | -18.3914*** | 40.4802     | -0.4531     | 1.2388     |             | 13.8897     | -21.5170*** |
| FT                      | 10.4247*** | 10.4061***  | 1.9749**   | 4.4374***   | -6.3569     | 3.1026***   | -0.3033    | 4.0846***   | -6.2667     | 9.3312***   |
| H                       | 10.9427*** | -0.4852     | 83.1449*** | 3.4767***   | 122.1565*** | 100.6835*** | 74.5886*** | 0.5313***   | 102.5665*** | 2.9926***   |
| CADF/CIPS               | -2.902***  | -5.112***   | -1.766     | -4.414***   | -1.210      | -3.791***   | -1.657     | -3.778***   | -1.335      | -1.35***    |
| <b>Eastern Africa</b>   |            |             |            |             |             |             |            |             |             |             |
| HT                      | 0.3694***  | 0.1146***   | 0.9251     | 0.0291***   | 1.0238      | 0.933       | 0.895      | 0.2425***   | 0.9829      | 0.0418***   |
| B                       | -0.8712    | -3.2408***  | 0.9614     | -11.2214*** | 17.4712     | 7.8772      | 3.2478     | -8.9372***  | 10.9838     | -14.2062*** |
| LLC                     | -2.183**   | -19.1673*** | -1.5514*   | -8.9108***  | 1.8569      | -3.8373***  | -0.065     | -10.6177*** | 1.0281      | -12.113***  |
| IPS                     | -6.1148*** | -12.3790*** | 0.0137     | -10.1683*** | 22.7301     | -0.6724     | 0.0934     |             | 6.3006      | -12.4202*** |
| FT                      | 6.2285***  | 7.4757***   | 1.4309*    | 3.0718***   | -3.3422     | 1.847**     | -0.273     | 3.8688***   | -3.5548     | 7.2649***   |
| H                       | 5.9422***  | 4.2013***   | 50.5588*** | 1.2825*     | 67.5076***  | 57.0838***  | 47.8024*** | -1.5564     | 63.5259***  | -2.1607     |
| CADF/CIPS               | -3.235***  | -5.313***   | -1.411     | -4.111***   | -1.176      | -2.759***   | -1.959     | -3.801***   | -1.347      | -3.115***   |
| <b>Middle Africa</b>    |            |             |            |             |             |             |            |             |             |             |
| HT                      | 0.3351***  | -0.0674***  | 0.9104     | 0.0044***   | 1.0371      | 0.9439      | 0.9645     | 0.2714***   | 0.9808      | 0.3372***   |
| B                       | -2.2963**  | -7.188***   | 0.5371     | -6.5697***  | 13.3538     | 4.6800      | 0.5383     | -8.3372***  | 0.0112      | -8.3640***  |
| LLC                     | -2.3497*** | -4.5469***  | -1.7112**  | -7.1917***  | -0.9693     | -2.6582***  | -1.513*    | -8.2454***  | 1.7746      | -7.3902***  |
| IPS                     | -1.7674**  | -7.9233***  | 0.0533     | -7.8070***  | 17.9943     | 0.0095      | 1.2797     | -6.1315***  | 5.8877      | -8.3872***  |
| FT                      | -0.1321    | 1.9225**    | 1.6207*    | 1.756**     | -2.6581     | 1.4536*     | 0.8137     | 1.1557      | -2.3182     | 2.5048***   |
| H                       | 3.3568***  | 0.3149      | 35.7549*** | 0.0515      | 50.2559***  | 46.6803***  | 38.7004*** | 2.2506**    | 32.4831***  | 16.7966***  |
| CADF/CIPS               | -1.799     | -4.67***    | -1.678     | -4.71***    | 0.811       | -1.166      | -0.453     | -2.94***    | -1.97       | -3.062***   |
| <b>Northern Africa</b>  |            |             |            |             |             |             |            |             |             |             |
| HT                      | 0.3745***  | -0.2604***  | 0.9553     | 0.1315***   | 1.0144      | 0.8502      | 0.8981     | 0.0916***   | 0.8819      | -0.4607***  |
| B                       | -1.8402**  | -7.5608***  | -0.4238    | -6.315***   | 10.4421     | -0.7464     | -0.3538    | -6.1402***  | 6.563       | -7.8079***  |
| LLC                     | -5.0276*** | -5.8596***  | -0.3121    | -2.3007**   | -0.8818     | -2.4396***  | -1.3748*   | -3.0581***  | 4.3916      | -6.0007***  |

|                        |            |             |            |             |            |            |            |             |            |             |
|------------------------|------------|-------------|------------|-------------|------------|------------|------------|-------------|------------|-------------|
| IPS                    | -3.2148*** | -6.7689***  | 1.8534     | -5.9697***  | 9.0824     | 0.1017     | -0.6993    | -6.0926***  | 6.0393     | -7.3306***  |
| FT                     | 1.7784**   | 0.7747      | 1.6143     | 1.3351*     | -2.1954    | 3.6025***  | 1.7364**   | 0.6127      | -2.3829    | -0.1161     |
| H                      | -0.2688    | 0.8486      | 27.7829*** | 1.164       | 41.5198*** | 24.3325*** | 26.2238*** | 0.6336      | 33.168***  | -2.0094     |
| CADF/CIPS              | -1.799     | -4.67***    | -1.678     | -4.71***    | 0.811      | -1.166     | -0.453     | -2.94***    | -1.97      | -3.062***   |
| <b>Southern Africa</b> |            |             |            |             |            |            |            |             |            |             |
| HT                     | -0.019***  | -0.6024***  | 0.8921     | -0.181***   | 1.0302     | 0.6657***  | 0.9535     | 0.2877***   | 1.0313     | -0.1071***  |
| B                      | -0.8907    | -5.1251***  | 1.7985     | -7.5249***  | 9.7191     | -0.5167    | 0.8409     | -5.5851***  | 6.6864     | -7.0164***  |
| LLC                    | -1.2259    | -4.8616***  | 1.3823     | -6.1203***  | 3.9305     | -2.6290*** | -0.9051    | -4.3916***  | 4.6393     | -4.5234***  |
| IPS                    | -1.2163    | -5.495***   | 0.5207     | -6.8671***  | 10.6705    | 0.7214     | 1.4017     | -4.5396***  | 6.9622     | -5.7124***  |
| FT                     | 0.3622     | 2.3214**    | -1.6172    | 1.0722      | -2.215     | 0.7594     | -0.73      | 0.7142      | -2.2015    | -0.1882     |
| H                      | 7.8154***  | -2.2771     | 25.5382*** | -1.2408     | 37.4827*** | 20.3062*** | 16.8972*** | 0.6417      | 34.2193*** | 1.5558*     |
| CADF/CIPS              | -1.639     | -3.611***   | -2.624***  | -5.292***   | -1.682     | -1.957     | -2.098     | -4.222***   | -1.358     | -4.491***   |
| <b>Western Africa</b>  |            |             |            |             |            |            |            |             |            |             |
| HT                     | 0.6052***  | -0.1591***  | 0.9158     | 0.1556***   | 1.0157     | 0.9253     | 0.9001     | 0.1939***   | 0.9963     | -0.1952***  |
| B                      | -0.7791    | -5.018***   | 0.1489     | -10.6323*** | 17.7407    | 7.6797     | -1.1406    | -11.7595*** | 10.9752    | -14.4278*** |
| LLC                    | -6.7937*** | -5.3241***  | -1.4742*   | -8.137***   | 0.4099     | -3.382***  | -2.1707    | -11.0729*** | 0.8553     | -13.1363*** |
| IPS                    | -4.9021*** | -11.9923*** | 0.1898     | -9.6374***  | 25.2242    | -0.6172    | 0.8248     | -9.0344***  | 6.7334     | -12.3973*** |
| FT                     | 11.3724*** | 8.0701***   | 0.8293     | 2.1939**    | -3.5418    | 0.0257     | -1.5389    | 1.8537**    | -3.3142    | 7.8548***   |
| H                      | 13.9002*** | -2.1183     | 40.5209*** | 4.2699***   | 68.1427*** | 54.1656*** | 39.5122*** | -1.3055     | 66.4729*** | -2.9016     |
| CADF/CIPS              | -2.848***  | -5.033***   | -1.573     | -4.22***    | -1.234     | -1.621     | -1.626     | -3.852***   | -1.713     | -4.246***   |

HT=Harris-Tzavalis unit-root test ( $\rho$ ), B=Breitung unit-root test ( $\Lambda$ ), LLC=Levin-Lin-Chu unit-root test (Adjusted  $t^*$ ), IPS=Im Pesaran & Shin unit root test ( $Z-\tilde{t}$ ), FT=Fisher-type unit-root test (Modified inv. chi-squared  $P_m$ ), H=Hadri (2000) Lagrange multiplier stationarity test, and CADF/CIPS=Pesaran's Cross-sectionally Augmented Dickey-Fuller (CADF) / CIPS Test (CIPS\*)

**Table 3: Panel Causality Test Results**

| Null Hypothesis                                                  | All         | Eastern Africa | Middle Africa | Northern Africa | Southern Africa | Western Africa |
|------------------------------------------------------------------|-------------|----------------|---------------|-----------------|-----------------|----------------|
| Dumitrescu & Hurlin (2012) Granger non-causality test            |             |                |               |                 |                 |                |
| GOV does not Granger-cause NM                                    | 6.6198***   | 7.9088***      | 0.292         | -1.504          | 1.6426          | 3.809***       |
| NM does not Granger-cause GOV                                    | 2.4**       | 0.043          | -0.0981       | 1.1829          | 3.5449***       | 1.6512*        |
| POPG does not Granger-cause NM                                   | 12.4108***  | 12.6656***     | 3.5092***     | 0.104           | 2.0867**        | 5.8462***      |
| NM does not Granger-cause POPG                                   | 355.495***  | 165.5946***    | 350.2279***   | 9.671***        | 90.9946***      | 155.8223***    |
| UNE does not Granger-cause NM                                    | 11.6942***  | 9.9092***      | 0.0566        | 4.5062***       | 0.6326          | 8.0173***      |
| NM does not Granger-cause UNE                                    |             |                | 2.1278**      | 2.6941***       | 0.5847          | 0.3896         |
| DRGDP does not Granger-cause NM                                  | 10.1317***  | 9.7117***      | 2.0977**      | 0.0876          | 2.2868**        | 5.648***       |
| UNE does not Granger-cause DRGDP                                 | 0.4138      | -1.6568*       | 0.5842        | 2.4668**        | 1.5916          | -0.4357        |
| Juodis, Karavias and Sarafidis (2021) Granger non-causality Test |             |                |               |                 |                 |                |
| GOV does not Granger-cause NM                                    | 2.5603      | 8.6388***      | 0.0019        | 3.2249*         | 42.3891***      | 4.6217**       |
| NM does not Granger-cause GOV                                    | 0.0931      | 6.6773***      | 5.4838**      | 8.9288***       | 2.9466*         | 0.1655         |
| POPG does not Granger-cause NM                                   | 126.9675*** | 124.2578***    | 39.6244***    | 8.763***        | 123.6923***     | 24.3769***     |
| NM does not Granger-cause POPG                                   | 580.7208*** | 682.8058***    | 544.5494***   | 26.3434***      | 93.5998***      | 31.0929***     |
| UNE does not Granger-cause NM                                    | 9.2977***   | 0.1059         | 0.0068        | 5.0506**        | 24.0558***      | 2.6442         |
| NM does not Granger-cause UNE                                    | 0.412       | 4.0328**       | 0.0496        | 9.1392***       | 2.0847          | 1.0841         |
| DRGDP does not Granger-cause NM                                  | 1.0586      | 13.7183***     | 0.0094        | 0.9327          | 18.0483***      | 0.0077         |
| NM does not Granger-cause DRGDP                                  | 8.9338***   | 0.0028         | 0.1053        | 36.3029***      | 0.0012          | 1.7171         |

**Table 4: Cointegration test Results**

| Cointegration tests                 | All         | Eastern Africa | Middle Africa | Northern Africa | Southern Africa | Western Africa |
|-------------------------------------|-------------|----------------|---------------|-----------------|-----------------|----------------|
| <b>Kao Test Results</b>             |             |                |               |                 |                 |                |
| Modified Dickey-Fuller t            | -30.8413*** | -16.2167***    | -13.6268***   | -9.0504***      | -21.9325***     | -4.735***      |
| Dickey-Fuller t                     | -18.706***  | -10.211***     | -11.5424***   | -2.3454***      | -14.6614***     | -6.6691***     |
| Augmented Dickey-Fuller t           | -8.7208***  | -4.9485***     | -3.8799***    | -1.9717**       | -9.2215***      | -5.2096***     |
| Unadjusted modified Dickey-Fuller t | -37.6364*** | -13.4143***    | -19.7216***   | -9.3128***      | -21.9554***     | -10.3443***    |
| Unadjusted Dickey-Fuller t          | -19.5059*** | -10.0413***    | -12.2808***   | -2.3873***      | -14.661***      | -8.5193***     |
| <b>Pedroni Test Results</b>         |             |                |               |                 |                 |                |
| Modified Phillips-Perron t          | 1.8567**    | 1.0784         | 0.3859        | 1.289           | 1.7687**        | 0.601          |
| Phillips-Perron t                   | -8.3811***  | -7.4203***     | -3.0372***    | -0.7125         | -0.3001         | -5.8032***     |
| Augmented Dickey-Fuller t           | -6.0544***  | -3.3039***     | -3.4672***    | -2.1671**       | 0.4083          | -3.9116***     |
| <b>Westerlund Test Results</b>      |             |                |               |                 |                 |                |
| Gt                                  | -1.737      | -1.682         | -2.908*       | -1.502          | -2.151          | -1.091         |
| Ga                                  | -0.572      | -0.784         | -0.404        | -0.505          | -1.124          | -0.306         |
| Pt                                  | -41.869***  | -16.975***     | -4.932        | -4.543          | -4.366          | -6.272         |
| Pa                                  | -2.153      | -2.301         | -1.426        | -0.686          | -1.414          | -0.184         |

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Source: Extractions from STATA Output

**Table 5: Average Correlation Coefficients, Pesaran's CD Test, and Slope Heterogeneity Diagnostics**

| Variable                                                | All       | Eastern Africa | Middle Africa | Northern Africa | Southern Africa | Western Africa |
|---------------------------------------------------------|-----------|----------------|---------------|-----------------|-----------------|----------------|
| NM                                                      | 0.19      | -0.29          | 0.33          | -0.72           | -0.24           | -2.15**        |
| GOV                                                     | 6.64***   | -1.82*         | -1.35         | 4.33***         | 9.19***         | -1.33          |
| POPG                                                    | 189.1***  | 56.93***       | 31.39***      | 20.29***        | 15.9***         | 56.99***       |
| UNE                                                     | 15.44***  | 11.77***       | 3.46***       | 2.71***         | 4.6***          | -0.63          |
| DRGDP                                                   | 168.8***  | 45.4***        | 25.31***      | 19.07***        | 15.58***        | 56.98***       |
| Pesaran & Yamagata. (2008) Test for slope heterogeneity | 17.282*** | 6.027***       | 4.241***      | 3.311***        | 2.19**          | 5.311***       |

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Source: Extractions from STATA Output

**Table 6: Hausman Test Results**

| Variable                       | mg=(b)                 | pmg=(B)   | (b-B)     | S.E.     | mg=(b)                 | pmg=(B)  | (b-B)      | S.E.      |
|--------------------------------|------------------------|-----------|-----------|----------|------------------------|----------|------------|-----------|
|                                | <b>Eastern Africa</b>  |           |           |          | <b>Middle Africa</b>   |          |            |           |
| GOV_pos                        | -166.9289              | -208.3373 | 41.4084   | 36.9877  | -62.2290               | 5.1295   | -67.3586   | 54.8158   |
| GOV_neg                        | 76.0976                | 63.0402   | 13.0574   | 40.1941  | 95.8640                | -11.0247 | 106.8888   | 59.8564   |
| POPG                           | -9.4944                | -21.5484  | 12.0540   | 5.5579   | -28.5652               | -20.3648 | -8.2004    | 4.0189    |
| UNE                            | -7.6084                | 8.8441    | -16.4525  | 10.1200  | 3.6906                 | 1.1081   | 2.5825     | 10.7475   |
| DRGDP                          | -35.3699               | 1.0738    | -36.4437  | 27.3128  | -6.2548                | 0.4581   | -6.7129    | 9.2517    |
| Hausman test: Chi-squared (5)= | 12.43 (0.0294)         |           |           |          | 16.95(0.0046)          |          |            |           |
|                                | <b>Northern Africa</b> |           |           |          | <b>Southern Africa</b> |          |            |           |
| GOV_pos                        | -472.1491              | -113.5920 | -358.5572 | 392.5761 | -1003.5770             | 0.2235   | -1003.8010 | 1005.1110 |
| GOV_neg                        | 58.3435                | 163.3791  | -105.0356 | 59.9528  | 415.4587               | -1.2091  | 416.6678   | 416.3743  |
| POPG                           | -13.1201               | -0.4047   | -12.7154  | 3.9925   | -27.5566               | -9.4569  | -18.0997   | 8.9873    |
| UNE                            | -20.4123               | -0.0942   | -20.3181  | 20.8919  | 1.9251                 | 0.3119   | 1.6132     | 1.1862    |
| DRGDP                          | 69.4968                | 0.9583    | 68.5385   | 59.7712  | 15.6930                | -0.5441  | 16.2371    | 13.3968   |
| Hausman test: Chi-squared (5)= | 12.1(0.0334)           |           |           |          | 21.52(0.0006)          |          |            |           |
|                                | <b>Western Africa</b>  |           |           |          |                        |          |            |           |
| GOV_pos                        | -29.9955               | -31.4262  | 1.4307    | 49.4613  |                        |          |            |           |
| GOV_neg                        | 38.9758                | 23.6779   | 15.2979   | 45.9848  |                        |          |            |           |
| POPG                           | -1.5682                | -18.0188  | 16.4507   | 4.9239   |                        |          |            |           |
| UNE                            | -4.5226                | 5.5728    | -10.0954  | 3.6408   |                        |          |            |           |
| DRGDP                          | -28.1815               | -1.6420   | -26.5394  | 14.8843  |                        |          |            |           |
| Hausman test: Chi-squared (5)= | 34.45(0.0000)          |           |           |          |                        |          |            |           |

b = consistent under Ho and Ha; obtained from xtprg

B = inconsistent under Ha, efficient under Ho; obtained from xtprg

Test: Ho: difference in coefficients not systematic

**Table 7: MG Results for Eastern African Countries**

| Variables                | Burundi               | Comoros           | Djibouti             | Eritrea               | Ethiopia             | Kenya                | Madagascar          | Malawi              | Mozambique          |
|--------------------------|-----------------------|-------------------|----------------------|-----------------------|----------------------|----------------------|---------------------|---------------------|---------------------|
| <b>Short-Run Results</b> |                       |                   |                      |                       |                      |                      |                     |                     |                     |
| Ec                       | -0.626***<br>(0.20)   | -0.608*<br>(0.33) | -0.764***<br>(0.21)  | -1.059***<br>(0.09)   | -0.654***<br>(0.18)  | -0.864**<br>(0.42)   | -0.764***<br>(0.15) | -0.691***<br>(0.17) | -0.775***<br>(0.14) |
| D.INM                    | 0.0391<br>(0.09)      | 0.138<br>(0.29)   | 0.00858<br>(0.10)    | 0.0644<br>(0.05)      | 0.00361<br>(0.25)    | 0.0222<br>(0.26)     | 0.642***<br>(0.13)  | 0.509***<br>(0.17)  | -0.142***<br>(0.05) |
| D.GOV_pos                | 205.4<br>(134.60)     | 2.294<br>(4.13)   | -3.168<br>(6.63)     | 102.9<br>(87.12)      | -31.46<br>(224.50)   | 334.1<br>(247.70)    | 83.48***<br>(24.11) | 70.27*<br>(37.03)   | 151.1*<br>(83.44)   |
| D.GOV_neg                | -333.6*<br>(170.80)   | 3.168<br>(2.46)   | 6.754<br>(5.33)      | -54.09**<br>(22.83)   | 312.5<br>(199.00)    | -85.63<br>(364.50)   | -16.53*<br>(9.81)   | 48.45<br>(34.19)    | -68.75**<br>(34.66) |
| D.POPG                   | 1,040***<br>(230.80)  | 118.9<br>(290.30) | 2,139***<br>(277.20) | -2,071***<br>(111.30) | -78.12<br>(266.20)   | -125.1<br>(227.30)   | 105.5<br>(69.32)    | 71.26<br>(63.92)    | 133.3<br>(92.56)    |
| D.UNE                    | 4.612<br>(53.83)      | 0.0515<br>(1.34)  | -0.176<br>(0.84)     | -2.914<br>(9.88)      | -112.4***<br>(41.50) | -70.71**<br>(29.97)  | -0.777<br>(0.53)    | 11.74*<br>(5.99)    | -2.266<br>(18.72)   |
| D.DRGDP                  | -45.64<br>(47.88)     | 0.295<br>(1.08)   | -1.221<br>(2.56)     | -9.168<br>(7.57)      | 145.8**<br>(68.02)   | -115.1<br>(73.80)    | 1.598<br>(2.82)     | 3.283<br>(7.50)     | 2.811<br>(13.14)    |
| <b>Long-Run Results</b>  |                       |                   |                      |                       |                      |                      |                     |                     |                     |
| GOV_pos                  | 228.8**<br>(96.31)    | 2.03<br>(9.05)    | 4.612<br>(7.03)      | 151.2**<br>(60.07)    | -504.1<br>(576.90)   | -312.8<br>(433.20)   | 159.2***<br>(36.33) | 172.5<br>(112.30)   | -233.5<br>(169.70)  |
| GOV_neg                  | -464.0***<br>(119.90) | -3.456<br>(5.62)  | -6.688<br>(4.95)     | -40.34***<br>(14.43)  | 41.44<br>(360.90)    | 113.7<br>(598.70)    | 18.96<br>(13.04)    | -172.9**<br>(82.93) | -105.4*<br>(61.94)  |
| POPG                     | -23.32<br>(27.22)     | 24.57<br>(22.13)  | 1.236<br>(12.19)     | -45.36***<br>(7.60)   | -19.79**<br>(8.47)   | -20.82*<br>(12.27)   | -0.837<br>(1.60)    | -0.0425<br>(3.41)   | 0.36<br>(4.41)      |
| UNE                      | 20.28<br>(22.55)      | 0.345<br>(2.15)   | 0.609<br>(0.41)      | -8.435**<br>(4.26)    | -141.2***<br>(38.82) | -32.09***<br>(10.88) | 0.125<br>(0.48)     | -19.66<br>(13.81)   | 29.38<br>(24.45)    |
| DRGDP                    | 22.94<br>(46.21)      | -2.248<br>(2.37)  | 1.915<br>(2.51)      | -8.057***<br>(2.29)   | -340.7**<br>(140.10) | 128.6<br>(107.40)    | -5.603<br>(4.49)    | 4.708<br>(10.38)    | -16.52<br>(13.92)   |
| Constant                 | -309.3<br>(241.40)    | -3.222<br>(8.58)  | -91.86***<br>(28.64) | -112.3**<br>(45.11)   | 1,255***<br>(386.20) | -352.5*<br>(191.20)  | -13.95<br>(19.07)   | -7.282<br>(51.56)   | -108.0*<br>(61.03)  |
| Observations             | 416                   | 416               | 416                  | 416                   | 416                  | 416                  | 416                 | 416                 | 416                 |

Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 8: MG Results for Eastern African Countries**

| Variables                | Rwanda                | Seychelles        | Somalia              | Tanzania              | Uganda                | Zambia                | Zimbabwe             |
|--------------------------|-----------------------|-------------------|----------------------|-----------------------|-----------------------|-----------------------|----------------------|
| <b>Short-Run Results</b> |                       |                   |                      |                       |                       |                       |                      |
| Ec                       | -0.604***<br>(0.08)   | -0.281*<br>(0.17) | -0.904***<br>(0.18)  | -0.885***<br>(0.22)   | -1.146***<br>(0.25)   | -1.295***<br>(0.29)   | -1.241**<br>(0.48)   |
| D.INM                    | -0.0127<br>(0.02)     | 0.302<br>(0.27)   | 0.0868<br>(0.11)     | 0.0175<br>(0.10)      | -0.338**<br>(0.14)    | -0.249<br>(0.19)      | 0.371<br>(0.24)      |
| D.GOV_pos                | -6.288<br>(34.46)     | 0.485<br>(1.06)   | 516.9<br>(317.70)    | -451.4<br>(431.30)    | -48.57<br>(457.40)    | 29.47<br>(58.02)      | 246.9*<br>(148.50)   |
| D.GOV_neg                | -76.77<br>(147.80)    | -1.525<br>(1.17)  | -189.3<br>(121.80)   | 143.4<br>(500.50)     | -313.3<br>(485.00)    | 187.6*<br>(102.00)    | 93.84<br>(180.30)    |
| D.POPG                   | -1,274***<br>(130.60) | -16.96<br>(20.13) | 1,260***<br>(106.80) | -1,469***<br>(223.20) | -1,531***<br>(267.70) | -469.9***<br>(151.80) | 683.1<br>(471.00)    |
| D.UNE                    | -5.216**<br>(2.42)    | 0<br>(0.00)       | 55.3<br>(38.97)      | -20.94<br>(42.74)     | -52.72**<br>(23.88)   | 3.151*<br>(1.84)      | -7.648<br>(13.58)    |
| D.DRGDP                  | 42.68**<br>(21.10)    | -0.0921<br>(0.09) | 116.0*<br>(62.54)    | 199.3***<br>(75.74)   | 130.6**<br>(63.66)    | -38.57***<br>(12.97)  | 29.43<br>(32.94)     |
| <b>Long-Run Results</b>  |                       |                   |                      |                       |                       |                       |                      |
| GOV_pos                  | 10.97<br>(39.19)      | -0.319<br>(5.67)  | 523.2**<br>(216.20)  | -169.8<br>(352.10)    | -231.2<br>(586.30)    | -56.84<br>(72.89)     | -289.9<br>(235.80)   |
| GOV_neg                  | 67.5<br>(83.30)       | 8.407<br>(8.63)   | -175.7**<br>(69.82)  | 219.5<br>(517.60)     | 391.5<br>(598.60)     | -71.3<br>(117.10)     | 36.43<br>(196.20)    |
| POPG                     | -12.74*<br>(7.25)     | -16.16<br>(55.86) | 11.62<br>(14.83)     | -12.74***<br>(4.70)   | -17.83*<br>(10.32)    | -28.01***<br>(4.48)   | -57.11***<br>(13.75) |
| UNE                      | 1.191<br>(1.56)       | -1.437<br>(1.15)  | -38.13*<br>(22.33)   | 4.319<br>(27.92)      | -40.05*<br>(24.02)    | -0.652<br>(0.83)      | -22.59***<br>(8.32)  |
| DRGDP                    | -42.66***<br>(14.59)  | 0.084<br>(0.25)   | -83.73**<br>(36.45)  | -159.1***<br>(39.96)  | -164.8***<br>(62.60)  | -61.39***<br>(14.84)  | -21.73*<br>(13.02)   |
| Constant                 | -9.081<br>(91.64)     | 2.683<br>(2.50)   | 2,311*<br>(1278.00)  | 1,018***<br>(334.80)  | 811.7**<br>(361.10)   | -310.3***<br>(62.60)  | 313.8*<br>(168.50)   |
| Observations             | 416                   | 416               | 416                  | 416                   | 416                   | 416                   | 416                  |

Standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 9: MG Results for Middle African Countries

| Variables                | Angola               | Cameroon              | Central African Republic | Chad                | Congo DR             | Congo, Rep.          | Equatorial Guinea   | Gabon                | Sao Tome and Principe |
|--------------------------|----------------------|-----------------------|--------------------------|---------------------|----------------------|----------------------|---------------------|----------------------|-----------------------|
| <b>Short-Run Results</b> |                      |                       |                          |                     |                      |                      |                     |                      |                       |
| Ec                       | -0.885***<br>(0.28)  | -0.901***<br>(0.22)   | -0.935<br>(0.61)         | -1.041***<br>(0.13) | 0.976***<br>(0.07)   | -0.944***<br>(0.17)  | -0.969***<br>(0.09) | -0.581***<br>(0.12)  | -1.031***<br>(0.21)   |
| D.INM                    | -0.151<br>(0.20)     | 0.470***<br>(0.11)    | 0.148<br>(0.46)          | 0.0752<br>(0.10)    | 0.0878**<br>(0.04)   | 0.0222<br>(0.08)     | 0.0244<br>(0.05)    | 0.779***<br>(0.09)   | -0.267**<br>(0.13)    |
| D.GOV_pos                | 101.5<br>(62.12)     | 119<br>(90.56)        | 325.5<br>(435.70)        | 130.4<br>(108.70)   | -89.62<br>(308.80)   | 185.6**<br>(74.45)   | -2.671<br>(6.97)    | 0.895<br>(3.95)      | 0.269<br>(3.02)       |
| D.GOV_neg                | -117.5<br>(102.80)   | -610.7***<br>(151.10) | -36.29<br>(174.60)       | 34.64<br>(74.83)    | -181.5<br>(265.70)   | 87.36<br>(61.58)     | 1.583<br>(7.39)     | 2.628<br>(2.77)      | -3.182*<br>(1.64)     |
| D.POPG                   | 747.4***<br>(127.30) | 1,823***<br>(211.40)  | 58.29<br>(213.00)        | 2,050***<br>(73.24) | 1,823***<br>(102.50) | 1,539***<br>(162.00) | 1,966***<br>(89.70) | 409.3***<br>(111.70) | 1,874***<br>(452.60)  |
| D.UNE                    | -12.27<br>(9.19)     | -26.67***<br>(8.56)   | -127.9<br>(78.00)        | -25.58<br>(30.62)   | 57.87<br>(38.08)     | -7.994*<br>(4.26)    | -2.535**<br>(1.23)  | -0.482<br>(0.34)     | 0.594***<br>(0.09)    |
| D.DRGDP                  | 6.277<br>(14.53)     | -9.129<br>(22.22)     | -91.81*<br>(48.10)       | -3.464<br>(25.75)   | -141.8**<br>(59.03)  | -24.62**<br>(9.82)   | -0.664*<br>(0.37)   | 0.0969<br>(0.44)     | -0.0633<br>(0.44)     |
| <b>Long-Run Results</b>  |                      |                       |                          |                     |                      |                      |                     |                      |                       |
| GOV_pos                  | -138.5<br>(98.44)    | -74.72<br>(57.63)     | -414.4<br>(497.60)       | 170.4**<br>(71.48)  | 102.9<br>(221.80)    | 125.3*<br>(65.11)    | 4.351<br>(4.23)     | 6.512<br>(8.41)      | -0.967<br>(4.72)      |
| GOV_neg                  | 95.89<br>(122.80)    | -442.8***<br>(81.36)  | -358.5**<br>(177.60)     | -13.14<br>(49.58)   | 55.03<br>(193.20)    | -63.37<br>(39.55)    | -0.899<br>(4.75)    | -13.07<br>(9.70)     | 1.003<br>(1.63)       |
| POPG                     | -25.71***<br>(5.84)  | -16.53***<br>(3.55)   | -23.48<br>(119.60)       | -29.03***<br>(6.98) | -25.23***<br>(1.47)  | -40.91***<br>(5.16)  | -20.75***<br>(0.67) | -20.35***<br>(2.41)  | -55.10***<br>(19.85)  |
| UNE                      | -1.296<br>(5.03)     | -9.343***<br>(1.88)   | -57.74*<br>(33.47)       | 25.53<br>(17.56)    | -65.83***<br>(12.38) | 5.549**<br>(2.16)    | -1.837***<br>(0.59) | 0.818<br>(0.82)      | -0.471***<br>(0.11)   |
| DRGDP                    | 20.9<br>(14.74)      | -4.249<br>(13.89)     | -8.791<br>(46.26)        | -4.327<br>(15.80)   | -75.76***<br>(20.45) | -14.95***<br>(3.96)  | -0.413***<br>(0.05) | 0.771<br>(0.55)      | -0.208<br>(0.46)      |
| Constant                 | 69.38<br>(98.79)     | -263.4*<br>(136.50)   | -131.6<br>(247.30)       | -52.58<br>(152.10)  | 1,290***<br>(191.00) | -261.1***<br>(74.21) | -40.37***<br>(9.21) | -5.075<br>(6.62)     | 10.63***<br>(4.01)    |
| Observations             | 234                  | 234                   | 234                      | 234                 | 234                  | 234                  | 234                 | 234                  | 234                   |

Standard errors in parentheses. \*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

**Table 10: MG Results for Northern African Countries**

| Variables                | Algeria   | Egypt     | Libya     | Morocco   | Sudan     | Tunisia  |
|--------------------------|-----------|-----------|-----------|-----------|-----------|----------|
| <b>Short-Run Results</b> |           |           |           |           |           |          |
| Ec                       | -0.903*** | -0.673    | -0.820*** | -1.241*** | -0.509*** | -0.481   |
|                          | (0.11)    | (0.46)    | (0.07)    | (0.47)    | (0.11)    | (0.35)   |
| D.INM                    | -0.011    | 0.106     | 0.0165    | 0.273     | 0.0996    | 0.27     |
|                          | (0.09)    | (0.30)    | (0.02)    | (0.35)    | (0.06)    | (0.35)   |
| D.GOV_pos                | 229.2***  | 1,964     | 88.91     | 22.71     | 311.7     | 9.348    |
|                          | (67.31)   | (1199.00) | (60.65)   | (140.50)  | (190.10)  | (35.59)  |
| D.GOV_neg                | -181.2    | -687.7    | -163.3*** | 32.06     | -242.6    | -53.49   |
|                          | (125.5)   | (454.50)  | (49.35)   | (109.40)  | (205.70)  | (36.84)  |
| D.POPG                   | -62.5     | -634.9*** | -2,057*** | 185.5     | -1,987*** | 39.45    |
|                          | (65.52)   | (222.60)  | (86.54)   | (277.90)  | (85.11)   | (113.90) |
| D.UNE                    | 1.212     | -53.61*   | -9.29     | -2.933    | -6.384    | -0.987   |
|                          | (2.02)    | (27.59)   | (19.18)   | (7.85)    | (9.72)    | (1.02)   |
| D.DRGDP                  | -38.62**  | -22.33    | 1.55      | -8.213    | -99.64**  | -19      |
|                          | (19.10)   | (135.80)  | (4.78)    | (32.39)   | (48.99)   | (14.67)  |
| <b>Long-Run Results</b>  |           |           |           |           |           |          |
| GOV_pos                  | 424.4***  | -2,409    | -44.23    | -34.82    | 52.8      | 27.22    |
|                          | (97.16)   | (1888.00) | (41.46)   | (141.30)  | (150.70)  | (128.00) |
| GOV_neg                  | -342.5*   | -55.14    | -129.5*** | -47.31    | -16.49    | -3.083   |
|                          | (189.80)  | (829.90)  | (24.65)   | (137.30)  | (102.60)  | (94.04)  |
| POPG                     | -2.297    | -23.04    | -11.91*** | -0.361    | -20.00*** | -21.11   |
|                          | (4.55)    | (17.20)   | (4.42)    | (6.41)    | (5.67)    | (16.22)  |
| UNE                      | -1.046    | -124.8*   | -0.812    | 4.707     | -2.527    | 1.998    |
|                          | (0.96)    | (71.02)   | (6.68)    | (5.29)    | (3.73)    | (2.04)   |
| DRGDP                    | 19.95     | 367       | -3.456*** | 20.55     | -15.11    | 21.19    |
|                          | (21.78)   | (315.60)  | (1.21)    | (24.13)   | (34.28)   | (20.23)  |
| Constant                 | 43.09     | -403.3    | -0.14     | -376.3    | -285.3*   | 25.71    |
|                          | (55.65)   | (337.00)  | (312.40)  | (260.80)  | (159.40)  | (43.19)  |
| Observations             | 156       | 156       | 156       | 156       | 156       | 156      |

Standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 11: MG Results for Southern African Countries**

| Variables                | Botswana  | Eswatini  | Lesotho   | Namibia   | South Africa |
|--------------------------|-----------|-----------|-----------|-----------|--------------|
| <b>Short-Run Results</b> |           |           |           |           |              |
| Ec                       | -0.876*** | -0.607*** | -0.868*** | -0.903*** | -0.850***    |
|                          | (0.29)    | (0.11)    | (0.20)    | (0.23)    | (0.22)       |
| D.INM                    | 0.19      | 0.331***  | 0.420***  | 0.349**   | 0.00123      |
|                          | (0.18)    | (0.11)    | (0.16)    | (0.17)    | (0.14)       |
| D.GOV_pos                | -1.079    | -0.0864   | -33.19    | 37.89**   | 4,907        |
|                          | (17.72)   | (2.88)    | (22.71)   | (18.43)   | (3186.00)    |
| D.GOV_neg                | 13.67     | -0.223    | -22.08    | -18.48    | -2,738*      |
|                          | (10.45)   | (2.59)    | (14.49)   | (11.67)   | (1404.00)    |
| D.POPG                   | -1,255*** | -784.2*** | -1,269*** | -965.4*** | -1,788***    |
|                          | (285.70)  | (171.00)  | (222.40)  | (174.20)  | (236.00)     |
| D.UNE                    | -0.0173   | -0.507*** | -5.210**  | 0.764     | -9.628       |
|                          | (0.33)    | (0.18)    | (2.10)    | (0.68)    | (35.06)      |
| D.DRGDP                  | 1.034     | 1.043     | -11.56**  | -3.058    | -223.5       |
|                          | (2.42)    | (1.16)    | (4.89)    | (5.48)    | (421.60)     |
| <b>Long-Run Results</b>  |           |           |           |           |              |
| GOV_pos                  | 10.33     | 0.433     | 27.30*    | 32.11**   | 5,024**      |
|                          | (15.49)   | (3.05)    | (15.46)   | (14.26)   | (2551.00)    |
| GOV_neg                  | -23.2     | -1.418    | 17.88     | 3.267     | -2,081**     |
|                          | (16.85)   | (2.44)    | (11.48)   | (14.04)   | (1040.00)    |
| POPG                     | -24.03*** | -9.888    | -63.86*** | -24.41*** | -15.58       |
|                          | (5.73)    | (10.20)   | (11.52)   | (5.75)    | (12.58)      |
| UNE                      | -0.364*   | -0.313*** | -2.730*** | -0.0273   | 6.244        |
|                          | (0.19)    | (0.03)    | (0.98)    | (0.37)    | (20.65)      |
| DRGDP                    | -2.159    | -0.526    | -5.603*** | -6.691*** | 68.86        |
|                          | (2.94)    | (0.82)    | (0.89)    | (2.19)    | (108.70)     |
| Constant                 | 16.97     | -13.01    | 35.39     | -12.36    | -16.69       |
|                          | (10.71)   | (9.76)    | (23.25)   | (13.98)   | (960.80)     |
| Observations             | 130       | 130       | 130       | 130       | 130          |

Standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 12: MG Results for Western African Countries**

| Variables                | Benin     | Burkina Faso | Cabo Verde | Cote d'Ivoire | Gambia, The | Ghana     | Guinea    | Guinea-Bissau | Liberia   |
|--------------------------|-----------|--------------|------------|---------------|-------------|-----------|-----------|---------------|-----------|
| <b>Short-Run Results</b> |           |              |            |               |             |           |           |               |           |
| Ec                       | -0.650*** | -0.279**     | -0.907***  | -0.605***     | -0.625***   | -0.430**  | -0.820*** | -0.214        | -0.906*** |
|                          | (0.09)    | (0.12)       | (0.24)     | (0.21)        | (0.20)      | (0.18)    | (0.12)    | (0.21)        | (0.06)    |
| D.INM                    | 0.119     | -0.154       | -0.199     | -0.101        | 0.428***    | 0.047     | 0.131**   | 0.393***      | -0.0201   |
|                          | (0.24)    | (0.28)       | (0.18)     | (0.15)        | (0.16)      | (0.19)    | (0.06)    | (0.11)        | (0.02)    |
| D.GOV_pos                | 2.226     | -125.5       | 0.592      | -99.81        | -2.293      | -101.8    | -44.93    | -0.277        | 96.20***  |
|                          | (96.22)   | (132.90)     | (2.55)     | (148.70)      | (1.77)      | (69.51)   | (43.00)   | (0.52)        | (35.70)   |
| D.GOV_neg                | 91.69     | 102.8        | -2.859     | -3.743        | 1.785       | -11.23    | 71.71     | -0.518        | -97.32    |
|                          | (76.08)   | (67.93)      | (2.15)     | (117.70)      | (1.32)      | (112.10)  | (45.34)   | (0.70)        | (62.60)   |
| D.POPG                   | 261.8     | 18.76        | -807.0**   | 593.3         | 58.91       | 52.77     | -1,721*** | 75.25         | -2,030*** |
|                          | (281.90)  | (87.06)      | (383.60)   | (391.30)      | (36.72)     | (108.60)  | (139.50)  | (69.18)       | (93.85)   |
| D.UNE                    | 4.435     | 0.687        | -0.429     | 34.95*        | 0.362*      | -5.093**  | 6.325     | 0.138         | -2.049    |
|                          | (4.26)    | (12.86)      | (0.29)     | (17.94)       | (0.21)      | (2.10)    | (10.24)   | (0.22)        | (6.33)    |
| D.DRGDP                  | 5.925     | 23.71        | -1.997**   | 44.28         | -1.114**    | -37.05*** | 29.53**   | -0.0073       | -7.138    |
|                          | (10.98)   | (19.58)      | (0.96)     | (44.36)       | (0.53)      | (14.11)   | (14.43)   | (0.20)        | (13.14)   |
| <b>Long-Run Results</b>  |           |              |            |               |             |           |           |               |           |
| GOV_pos                  | -26.79    | 174.1        | -2.273     | 157.9         | 3.722       | 251.7     | 36.32     | 4.202         | 92.70***  |
|                          | (89.26)   | (798.50)     | (3.07)     | (235.60)      | (5.10)      | (265.30)  | (32.05)   | (6.92)        | (22.63)   |
| GOV_neg                  | -96.34    | -255.8       | 2.048      | 211.4         | -2.333      | -282.5    | -57.14**  | 4.043         | -129.3*** |
|                          | (63.58)   | (369.30)     | (2.49)     | (166.00)      | (3.64)      | (439.80)  | (25.02)   | (5.68)        | (44.43)   |
| POPG                     | -0.431    | 59.68        | -22.37*    | -6.972        | 0.579       | -6.982    | -1.722    | -5.001        | -35.63*** |
|                          | (2.64)    | (43.83)      | (12.44)    | (9.73)        | (2.78)      | (6.69)    | (2.59)    | (5.80)        | (7.61)    |
| UNE                      | -2.653    | 3.278        | -0.882**   | -32.15        | 0.235       | 7.739     | -6.066    | -1.37         | -6.950*** |
|                          | (2.37)    | (48.92)      | (0.44)     | (20.17)       | (0.18)      | (7.34)    | (3.95)    | (2.27)        | (2.36)    |
| DRGDP                    | -4.243    | -222.2       | -2.433***  | -39.67        | -0.313      | 40.06     | -23.75*** | 0.0494        | -10.75*   |
|                          | (9.80)    | (162.30)     | (0.33)     | (36.34)       | (0.87)      | (36.37)   | (5.00)    | (1.08)        | (5.85)    |
| Constant                 | -2.829    | 249.4**      | -48.19***  | 230           | -5.101*     | -108.3    | 24        | -0.898        | -142.1*** |
|                          | (47.47)   | (117.40)     | (11.46)    | (222.20)      | (2.92)      | (89.43)   | (50.36)   | (3.42)        | (33.51)   |
| Observations             | 416       | 416          | 416        | 416           | 416         | 416       | 416       | 416           | 416       |

Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 13: MG Results for Western African Countries**

| Variables                | Mali      | Mauritania | Niger     | Nigeria   | Senegal   | Sierra Leone | Togo      |
|--------------------------|-----------|------------|-----------|-----------|-----------|--------------|-----------|
| <b>Short-Run Results</b> |           |            |           |           |           |              |           |
| Ec                       | -0.759*** | -0.871***  | -0.931*** | -0.967*** | -0.672*** | -0.634***    | -0.756*** |
|                          | (0.21)    | (0.23)     | (0.27)    | (0.12)    | (0.19)    | (0.09)       | (0.26)    |
| D.INM                    | -0.102    | 0.0262     | -0.0191   | 0.479**   | -0.383**  | 0.0698       | -0.297**  |
|                          | (0.09)    | (0.12)     | (0.18)    | (0.21)    | (0.17)    | (0.05)       | (0.12)    |
| D.GOV_pos                | 19.4      | 23.12      | -42.12    | 78.11     | -24.62    | 56.47        | -18.06    |
|                          | (124.40)  | (23.23)    | (63.10)   | (356.70)  | (82.30)   | (60.89)      | (41.65)   |
| D.GOV_neg                | 32.9      | -11.27     | -37.92    | -214.2    | -10.73    | 65.3         | -42.33*   |
|                          | (65.06)   | (13.10)    | (55.10)   | (366.00)  | (59.97)   | (103.00)     | (24.95)   |
| D.POPG                   | -243.6*   | -1,247***  | -305.9*** | -104.6*   | -1,100*** | -2,052***    | 262.4     |
|                          | (129.00)  | (170.10)   | (95.87)   | (60.63)   | (216.40)  | (84.45)      | (285.20)  |
| D.UNE                    | -0.93     | -5.374*    | 5.93      | 34.34     | 12.11**   | -9.8         | 2.038     |
|                          | (4.45)    | (3.21)     | (3.61)    | (47.13)   | (5.59)    | (7.82)       | (3.31)    |
| D.DRGDP                  | -10.02    | 7.109      | 17.56     | 56.97     | 18.27     | 24.41**      | 1.889     |
|                          | (12.54)   | (6.59)     | (13.23)   | (79.62)   | (15.31)   | (11.55)      | (7.69)    |
| <b>Long-Run Results</b>  |           |            |           |           |           |              |           |
| GOV_pos                  | -152.8    | -14.93     | -12.08    | 661.8**   | -134.6    | 91.08**      | 81.11     |
|                          | (206.60)  | (25.01)    | (94.56)   | (328.70)  | (163.70)  | (43.27)      | (78.39)   |
| GOV_neg                  | -327.2*** | 8.374      | 106.3     | 417.8     | 163.3     | -20.86       | -31.31    |
|                          | (57.67)   | (13.92)    | (80.14)   | (342.80)  | (119.50)  | (63.71)      | (42.18)   |
| POPG                     | -5.159    | -6.614     | -0.681    | 2.67      | -21.13    | -12.80*      | -7.27     |
|                          | (6.39)    | (9.31)     | (2.31)    | (2.06)    | (18.05)   | (7.37)       | (9.14)    |
| UNE                      | -14.90*** | 2.802      | 1.587     | -39.8     | -24.08**  | -6.507***    | 1.889     |
|                          | (5.53)    | (2.93)     | (4.15)    | (26.80)   | (12.12)   | (2.25)       | (3.57)    |
| DRGDP                    | 26.12     | -11.19*    | -31.60**  | -98.45*   | -35.5     | -11.7        | 0.516     |
|                          | (20.76)   | (6.61)     | (14.54)   | (58.37)   | (22.64)   | (8.37)       | (15.10)   |
| Constant                 | 84.14     | -2.443     | 113.6*    | 1,042***  | 59.43     | 114.1        | -18.71    |
|                          | (62.07)   | (67.29)    | (61.75)   | (383.20)  | (42.94)   | (71.67)      | (28.69)   |
| Observations             | 416       | 416        | 416       | 416       | 416       | 416          | 416       |

Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1