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## THE MEDIATING ROLE OF INSTITUTIONS IN THE REMITTANCE–GROWTH RELATIONSHIP: EVIDENCE FROM NIGERIA

**ABSTRACT:** *This study examines the mediating role of institutions in the remittance–growth relationship in Nigeria. We use autoregressive distributed lag (ARDL) estimation to establish the interaction of the variables of interest. The short-run results reveal that remittance inflows positively influence growth, probably due to the immediate injection of financial resources that an increase in remittances brings about. This effect is reinforced by improvements in regulatory quality. In contrast the long-run results reveal that, over time, remittance inflows are negatively related to growth probably due to adverse macroeconomic consequences, to a decrease in work*

*incentives, and a decline in the motivation for technological innovation. However, the adoption of improved institutional environment is found to offset the negative long-run effect of remittances on growth, at least to some extent. Therefore, remittance-receiving countries should improve the design and enforcement of laws, regulatory quality, and control over corruption, so that they can make best use of remittance inflows and other sources of external financing needed to augment domestic productivity and growth.*

**KEY WORDS:** *economic growth, remittances, institutions, ARDL, Nigeria.*

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## **1. INTRODUCTION**

The literature on remittances and growth outcomes has grown tremendously because of the enormous influence of the inflow of workers' remittances to developing nations. However, the moderating role of institutions in the remittance–growth relationship is ambiguous and in need of study, since the heterogeneous nature of institutional arrangements in African nations means that their moderating role is region-specific. Most studies in this area have been continental panel studies and, as far as we know, no country-specific study has covered this ground, leaving a gap in the literature of development and international finance.

As both a source and a reflection of growth and development, remittances have aided developing nations by diversifying their capital outsourcing strategies (Enderwick, Tung, & Chung, 2011), eased credit constraints by augmenting the household capital needed for savings and investments (Delgado-Wise, 2016), and alleviated poverty (Azam, Haseeb, & Samsudin, 2016; Brown, Connell, & Jimenez-Soto, 2014; Masron & Subramaniam, 2018). However, the capacity of remittances to induce growth depends on the institutional structure and capacity of the region or country (Saad-Filho & Weeks, 2013). There is no doubt that Nigeria, Africa's most populous black nation, has limited institutional and technical capacity to pursue growth and development objectives (Ojeka et al., 2019). The inadequate technical and institutional capacity is expected to influence the interaction between core macroeconomic indices and growth outcomes (Acemoglu & Robinson, 2010), leading to the question of how well institutions moderate the remittance–growth relationship.

Previous studies on the remittance–growth relationship in Nigeria report heterogeneous findings along various dimensions. On the one hand, some studies argue that remittance inflows are inversely related to growth.<sup>1</sup> Remittances may spark inflation and sometimes hyperinflation, worsen the bilateral real exchange rate (Udoh & Egwaikhide, 2010), promote an unproductive labour force when households' dependency on migrants' remittances soars (Ajefu & Ogebe, 2019), and lead to a brain drain and loss of technological know-how as more competent

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<sup>1</sup> For example Ajefu and Ogebe (2019), Egbiremolen and Nnetu (2015), Olayungbo and Quadri (2019), Olubiyi (2014), and Udoh and Egwaikhide (2010).

individuals migrate in search of greener pastures (Eigbiremolen & Nnetu, 2015). On the other hand, many studies argue that remittance inflows induce significant growth and development in Nigeria because they inject scarce financial resources into the economy (Olowa et al., 2013), restrain capital rigidity (Olubiyi, 2014), and improve technological advancement.<sup>2</sup> These conflicting outcomes of the remittance–growth relationship might be due to omitted variable bias.

Catrinescu et al. (2009) argue that remittance inflows to regions or countries with a weak institutional framework are likely to have a nominal effect on growth and development because government regulations go a long way to determine the success or otherwise of a policy or capital injection. Thus, the type, structure, and functionality of the institutional framework in a region or country are one of the most significant factors aiding or impeding the relationship between remittances and economic growth. Democratic dispensation, capital restriction options, and capital outsourcing strategies are by far the most significant determinants of a productive remittance–growth relationship in developing nations (Ajide, Raheem, & Adeniyi. 2015).

Since governments make and enforce the laws that govern hedging acts and practices, the type of capital traded and transferred, restrictions on banking and unbanked transactions, migrant policy, and much more, institutional quality necessarily determines the remittance–growth relationship, and thus it is necessary to examine the quantitative influence of institutions as a moderating variable in the remittance–growth relationship. In this study, we test this relationship in Nigeria in order to reach conclusions that can help to redefine policy and research on the subject. The novelty of this research is three-fold.

First, it leads the debate on the moderating role of institutions in the remittance–growth relationship in Nigeria. Most country-level studies on remittance inflows examine their capacity to induce growth and neglect the moderating role of institutions. This is unfortunate since it is well documented that the prevailing economic policy and institutional arrangements of a region or country govern the interaction of political, social, and economic variables (Le, 2009). Robust

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<sup>2</sup> See also Afaha (2012), Ajaero et al. (2018), Ajaero and Onokala (2013), Fonta et al. (2015), Iheke (2012), Oke, et al. (2011), Oshota and Badejo (2014), Olowa and Awoyemi (20,09) Olowa, eta l. (2013), Olubiyi (2014), and Oshota and Badejo (2015).

institutional arrangements ensure that property rights are not violated, the confidence of migrants to invest is not dented (Singh et al., 2011), and recipient households can function without socioeconomic uncertainty and structural ambiguity (Chitambara, 2019). Catrinescu et al. (2009) find that capital formation, expansive bilateral trade relations, and investment objectives are less likely to grow where institutions are weak and ineffective.

Second, it provides empirical evidence regarding the role of institutions in the remittance–growth relationship in Nigeria. Within Africa, Nigeria has one of the largest migrant flows and as such receives a large inflow of remittances amounting to 5.3% of GDP in 2019.<sup>3</sup> This high level of remittances risks adverse economic effects such as inflation, unemployment, an uncompetitive real exchange rate, and sub-optimal industrialisation strategies. However, the way in which institutional bottlenecks have culminated in the misalignment of remittances with growth and development objectives remains a priori unclear.

Third, it is the first study to examine the moderating role of institutions in the remittance–growth relationship in Africa that is country-specific. Most studies have been carried out on a cross-country basis.<sup>4</sup> The structural variation that characterises national institutional frameworks and hence the outcomes of the remittance–growth relationship differ according to the laws and enforcement strategies favoured in each nation. The heterogeneous nature of institutions in developing nations, particularly in Africa, means that their moderating role in the remittance–growth relationship needs to be examined on a country basis since the findings are likely to be regional or country-specific. A country-by-country-level analysis of institutions and the remittance–growth nexus will result in policy implications that suit the development objectives of each nation.

Following the above, this study asks the following questions: Do remittances induce growth when institutional variables are controlled for? And how significant is the influence of institutions in the remittance–growth relationship in Nigeria? We employ Auto-Regressive Distributed Lag (ARDL) estimation to

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<sup>3</sup> Data from World Bank World Development Indicators:  
<https://databank.worldbank.org/source/world-development-indicators>

<sup>4</sup> See Ajide and Raheem (2016), Ajide et al. (2015), Chitambara (2019) and Zghidi, et al. (2018) for an extensive review).

account for the dynamic relationship between institutions and the remittance–growth relationship for the following reasons. The ARDL estimation procedure allows a dynamic estimation of the short-run and long-run outcomes of the contemporaneous influence of institutions on the remittance–growth relationship. Pesaran, Shin, and Smith (2001) argue that the ARDL estimation procedure allows lagged values to be regressed on the contemporaneous values of the dependent variable without constraints on the specific order of the integration (i.e., I(0) or I(1) variables). It performs optimally under mild assumptions of a short sample size, which is the case with our sample frame of 1996 through 2017. We build upon the work of Ajide et al. (2015) and use data on personal remittances provided by the World Development Indicators database.<sup>5</sup> The metadata classification defines personal remittances without reference to households' source of income or the underlying motive (altruistic or non-altruistic) behind the remittance.<sup>6</sup>

Section 2 of this paper briefly reviews the relevant literature, section 3 introduces the materials and methods, section 4 presents the results and interpretations, and section 5 concludes.

## **2. A BRIEF REVIEW OF THE LITERATURE**

In the literature of international finance, both cross-country and country-specific studies on remittances and growth outcomes have grown tremendously, but the mediating role of remittances in the remittance–growth relationship remains understudied. A few cross-country and continental studies have examined this trend in contexts other than Nigeria. Adams and Klobodu (2016) discuss the influence of remittances and regime durability on economic growth outcomes in 33 Sub-Saharan African (SSA) countries. Using the generalised method of moments (GMM) estimation procedure, the authors find that remittances influence growth positively and regime type influences growth inversely. In a related finding, Kadozi (2019) examines the impact of remittances on growth in

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<sup>5</sup> See: <https://databank.worldbank.org/source/world-development-indicators>

<sup>6</sup> The World Bank Indicators meta data define remittances as the sum of "personal transfers" and "compensation of employees", both of which are items in the balance of payments (BPM6) framework. Personal transfers include all current transfers in cash or in kind between resident and nonresident individuals, independent of the source of income of the sender and irrespective of whether they are related or unrelated individuals.

45 SSA countries and Rwanda using cross-sectional analysis and finds no statistical influence of remittances on growth. Williams (2018) examines the role of political institutions in the remittance–growth relationship and finds that remittances influence growth in countries or regions with strong institutions. Ajide et al. (2015) have produced the most important findings on the moderating roles of institutions in the remittance–growth relationship in Africa. Using GMM estimation, they find that remittances substantially reduce growth volatility when institutional factors are accounted for. Ajide, Adeniyi, and Raheem (2017) examine remittances, institutions, and investment volatility on a continental basis. Using GMM estimation, the authors find that the interaction of remittances with institutional variables mitigates investment volatility in 70 selected countries. Afaha (2012) examines the influence of migration and remittances in origin countries with particular reference to Nigeria, and finds that remittances induce economic growth. Mim and Ali (2012) examine the channels through which remittance inflows influence growth in Middle East and North Africa countries. Using the system generalised method of moments (SGMM) estimation procedure, the authors find that remittances finance consumables, and only instigate growth when its investment properties are well developed.

Using dynamic panel estimation procedures, Catrinescu et al. (2009) find that institutional factors moderate the remittance–growth relationship in a selection of African countries. Ruiz, Shukralla, and Vargas-Silva (2009) find a positive non-linear relationship between remittances and growth in their parametric analysis, which fades when the non-linearity of parameters are considered in their non-parametric estimation. In a related finding, Le (2009) examines the influence of trade, remittances, and institutions on economic growth and finds that they have positive growth-inducing capacities. Bahattab et al. (2016) examine foreign capital flows, institutional factors, and economic growth in Yemen and only find a positive influence on growth outcomes for FDI. Imad (2017) examines the mediating role of institutions in the remittance–growth relationship in south Mediterranean countries using GMM estimation and establishes a complementarity of remittances and institutions in the pursuance of growth objectives.

Afawubo and Noglo (2019) examine the mediating role of institutions in the relationship between remittances and deforestation in developing countries and

find that remittances and institutional factors reduce deforestation. In the industrialisation discourse, Efobi et al. (2019) examine remittances, finance, and industrialisation in 49 African countries. Using an instrumental variable, fixed effects, GMM, and instrumental quantile regression, the authors find that remittances influence industrialisation in Africa. On the remittances–growth volatility relationship, Bugamelli and Paternò (2011) find that remittances relate negatively to growth in 60 emerging and developing economies. Abdih et al. (2012) examine whether remittances are a curse or a blessing in the remittance–institutions relationship. The authors examined 111 countries and find that a higher remittance-to-GDP ratio is inversely related to institutional factors. Adams and Klobodu (2018) examine capital flows and growth outcomes in five SSA countries. Using the panel ARDL estimation procedure, they find that capital flow channels heterogeneously influence growth.

### **3. MODEL SPECIFICATION**

To gauge the moderating influence of institutions on the remittance–growth relationship, we rely on the neoclassical theory of the international flow of capital, in tandem with Ojapinwa and Odekunle (2013). The classical and neoclassical theories argue that significant and sufficient capital is transferred from developed regions to developing regions where there are greater needs and incentives to optimise returns for investors are also satisfied (Rose, 1998). This theoretical exposition predicates growth and subsequent development. In more general terms, the extended neoclassical growth theory argues that the growth of capital stock, improved technological know-how, and increased output per unit of effective labour are the essential growth-inducing factors (Solow, 1994). Meanwhile, the open economy analytical framework of growth outcomes assumes capital injections, but mainly through established financial institutions (Romer, 1993). Since institutions are responsible for the laws that guide the operation of financial institutions, the overriding influence of remittances on growth outcomes is the direct result of the remittance inflows or outflows permitted to varying degrees by the existing institutional framework (Catrinescu et al. 2009). In open economy theory, capital flows to developing nations induce a steady growth rate when resources are allocated efficiently by strong institutions. The adverse consequence in the open economy theory is the likelihood of capital flight, which induces savings gaps (Cobb-Clark et al., 2016)

when domestic savings are inadequate, and a trade gap (Petersen & Rajan, 1997) when financial intermediation fails. In an efficacy analysis of remittance inflows and their consequences for growth, the role of institutions is pronounced.

We adopt the Solow-Swan growth framework based on the premise that output in an economy is produced by a combination of labour ( $L$ ) and capital ( $K$ ) under constant returns, where the quantity of output ( $Y$ ) is determined by efficiency ( $A$ ). By introducing the moderating variable of institutions using the Cobb-Douglas production function framework, we can extend the Solow-Swan growth model and express it as

$$Y_t = AL_t^{1-\alpha} K_t^\alpha REM_t * INST_t \quad (1)$$

where  $Y_t$  represents output,  $L_t$  measures input of effective labour,  $K_t$  represents input of effective capital,  $REM_t$  is personal remittance inflow (the improved measure of remittance inflow), and  $INST_t$  gives the institutional factors moderating the remittance–growth relationship. The remittance, institutions, and growth model is expressed as:

$$\ln RGDP_t = A + \varphi \ln L_t + \rho \ln K_t + \gamma \ln REM_t + \pi \ln RULE_t * REM_t + \omega \ln REG_t * REM_t + \theta \ln CONT_t * REM_t + \mu_t \quad (2)$$

Where  $\varphi$ ,  $\rho$ ,  $\gamma$ ,  $\pi$ ,  $\omega$ , and  $\theta$  are the elasticities of labour, capital, remittance inflow, the rule of law, regulatory quality, and control of corruption, respectively.  $\ln$  is the natural logarithm,  $A$  is a technical and institutional efficiency factor,  $L_t$  is the supply of labour measured as the labour force participation rate,  $K_t$  is the capital measured as gross fixed capital formation,  $RGDP$  is real GDP,  $RULE_t$  is the rule of law measured as relative perceptions of the extent to which rules and order are enforced,  $REG_t$  measures regulatory quality and represents perceptions of the ability of government to formulate and implement policies that are private-sector inclusive, and  $CONT_t$  measures the control of corruption, representing perceptions of the control over the use of public office for personal gain, whether small or large and including godfatherism and political hijacking.

### 3.1 Data

This paper is a country-specific study that gauges the mediating role of institutions in the remittance–growth relationship in Nigeria from 1986 through 2017. Data availability was an important consideration when choosing the scope and dimension of the study. Since 1996 World Governance Indicators (WGI) has measured six key dimensions of governance (regulation quality, government effectiveness, the rule of law, control of corruption, voice & accountability" and political stability/no violence) in over 200 countries. These aggregates are not generalisable in a cross-border examination because of varying laws and enforcement strategies, so our study is restricted to Nigeria. We measured growth outcomes in Nigeria using data on real GDP as in Catrinescu et al. (2009), remittances were measured with data on personal remittances as in Ajide et al. (2015), and we considered the rule of law, regulatory quality, and control of corruption as measures of institutional quality that mediate the remittance–growth relationship. These measures are consonant with measures used in the work of Lijphart (2011) and Nifo and Vecchione (2015). The data are mainly obtained from the Central Bank of Nigeria (CBN), World Development Indicators (WDI), and World Governance Indicators (WGI 2017). The variables used in this study are described in Table 1.

**Table 1:** Description of variables

Abbreviation	Description	Measured As	Source
$RGDP_t$	Economic activity	Real Gross Domestic Product (RGDP)	Central Bank of Nigeria (CBN)
$L_t$	Labour	Labour Participation Rate	World Bank Database (WDI)
$K_t$	Capital	Gross Fixed Capital Formation	World Bank Database (WDI)
$REM_t$	Remittances	Personal Remittances	World Bank Database (WDI)
$RULE_t$	Rule of Law	Rule of Law	World Governance Indicators (WGI)
$REG_t$	Regulatory Quality	Regulatory Quality	World Governance Indicators (WGI)
$CONT_t$	Control of Corruption	Control of Corruption	World Governance Indicators (WGI)

**Note:** \*WDI: World Development Indicators; WGI: World Governance Indicators; CBN: Central Bank of Nigeria

### 3.2 Research Design

We adopt an ex-post-facto analytical technique to gauge the moderating role of institutions in the remittance–growth relationship in Nigeria. We report the descriptive statistics to establish the normality conditions of the variables in our data set as in Gujarati and Porter (2009). We estimate the correlation coefficients to ensure that the covariance assumptions of the conventional classical linear regression models are not violated, leading to problems of multicollinearity of regressors and thus providing unreliable and spurious elasticities. We proceed to estimate the stationarity of the data set and inform the choice of the estimation procedure. We use the Augmented Dickey-Fuller (ADF) test, the Philip Perron (PP) test, and the Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) reconfirmation test (Kwiatkowski et al., 1992) to ascertain the stationarity of the variables. In line with the most recent literature on unit-root testing, the time series unit root test is based on the estimation of Equation (3):

$$\Delta Y_t = \alpha_i + \eta y_{t-1} + \delta_t + \sum_{k=1}^{k_i} \theta_i^{(k)} \Delta y_{t-k} + \varepsilon_t$$

$$\varepsilon_t \sim idN(0, \theta_\varepsilon^2) = 1, 2, \dots, N, t = 1, 2, \dots, T \quad (3)$$

where  $y_t$  denotes the  $y$  variable observed for  $N$  entities in  $T$  periods, and  $\Delta$  is the difference operator. The unit root test involves the null hypothesis  $H_0 : \rho_i = 0 \forall i$  against the alternative  $H_A : \rho_i = \rho < 0 \forall i$ .

For robustness and heteroskedasticity consistency, we estimate the KPSS unit root test, which reports the null hypothesis of no unit root in any of the series estimated. Given the residuals obtainable from the individual ordinary least square (OLS) regressions of a constant, or on a constant and a trend, the KPSS unit root test requires only the specification of the form of the OLS regressions: whether to include only individual-specific constant terms, or whether to include both constant and trend terms. In particular, the KPSS appears to over-reject the null of stationarity and may yield results that directly contradict those obtained using alternative test statistics.<sup>7</sup>

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<sup>7</sup> See Hasan and Koenker (1997), and Said and Dickey (1984) for discussion and details.

We proceed by estimating the Auto-Regressive Distributed Lag (ARDL) to establish the moderating effect of institutions in the remittance–growth relationship in Nigeria. We employ the ARDL estimation procedure for various reasons. It allows dynamic estimation of the short-run and long-run outcomes of the contemporaneous influence of institutions in the remittance–growth relationship. Pesaran et al. (2001) argue that the ARDL estimation procedure allows lagged values to be regressed on the contemporaneous values of the dependent variable without constraints on the specific order of integration (i.e., I(0) or I(1) variables). It performs optimally under mild assumptions of a small sample size, which is the case with our sample frame of 1996 through 2017. To establish the robustness and validity of our ARDL we test for serial correlation using the Breusch-Godfrey Serial Correlation test and the Breusch Pagan Heteroscedasticity test to establish homoscedastic assumptions. The CUSUM stability test is employed to verify the structural stability of the model.

#### 4. RESULTS AND INTERPRETATION

Table 2 shows that the series under investigation indicates high tendency of normal distribution. The Jarque-Bera statistics show that the series are normally distributed since the p-values of all the series are not statistically significant at the 5% level, thus informing the acceptance of the null hypothesis that says each variable is normally distributed.

**Table 2:** Descriptive statistics of the data set

	<i>RGDP</i>	<i>REM</i>	<i>RULE</i>	<i>REG</i>	<i>CONT</i>	<i>L</i>	<i>K</i>
<b>Mean</b>	2.562	3.332	2.663	3.882	2.663	1.524	2.562
<b>Median</b>	3.562	4.612	3.772	4.662	3.331	2.662	2.662
<b>Maximum</b>	5.735	5.773	5.674	7.772	6.777	3.552	5.676
<b>Minimum</b>	1.459	2.286	1.226	2.556	1.563	1.113	1.572
<b>Std. Dev.</b>	2.655	1.313	1.575	2.285	2.568	1.662	1.788
<b>Skewness</b>	0.299	1.333	0.667	0.473	0.737	0.566	1.771
<b>Kurtosis</b>	1.323	1.564	1.646	2.664	2.099	1.622	1.552
<b>Jarque-Bera</b>	3.456	3.828	1.663	2.182	1.267	2.552	2.562
<b>Probability</b>	0.133	0.083	0.072	0.383	0.737	0.421	0.652

**Source:** Authors Computations

**Note:** Descriptive statistics were taken before the variables were transformed into logarithm form. Jarque-Bera tests whether a given series follows a normal distribution or not. It tests the null hypothesis that a given series is normally distributed.

**4.1 Stationarity Analysis**

Table 3 reports the results of the ADF, PP, and KPSS confirmatory tests. All tests confirm that the variables are non-stationary at level but are stationary at the first difference, except the rule of law, which was stationary at level. These empirical outcomes not only show the non-stationary properties of all the variables but also establish the covariance nature of the data set under investigation. We proceed to estimate the ARDL to establish the baseline relationship between the variables of interest. This is indispensable in this research because the choice of the estimation strategy is consistent with the data behaviour and consonant with contemporary ARDL literature (see Kisswani, 2017, Mathur & Shekhawat, 2018, Pal & Mitra, 2016, and Sharma & Kautish, 2019 for some examples).

**Table 3: Unit Root Tests**

Variable	@LEVEL			@FIRST DIFFERENCE			ORDER OF INTEGRATION
	ADF	PP	KPSS	ADF	PP	KPSS	
	Intercept {Trend & Intercept}						
<b>RGDP</b>	0.522 {0.662}	0.672 {0.989}	0.633 {0.872}	0.766* {0.231}**	0.539* {0.791}*	0.622* {0.899}*	I(1)
<b>L</b>	0.244 {0.562}	0.222 {0.612}	0.633 {0.872}	0.552* {0.324}**	0.427* {0.239}*	0.553* {0.442}*	I(1)
<b>K</b>	0.782** {0.332}*	0.993** {0.154}*	0.633** {0.872}*	-	-	-	I(0)
<b>RULE</b>	-1.681** {0.874}*	-1.569** {0.882}*	-1.539** {0.494}*	-	-	-	I(0)
<b>REG</b>	-1.521 {0.743}	-1.573 {0.765}	-1.595 {0.711}	-1.764* {0.812}*	-1.622* {0.666}*	-1.721* {0.793}*	I(1)
<b>CONT</b>	0.228 {0.624}	0.623 {0.583}	0.623 {3.252}	0.627* {0.727}*	0.838* {0.638}*	0.838* {0.783}*	I(1)
<b>REM</b>	-1.871 {0.728}	-1.839 {0.023}	-1.728 {0.567}	-1.288* {0.772}*	-1.838* {0.893}*	-1.788* {0.939}*	I(1)

**Note:** T-Stat values of intercept estimates are reported in the text box while T-Stat values of trend & intercept estimates are in parentheses; \* $P < 0.01$ , \*\* $P < 0.05$

The ARDL model is designed to investigate the impact of an increase in remittances on economic growth, and so we structure our model in first difference terms as follows:

$$\begin{aligned} \Delta \ln RGDP_t = & A + \sigma \Delta \ln RGDP_{t-n} + \varphi \Delta \ln L_t + \rho \Delta \ln K_t + \\ & \gamma \Delta \ln REM_t + \pi \Delta \ln RULE_t * REM_t + \\ & \omega \Delta \ln REG_t * REM_t + \theta \Delta \ln CONT_t * REM_t + \\ & CointEq_{-1} + \mu_t \end{aligned} \quad (4)$$

$\Delta$  is the first difference operator,  $RGDP_{t-n}$  gives the lagged value of the regressand, and  $CointEq_{-1}$  represents the error correction component of the ARDL model. All other variables are as defined earlier.

### 4.3 Lag Length Selection

The issue of finding the appropriate lag length for each of the underlying variables in the ARDL model is fundamental because we seek Gaussian error terms. For optimal lag length selection, we rely on Schwartz Information Criteria (SIC) to obtain the lag length value that minimises the Information Criterion and at which the model does not have autocorrelation.

**Table 4:** Lag length selection

Lag Length	SC
1	1.977*
2	3.552
3	3.998

Note: \* $P < 0.01$ , \*\* $P < 0.05$  respectively

The results in Table 4 show that lag 1 minimises SIC and is thus our optimal lag length. We proceed by testing for the long-run relationship between the variables.

**4.4 The Bound Test**

We estimate the bound testing procedure to establish the long-run relationship among the variables. The bound testing procedure is based on the F-test as prescribed in Pesaran et al. (2001). The F-test is based on the assumption of no cointegration among the variables against the premise of its existence, denoted as:

$H_0 : \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = 0$ , i.e., there is no cointegration among the variables.

$H_1 : \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq \beta_7 \neq 0$ , i.e., there is cointegration among the variables.

**Table 5:** Bound Test Results

F-Statistic	1%		5%		10%	
	Lower bound	Upper bound	Lower bound	Upper bound	Lower bound	Upper bound
2.445	3.41	4.68	2.62	3.79	2.53	3.35

**Note:** \*  $P < 0.01$ , \*\*  $P < 0.05$

Given the result of the bound test in Table 5, the F-statistic value should be compared with the Pesaran critical value at traditional levels of significance. Narayan (2005) notes that the current critical values reported in Pesaran et al. (2001) cannot be used for small sample sizes because they are predicated on the premise of the existence of large sample sizes. Narayan (2005) provides a set of critical values for sample sizes ranging from 30 to 80 observations. They are 2.496–3.346 at a 10% level of significance, 2.962–3.910 at a 5% level of significance, and 4.068–5.250 at a 1% level of significance. Since the F-statistic of 2.445 is lower than the lower bound critical value, we reject the null hypothesis and conclude that all the variables in the model have co-movements in the long-run in Nigeria. Hence, from the result we can estimate the long-run mediating role of institutions in the remittance–growth relationship.

#### 4.5 ARDL long-run relationship

The estimated results presented in Table 6 explain the long-run intermediating role of institutions in the remittance–growth relationship in Nigeria. They reveal that the one-period lag values of real GDP are positive and statistically significant at 5%. This implies that a percentage increase in the one-period lag value of real GDP will exert a 0.729 percent increase in real GDP in the long run. This shows that growth outcomes in Nigeria follow an inflating pattern similar to that observed in Afonso and Claeys (2008). Our study also found that remittance inflows are negative and statistically significant at the 5% level, implying that a percentage increase in remittance inflows will induce a 0.704% decrease in growth in Nigeria. This inverse remittance–growth relationship may be due to the deleterious influence of remittances on growth as reported in the work of Udoh and Egwaikhide (2010), who argue that remittances aid inflation and sometimes hyperinflation, worsen the bilateral real exchange rate, promotes shirking attitudes to work when active and working-age individuals overly depend on remittances from their altruistic connections

This study interacted the institutional variables with remittances and regressed these interaction variables on economic activities indicator  $\Delta \ln RGDP_t$ . Our empirical results found the coefficient of these interactions to be positive. Specifically, rule of law, regulatory quality and control of corruption was positive and statistically significant at 1%, 5% and 5% respectively. The implication of these results is that institutions is essential in resolving the variations in the remittance-growth relationship. Hence, improvements in institutions raise the growth inducing capacities of remittances. This is evident from comparison of the magnitude of the coefficient of remittances in the models with and without institutional indices. These findings present new insight into the underexplored intermediating influence of institutions in the remittance-growth relations in Nigeria. In other words, the underlying long-run dampening of output growth arising from remittance inflows can be offset at least to some extent by the presence of well-functioning political and economic institutions.

**Table 6:** Long-run results

Dependent variable: $\Delta \ln RGDP_t$			
Variable	Coefficient	t-Statistic	Prob.
$C$	-4.961	-0.327	0.75
$\Delta \ln RGDP_{t-1}$	0.729	1.827	0.015**
$\Delta \ln REM_t$	-0.704	-0.417	0.04**
$\Delta \ln L$	0.328	1.562	0.085
$\Delta \ln K$	-0.529	-1.129	0.441
$\Delta \ln RULE_t \times \Delta \ln REM_t$	0.261	0.335	0.00*
$\Delta \ln REG_t \times \Delta \ln REM_t$	0.041	0.237	0.02**
$\Delta \ln CONT_t \times \Delta \ln REM_t$	0.022	0.042**	0.03**

Note: \* $P < 0.01$ , \*\* $P < 0.05$

**4.6 ARDL short-run results**

In the short-run analysis of the mediating role of institutions in the remittance–growth relationship (Table 7), the coefficient of the co-integrating term  $CointEq(-1)$  that gives the error correction term is negative and significant at 1%. The error correction term that denotes the speed of adjustment towards long-run equilibrium is 76.2%. The results indicate that in the short run, the one-period lagged value of real GDP is positive and statistically significant at 1%. Hence, a percentage increase in the one-period lag value of real GDP will exert a 0.563% increase in real GDP in the long run. In tandem with the long-run estimates, growth outcomes in Nigeria follow as an inflating pattern similar to the findings of Afonso and Claeys (2008). Also, remittance inflows induce positive growth in the short run since the coefficients exert an 0.768% increase in economic activities at a 5% level of significance. However, when institutional variables interact with remittance inflows, this study found that the coefficient of the short-run results was only significant for the interactions between regulatory quality and remittances impacting on  $RGDP$ . A 1% increase in remittance interacted with regulatory quality will lead to a 0.563% increase in  $RGDP$  in Nigeria in the short run. We observe that interacting the rule of law and control of corruption with remittances do not have a statistically significant impact on economic growth. This short-run lack of influence of the rule of law and control of corruption on the remittances-growth relationship could be due to the time

required before institutional policies begin to take effect and moderate the remittances-growth relationship in a positive direction.

**Table 7: Short-Run Results**

Dependent variable: $\Delta \ln RGDP_t$			
Variable	Coefficient	t-Statistic	Prob.
$C$	0.662	0.627	0.001
$\Delta \ln RGDP_{t-1}$	0.563	1.772	0.003***
$\Delta \ln REM_t$	0.768	0.882	0.048**
$\Delta \ln L$	0.452	1.225	0.252
$\Delta \ln K$	-0.662	-1.556	0.876
$\Delta \ln RULE_t \times \Delta \ln REM_t$	0.028	2.261	0.151
$\Delta \ln REG_t \times \Delta \ln REM_t$	0.563	2.351	0.031**
$\Delta \ln CONT_t \times \Delta \ln REM_t$	-0.035	-1.583	0.114
$CointEq(-1)$	-0.762	-0.176	0.002***
<b>R-square</b>	0.421	-	-
<b>Adjusted R-square</b>	0.653	-	-
<b>F-statistic</b> <b>(Prob)</b>	79.772 (0.003*)	<b>Durbin-Watson Stat</b>	1.865

Note: \* $P < 0.01$ , \*\* $P < 0.05$

### Robustness Checks

We tested for serial correlation in the estimated model (Results in Appendixes). Given the probability value of 13.4%, we fail to reject the null hypothesis and conclude that our model is free from serial correlation. The Heteroscedasticity test revealed that residuals have constant variance. The p-value (0.163) of Obs\* R-square shows that we fail to reject the null hypothesis of homoscedastic residuals. The CUSUM line is within the critical bounds of a 5% level of significance, which indicates that the model has structural stability

## 5. CONCLUSION

The ability of remittances to lead to substantial growth in a region or country is predicated on the type, structure, and functionality of the institutional

arrangement in place in the recipient country. Institutional factors are often considered to be the most significant determinants of a productive remittance–growth relationship in developing nations. Since governments at the most general level make and enforce laws, regulate the type of capital allowed to be traded and transferred, place restrictions on banking and unbanked transactions, and formulate migration policy, it is likely that institutional quality influences the remittance–growth relationship. Therefore, this paper has examined the quantitative influence of institutions in moderating the remittance–growth relationship in Nigeria. To this end, we employed the Autoregressive Distributed Lag (ARDL) estimation to produce long-run and short-run estimates of the moderating roles of institutions in the remittance-growth relationship in Nigeria.

The short-run results reveal that remittance inflows positively influence growth. These results suggest that in the short run, a country may benefit from the injection of financial resources into the economy brought about by an increase in remittance inflows. The effect is boosted by improvements in regulatory quality, since when interacted with remittances this variable has an additional positive effect on growth. However, the absence of any effect of the rule of law and control of corruption in the short-run results could be due to the length it takes for these institutional variables to influence the remittance-growth relations in a positive direction.

In the long-run, our results reveal that remittance inflows are negatively related to growth. These results suggest that in the long run, remittances may have negative macroeconomic effects and adversely influence work incentives and reduce the need for technological innovation. However, we find that the institutional variables can offset the potential negative long-run impact of remittances on economic growth. Intuitively, remittances as a predictor of economic growth are conditioned on institutional arrangements. These findings are the most significant contribution of this paper to the moderating role of institutions in the remittance–growth relationship in Nigeria. From a policy perspective, remittance-receiving countries should improve the design and enforcement of laws, particularly regulatory quality, and control of corruption in order to ensure that increased remittance inflows have a positive impact on domestic productivity and growth. If institutional arrangements are not improved, the capacity of remittance inflows to induce growth may be impeded.

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**APPENDIXES**

**Appendix A: Serial Correlation Test**

<b>Breusch-Godfrey Serial Correlation LM Test:</b>			
F-statistic	0.662	Prob. F(4,21)	0.443
Obs*R-squared	2.552	Prob. Chi-Square(4)	0.134

**Appendix B: Heteroscedasticity Test**

<b>Heteroskedasticity Test: Breusch-Pagan-Godfrey</b>			
F-statistic	1.772	Prob. F(4,21)	0.029
Obs*R-squared	2.522	Prob. Chi-Square(4)	0.163

**Appendix C: CUSUM Stability Test**

