The Impact of Inward Remittances on Economic Growth in Ghana

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Abstract
Ghana was the second largest recipient of remittances in West Africa after Nigeria in 2018, with an underlying economic growth rate which declined from 8.1 percent in 2017 to 5.6 percent in 2018 anchored on industrial-sector growth. The study re-examined the effect of inward remittances on economic growth in Ghana. The ARDL estimation technique is used to test for the relationship between remittances and economic growth, using annual data from 1970 to 2016. The traditional Granger causality test was also applied to explore the direction of causality between remittances and economic growth. The results revealed that remittances had a negative long-run effect on growth and a positive effect on economic growth in the short-run. The study found no granger causality between economic growth and remittances in Ghana for the period of the study. FDI, which appears to have a relatively stronger appeal to support economic growth in Ghana, must be focused on. Sound economic and political institutions will be needed to ensure that the economy benefits fully from inward remittances by directing them from consumption to savings avenues and investment opportunities.

Keywords: Remittance, economic growth, Granger Causality, ARDL
JEL classification: O52, C21

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1. Introduction

The World Bank classifies remittances as any form of money or goods that is received by relatives in a home country from a migrant worker living abroad. Remittances could also be goods in the form of an automobile or an electrical gadget. The IMF classifies remittances into employee compensations and personal transfers (World Bank, 2017). Since 1990, remittances to Lower Middle-Income Countries (LMICs) have, on average, been higher than official development assistance (ODA) and have also grown more steadily than private debt and portfolio equity (World Bank, 2019). In most developing countries, remittances constitute a major source of income and contribute over 20 percent as a proportion of GDP (Orzell, 2013). World Bank (2019) projected remittances to Sub-Saharan Africa (SSA) to increase by 9.6 percent between 2017 and 2018. The estimates by World Bank (2019) demonstrate that inward remittances to SSAs will continue expanding, however, at a slower amount to about $51 billion by 2020. This growth pattern from 2016 is anchored on resilient financial settings in the developed host economies for migrant workers from Sub-Saharan Africa. After its slowdown in 2015 and 2016, economic growth in Africa was downgraded from 2.5 percent in 2017 to about 2.3 percent in 2018 and increased to 2.8 percent in 2019. The recovery in economic growth in SSA since 2015 has been sluggish due to a slowdown in momentum in global trade and industrial activity, particularly falls in international agricultural and metal prices, and weak demand prospects and trade tariff barriers (World Bank, Africa's Pulse, October 2018). Other factors include domestic macroeconomic instability, political instability and fragility. Thus, the recent observed data shows that while remittances to Africa appear to be on a rising trend, economic growth, on the other hand, has slowed down considerably in Sub-Sahara Africa since 2015.

To contribute to the existing literature on the impact of inward remittances on the economy, we focus our study on Ghana. In Ghana, remittances constitute an important component of balance of payments accounts, which is, usually, recorded as receipts under the capital account section by the Bank of Ghana. Ghana's remittance receipts, in recent times, have assumed an increasing trend (Figure 1). The IMF balance of payments indicators in 2016 report that Ghana's inward remittance receipts from the rest of the world for the past decade averaged US$ 1.5 billion. The Bank of Ghana, in 2016, also reported that Ghana's total remittance was about 3.4 as a percent of GDP. The largest source of Ghana's inward remittance receipts is the United States of America and Canada, and the lowest inward remittance receipts come from the ECOWAS sub-region (BoG, 2012). In 2018, Ghana recorded 3.8 billion in official remittances, second largest in Sub-Saharan Africa, but the economic growth declined from 8.1 percent in 2017 to a rate of 5.6 percent in 2018, anchored on industrial sector growth. From the observed facts, while remittances to Sub-Sahara Africa and Ghana in particular appear to be on a rising trend, economic growth, on the other hand, has slowed down considerably since 2015.

Existing studies, such as Ramirez (2014), Nwaogu & Ryan (2015), Olayungbo & Quadri (2019), among others point to mixed effects of remittances on growth in different economies, due to differences in development environments. Given the recent economic scenario, therefore, this study aimed to re-examine the effect that inward remittances have on economic growth in the case of Ghana. Though a couple of studies, such as Antwi & Koranteng (2017), Mintah & Nikoi (2015) and Nyeadi & Atiga (2014), exist on Ghana, we motivate the current study by determining the long- and short-run impact of remittances. Specifically, this study uses the ARDL modelling to examine the short-run and long-run effects of remittances on economic growth and the Granger

causality testing to verify the causal relationship between economic growth and remittances for a period of 47 years, spanning from 1970 to 2016. The ARDL modelling approach is used to cure the finite sample problems that are encountered using typical vector error correction models (VECM) and to produce reliable estimates for the impact of remittances on growth in Ghana.
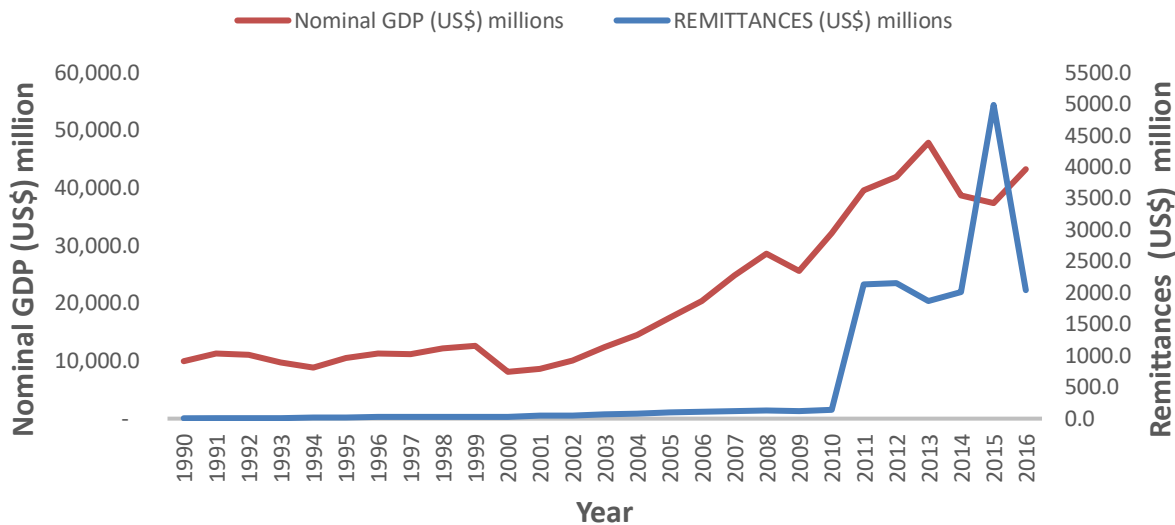
Figure 1: Trends in remittances and nominal GDP (US$) from 1990-2016
Source: World Bank estimates based on IMF balance of payments data, (2016)

The few known studies (Antwi & Koranteng, 2017; Nyeadi & Atiga, 2014; and Mintah & Nikoi, 2015) on remittance flows and economic growth in Ghana have some limitations, which the current study seeks to overcome. First, both Antwi & Koranteng (2017) and Nyeadi & Atiga (2014) applied the vector error correction model (VECM) and the Granger causality test technique for a relatively small sample period, spanning 25 years (1990 – 2014) and (1980 – 2012) respectively. Mintah & Nikoi (2015) rather employed the OLS estimation technique, which is even weaker in the presence of non-stationary time-series data, to examine the impact of remittances on socio-economic development in Ghana. The nature of the VECM and OLS estimation techniques and the sample size used in these extant studies make model over-fitting inevitable, leading to bias, inconsistent and inefficient estimation of parameters. In this paper, we revisit the remittances and economic-growth relationship by applying the ARDL estimator, which overcomes the weaknesses pointed above in the existing studies on Ghana.

The next section provides a theoretical and empirical literature overview on remittance and economic growth. The methodology describes the data, the models and the empirical strategy in section 3. The fourth and fifth sections present the empirical results and the conclusion respectively.

2. Theoretical Foundations and Empirical Literature
2.1 Theoretical motives for remittances
The role of migration and remittances in economic development can be traced to the New Economics Labour Migration (NELM) and the Sustainable Livelihood Approach (SLA) frameworks (Nzima, Duma, & Moyo, 2016). These frameworks argue that migration is a

livelihood diversification and survival strategy initiated by household agents to insure against income risks and invest in economic activities using remittances, especially in the absence of insurance or investment credit from economic institutions in source country (Massey, et al., 1993; Taylor, 1999; Nzima, et al., 2016). NELM theory links the motive to remit to the decision to migrate (Piracha & Saraogi, 2011). According to the NELM, the decision to migrate have net-benefits generated from the initial costs and remittances sent back home and therefore the overall economic benefits derived by the home country (Redehegn, et al., 2019). Rom the literature, three general stimuli for remitting back to the home country include a combination of pure self-interest, pure altruism, and impure altruism (or enlightened selfishness) theories (Lucas and Stark, 1985). The altruism theory explains that remittances are influenced by individual migrant's taste for charity or philanthropy and relates the migrant earnings positively to the recipient households' income and negatively to their living conditions (Piracha & Saraogi, 2011). The exchange theory suggests that the migrant remittance behaviour may be explain by underlying contractual agreement with remittance-receiving households to pay for support services (for example, child care, asset management, etc.) provided on the migrants' behalf back home (Cox 1987). According to the impure altruism (or enlightened selfishness) when pure altruism motive is set aside, then the motives for and size of remittances are clouded with informed self-interest, contractual arrangements and other factors such as marital status, duration of stay abroad, other migrant relatives in the same household, and household size. This gamut of factors could actually be associated with the exchange factor (Piracha & Saraogi, 2011). Rapoport & Docquier (2006) also classifies these motives into a mix of individualistic (e.g., altruism and exchange) and familial (e.g., investment and insurance) factors. The remittance behaviour of migrants is also influenced by moral hazards and the prospects of inheritance on the part of the recipients.

2.2 Remittances as a determinant of Economic Growth
Focusing on the main objective of this paper, we review remittance as a factor in the economic growth equation and present a picture of the existing empirical research. Growth and development theories are well-established debates in the macroeconomic literature (see Kumar et al., 2017). The determinants of economic growth are also well embedded in several schools of thought, such as the Keynes, the neoclassical growth model of Solow (1956), the endogenous growth model of Romer (1990), Lucas' (1984) new growth theory and the contemporary New Structural Economics (Stiglitz & Greenwald, 2014). The New Structural Economics theory anchored on the augmented Solow-type model has been popularly applied in recent economics research. This approach, which is based on the aggregate Cobb-Douglas production function, is specified to include proximate factors, such as the stock of labour, capital and technology.

On the role of remittances as a factors of growth, several development theories have been proffered with two main opposite views. According to the optimistic development theories, remittances promote economic growth by improving disposable national incomes and savings and providing investment capital, especially in developing countries (see Catrinescu et al., 2006; Olayungbo & Quadri, 2019; and many more). On the pessimistic side, remittances are hypothesized to be averse to long-run economic growth due to their ability to cause moral hazards in recipient countries in the nature of overdependence on source countries for transfers and a palpable disincentive to work in the labour market (Olufemi & Ayandibu, 2014; Chami et al., 2005; among others). Yaseen (2012) established a negative effect of remittances on economic growth through the loss in output and the change in the wage structure due to loss in vital human capital. And the over-dependence

on migrant relatives abroad represses creativity and innovation in the receiving economy. Despite the fact that remittances, when received, can increase the income of recipients, inflation and exchange rate depreciation can erode the positive effects of remittances on consumption, hence making the aggregate impact minimal. Other effects, such as reduction in labour supply and worsening income inequality, could also slow down economic development. Another school of thought argues that remittances dent growth and productivity in low-income economies due to the fact that they are spent more on the consumption of foreign-dominated goods than on direct investment (Brown & Ahlburg, 1999; Ahlburg, 1991; and Lipton, 1980). From both views, remittances appear to work through the total factor productivity variable in the augmented Solow type production function to affect economic growth. Empirical literature, therefore, is also replete with mixed results backing both strands of the theoretical perspectives and research on the causal effect of remittances on economic growth, which are yet to be settled.

A plethora of empirical studies discusses the effects of remittances on the economy of the receiving country. Examples include effects on real exchange rate, exports, inflation, labour supply, labour productivity, dependency ratio, demand for imports, employment and financial development (De Haas, 2011; Barajas et al., 2009; Mundaca, 2009; Catrinescu et al., 2006; Vargas-Silva & Peng, 2005; and Gubert, 1998). Focusing on the main objective of this study, remittances and growth links, the existing studies can be grouped into cross-country panel data studies (such as Ahamada & Coulibaly, 2013; Issahaku, Abor & Amidu, 2018; Olayungbo & Quadri, 2019; Eggoh, Bangake & Semedo, 2019) and single-country time series studies (such as Das, McFarlane & Jung, 2019 for Jamaica; Karagoz, 2009 for Turkey; Adenutsi, 2011; Antwi & Koranteng, 2017; Nyeadi & Atiga, 2014 and Mintah & Nikoi, 2015 for Ghana; Siddique et al., 2012 for Bangladesh, Sri Lanka and India, among other studies).

Linking the existing studies to the theoretical strands, several studies have reported positive effects of remittances on growth. Fayissa & Nsiah (2010) found that remittances have a positive impact on economic growth because they are a source of financing for investment to households and firms in times of liquidity constraints. Comes et al. (2018), using a panel of seven countries from Central and Eastern Europe, found positive impacts of remittances on growth. Vargas-Silva (2011), in his study of the remittance-growth effect in Asia, found a positive but small impact. Mundaca (2009) also found a long-term positive effect of remittances on economic growth in the Caribbean region. In the case of Siddique et al. (2012), remittances are found to promote growth in Bangladesh but no significant effect in India. Moreover, the results for Sri-Lanka showed a bi-directional causal relationship between remittances and growth. In the case of Ghana, the results from Nyeadi & Atiga (2014) uncovered a positive relationship between remittances per capita and GDP per capita growth, after controlling for exchange rate and import. The Granger causality test further found a uni-directional causality from growth in remittance per capital to GDP per capita growth in Ghana. Antwi & Koranteng (2017) applied the error correction model and the Engel-Granger cointegration test to examine the impact of remittances on economic growth in Ghana, using annual data from 1990 to 2014. They uncovered that remittances drives growth rate of real GDP positively and a uni-directional causality running from remittances to economic growth in Ghana. Similar results were found by Adenutsi (2011), who used a dynamic error correction model in a Keynesian aggregate demand framework for Ghana. Catrinescu et al. (2006) found a weak positive effect of remittances on long-run growth in countries with well established political and economic institutions. They showed that the effect of remittances on growth could be strengthened in

countries with sound and stable economic conditions. Other studies that posit a positive impact of remittances on economic growth include Das, McFarlane & Jung (2019) for Jamaica, Adarkwa (2015), Kumar & Stanvermann (2014) for Kenya, Lithuana, and Bangladesh.

Research reporting negative effects of remittances, on the other hand, are not far to fetch. Chami et al. (2005) and Singh et al. (2010) found remittances to negatively affect economic growth. The structural and institutional capacity of a country determines her ability to translate the gains from remittance inflows into growth (Chami et al., 2005). Sobiech (2015) studied 54 developing countries for the period 1970 to 2010, using GMM estimation techniques, and found negative effects of remittances on growth in countries with underdeveloped financial sector. Similarly, Karagoz (2009) reported negative effects of remittances on growth for Turkey for the period 1970 to 2005, explaining that remittances do not constitute a significant source of capital for development. Barajas et al. (2009) found no or negative impact of remittances on economic growth. They explained that, when the growth model is correctly specified and instrumented, remittances in most cases do not contribute to economic growth and in some cases it was negative. According to Barajas et al. (2009), remittances can better serve as insurance or "a lender of last resort" in periods of economic downturn and as poverty alleviating effect rather than for investment. De Haas (2011) explained that in less-developed countries with deprived economic conditions, remittances are not likely to exploit their potentials, which sometimes invoke the negative impacts and increase inequalities in the economy.

3. Model specification, methods and data
3.1 The growth model
The neoclassical Solow type aggregate production function remains the most relevant model used to examine the relationship between economic growth and its determinants. We followed the empirical aggregate production function specifications in Kumar et al. (2017) and Frimpong & Oteng-Abayie (2006) to examine the effect of remittances on growth, controlling for other factors as follows:

$$Y_t = F(K_t, L_t, A_t) \tag{1}$$

Y_t represents the aggregate output measured by real GDP, K_t represents the units of capital proxied with gross fixed capital formation, and L_t represents the units of labour. The production function can be expressed in intensity form as a ratio of labour units indicated below:

$$y_t = f(k_t, A_t) \tag{2}$$

y_t and k_t are output per labour and capital per labour units respectively. However, A_t is an index of total factor productivity, which captures other sources of growth not explained directly by the arguments of the function in equation (2). It is assumed that remittances and the other determinants affect economic growth through A_t. Following from this explanation, we further modelled the index of total factor productivity as a function of remittances ($Remit_t$), foreign direct investment (FDI_t), inflation (INF_t) and terms of trade (TOT). The functional form is specified as equation (3):
$$A_t = g(Remit_t, FDI_t, INF_t, TOT_t) \tag{3}$$

Substituting equation (3) into equation (2), we write equation (4) as:

$$y_t = f(k_t, Remit_t, FDI_t, INF_t, TOT_t) \tag{4}$$

where *Remit* represents remittances measured as the sum of money and the monetary value of goods received from migrant workers abroad, *FDI* represents foreign direct investment measured as the total equity and other long and short-term capital reported in the BOP, *INF* represents inflation measured as the percentage change in the consumer price index, and *TOT* represents terms of trade measured as the index of the ratio of export units to import units. The other variables have been previously defined. The precise estimable econometric equation is written in log-linearised form as:

$$lny_t = \alpha_0 + \alpha_1 lnk_t + \alpha_2 lnRemit_t + \alpha_3 lnFDI_t + \alpha_4 lnINF_t + \alpha_5 lnTOT_t + \varepsilon_t \tag{5}$$

where ε_t is the stochastic disturbance term. From the theory and empirical front, the choice of a log-linear model is as a result of its superiority to alternative methods (Kalim & Shahbaz, 2009; Cameron & Quiggin, 1994). The transformation into logs is essential since it can reduce the problems attendant with reduced unit of measurement, heteroscedasticity and non-normality.

3.2 Econometric methods

Following standard econometric procedures, the study used the Augmented Dickey Fuller (ADF) to test the stationarity properties of all the series. The ARDL bounds testing procedure by Pesaran, Shin & Smith (2001) was used to test for cointegration among the series. The ARDL approach is preferred due to its small-sample advantages and the flexible requirement that the variables can be of mixed order integration of I(0) and I(1), unlike the Engle-Granger and the Johansen-Juselius cointegration approaches, which require the variables to be of the same order of integration (Pesaran et al., 2001). The unrestricted error correction model is stated as:

$$\Delta lny_t = \theta_0 + \lambda lny_{t-1} + \pi_1 lnk_t + \pi_2 lnRemit_t + \pi_3 lnFDI_t + \pi_4 lnINF_t + \pi_5 lnTOT_t +$$
$$\sum_{i=1}^{a} \omega_0 \Delta lny_{t-i} + \sum_{i=1}^{b} \omega_1 \Delta lnk_{t-i} + \sum_{i=1}^{d} \omega_2 \Delta lnRemit_{t-i} + \sum_{i=1}^{e} \omega_3 \Delta lnFDI_{t-i} +$$
$$\sum_{i=1}^{f} \omega_4 \Delta lnINF_{t-i} + \sum_{i=1}^{g} \omega_5 \Delta lnTOT_{t-i} + \varphi ECM_{t-i} + \epsilon_t, \tag{6}$$

where θ_0 is a constant, Δ is the difference operator, λ and π_i are the long-run elasticities, the short-run elasticities are ω_i and the white noise error term is ϵ.

We test for cointegration using the bounds test F-statistics on the null hypothesis of no level cointegration that $\lambda = \pi_1 = \pi_2 = \pi_3 = \pi_4 = \pi_5 = 0$ against the alternative that there is cointegration when $\lambda \neq \pi_1 \neq \pi_2 \neq \pi_3 \neq \pi_4 \neq \pi_5 \neq 0$. If the calculated F-statistics is more extreme than the upper critical F-statistics, then the null is rejected in favour of the alternative hypothesis of long cointegration among the variables. Once there is long-run relationship among the variables, the conditional ARDL (a,b,c,d,e,f) long-run model for Y_t is estimated as:

$$lny_t = \varphi_0 + \sum_{i=1}^{a} \beta_0 lny_{t-i} + \sum_{i=1}^{b} \beta_1 \square nk_{t-i} + \sum_{i=1}^{d} \beta_2 lnRemit_{t-i} + \sum_{i=1}^{e} \beta_3 lnFDI_{t-i} +$$
$$\sum_{i=1}^{f} \beta_4 lnINF_{t-i} + \sum_{i=1}^{g} \beta_5 lnTOT_{t-i} + \varepsilon_t \qquad (7)$$

To estimate the dynamic short-run coefficients, an error correction model (ECM) is estimated. The ECM equation is specified as:

$$\Delta lny_t = \mu_0 + \sum_{i=1}^{a} \omega_0 \Delta lny_{t-i} + \sum_{i=1}^{b} \omega_1 \Delta lnk_{t-i} + \sum_{i=1}^{d} \omega_2 \Delta lnRemit_{t-i} +$$
$$\sum_{i=1}^{e} \omega_3 \Delta lnFDI_{t-i} + \sum_{i=1}^{f} \omega_4 \Delta lnINF_{t-i} + \sum_{i=1}^{g} \omega_5 \Delta lnTOT_{t-i} + \varphi ECM_{t-i} + \epsilon_t \qquad (8)$$

The coefficient of the ECM φ is required to be a negative fraction and statistically different from zero. To check the fitness of the selected model, we performed a number of diagnostic tests and report them.

3.3 Data description
The study used annual timeseries data covering the period 1970 to 2016, and this is constrained by the availability of the series involved. The data on economic growth and inflation was drawn from the Ghana Statistical Service, that on remittance inflows and terms of trade was drawn from the Bank of Ghana while that on gross fixed capital formation and FDI inflows was drawn from the World Development Indicators (WDI) 2016 for Ghana. Table 1 contains a summary description of the data variables presented in the empirical models in sections 3.1 and 3.2.

Table 1: Description of Variables

Variable	Description	Prior Expectations	Data Source
y	Measured as aggregate output expressed as a unit of labour.		GSS
k	Gross fixed capital formation measured as capital per labour expressed as a ratio of GDP.	+/-	WDI
Remit	Measured as the sum of money and the monetary value of goods received from migrant workers abroad.	+/-	BOG/WDI
FDI	Measured as the total of equity and other long- and short-term capital reported in the BOP.	+/-	WDI
INF	Measured as the percentage change in consumer price index.	-	BOG/GSS
TOT	Measured as the index of the ratio of export units to import units.	+	BOG

4. Results and Discussions
4.1 Unit Root Test
The results of the unit root presented in Table 2 indicate that, with the FDI and INF, the other variables are non-stationary at their levels (both at constant without trend and constant with trend) but are stationary at their first differences. The presence of I(0) and I(1) among the series is enough justification to use the ARDL procedure.

Table 2: ADF Unit Root Test Results

Variable	Level		1st Difference	
	Cons	Cons+T	Cons	Cons+T
lny	0.753	0.533	-4.002***	-4.201***
lnk	1.120	1.416	-7.017***	-7.421***
lnRemit	-1.614	-1.900	-4.852***	-5.160**
lnFDI	1.116	1.204	-5.353***	-5.286***
lnINF	-4.640**	-5.112***		
lnTOT	-3.589**	-4.061***		

, * denotes rejection of the null hypothesis at the 5% and 10% significance levels

4.2 ARDL Bounds Testing Results

From Table 3, it would be seen that the calculated F-statistics is extreme to the upper bound critical value at 1% significance level. This validates the presence of cointegraton among the variables, which, therefore, permitted us to estimate the effect sizes of the long and short runs coefficients, guided by appropriate lag order selection based on information criteria.

Table 3: Bound Test for Cointegration

F-test = 9.21	K=5	
Significance	1 percent	5 percent
lower bound I(0)	4.05	2.57
upper bound I(1)	6.01	5.35

Author's estimates

4.3 Long-Run ARDL Results

From the long-run ARDL results reported in Table 4, the coefficient of remittances is found to be negative (-0.017) in the long run and statistically different from zero. Also, per the effect size, it implies that, in the long run, remittances are growth inelastic. An increase in inward remittances by 1 percent reduces economic growth by 0.017 percent. Our finding is even with Chami et al. (2005) and Gubert (1998). According to Gubert (1998), remittances reduced the productivity of recipients and made them technically inefficient, which negatively affects economic growth. In the long run, foreign direct investment was found to have a positive impact on economic growth. An increase in foreign direct investment by 1 percent will cause economic growth to increase by 0.107 percent. According to Adams (2005), foreign direct investment improves and increases domestic capital, which, in effect, causes an increase in economic growth.

The coefficients of capital and foreign direct investment were significant at 5 percent level. However, those of inflation and terms of trade were not significant at 5 percent level. The coefficient of capital, in the long run, is positive, which is consistent with economic theory.

Table 4: Estimated Long-Run ARDL Results

Model: ARDL (1, 0, 1, 0, 0, 0)   Dependent Variable: *lny*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
lnk	0.013***	0.006	2.093	0.002
lnRemit	-0.017**	0.005	-3.203	0.020
lnFDI	0.107**	0.024	4.310	0.012
lnINF	-0.221	0.196	-1.124	0.261
lnTOT	0.311	0.298	1.042	0.301

*** and *** indicate significance at 5% and 1% respectively.*

4.4 Short-Run ARDL Results

From Table 5, remittance is found to have a positive impact on economic growth in the short run. The coefficients of remittances are found to be 0.01 and 0.20. The implication is that the economy will grow by 0.011 percent in the short term with a 1% increase in remittance, and the positive effect will persist even after a year. This result is consistent with Issahaku et al. (2018) for lower middle-income countries and Das et al. (2019) for Jamaica. According to Das et al. (2019), remittances may partly be used for investment, which can drive economic growth in receiving countries.

The speed of adjustment to restore any disequilibrium is negative (-0.89) and statistically significant at 5% level. This implies that about 89% of any divergence from the steady-state long-run economic growth path is restored within one year. Thus, the system is effective at restoring itself back to the long-run growth path.

Table 5: Estimated Short-Run ARDL Results

Model: ARDL (1, 0, 1, 0, 0, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
lny(-1)	0.012***	0.002	5.150	0.001
Lnk	0.114**	0.028	4.021	0.013
lnRemit	0.011**	0.004	2.447	0.022
lnRemit(-1)	0.201**	0.082	2.472	0.024
lnFDI	0.031**	0.014	2.148	0.032
lnINF	-0.113	0.105	-1.072	0.441
lnTOT	0.041	0.025	1.627	0.137
ECM (-1)	-0.891	0.282	-3.152	0.015
R-squared	0.969	Log likelihood		25.352
Adjusted R-squared	0.953	F-statistic		112.01
S.E. of regression	0.104	Prob(F-statistic)		0.000
Sum squared resid	0.446	Obs.		47

*** and *** indicate significance at 5% and 1% respectively.*

The results further showed that the coefficient of capital was statistically significant in the short run. Remittance and FDI were found to also have a statistically-significant impact on economic

growth at 5 percent level. Inflation and terms of trade did not have any significant effect on growth in the short run. FDI had a positive coefficient in the short run. The results support the works of Siddique et al. (2017) for Pakistan, Mehic et al. (2013) for southeast Europe countries and Pelinescu & Radulescu (2009), which found that FDI has a positive impact on growth. When FDI is channeled to pro-growth areas, it improves productivity, which enhances economic growth.

Model Adequacy Tests

The ARDL was subjected to a battery of diagnostic and parameter stability test to verify the model adequacy. Figures 2 and 3 show that the model estimated has stable parameters within 5% confidence boundary. From Table 6, the B-P-G heteroskedasticity test and the B-G LM test serial correlation test indicates the absence of both serial correlation and heteroskedasticity. The significance of the J-B statistics also shows that the model and data follow a normal distribution.

Table 6: Diagnostics and Model Stability Test Results

Test Criteria	Results
Breusch-Pagan-Godfrey (B-P-G) Heteroskedasticity Test	0.5606
Breusch-Godfrey (B-G) Serial Correlation LM Test	0.3020
Jarque-Bera (J-B) Normality Test	0.0000
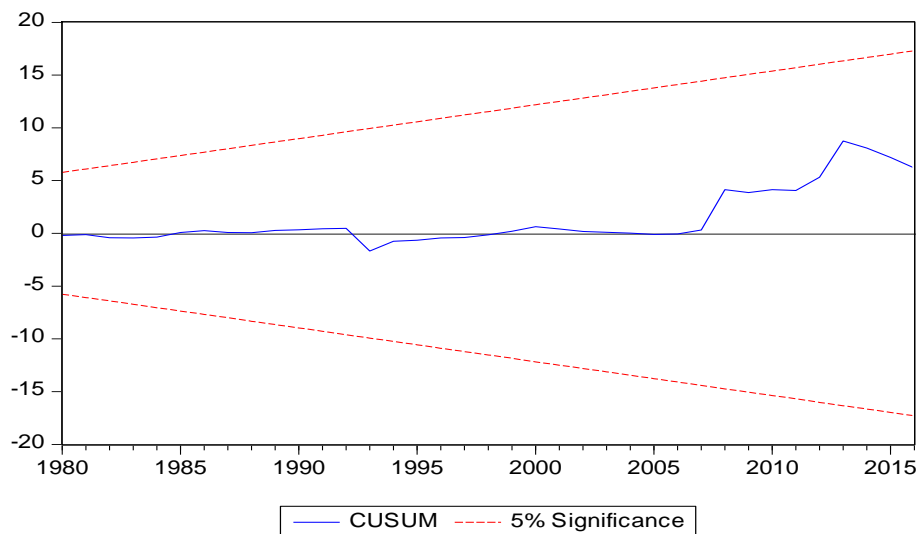
Figure 2: CUSUM test results
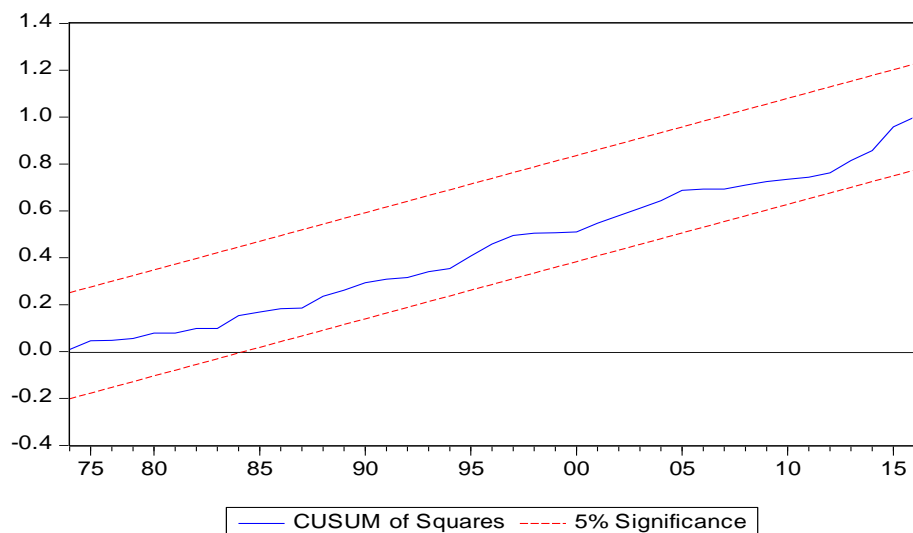
Figure 3: CUSUM square test

4.5 Granger Causality Analysis

The probability value of no causality running from remittance to economic growth is 0.143, hence we do not reject the null hypothesis at 5% significance level. The probability value of no causality running from economic growth to remittance is 0.158, hence we do not reject the null hypothesis at 5% significance level. We conclude that there is no direction of causality between remittance and economic growth in Ghana. Ahamada & Coulibaly (2013), Siddique et al. (2012), Barajas et al. (2009) and Catrinescu et al. (2009) found no direction of causality between economic growth and remittance. According to Catrinescu et al. (2009), due to the absence of sound economic policies and political institutions to channel remittance inflows into growth-oriented areas, countries will not enjoy the full benefits of remittances in the area of expanded economic activity and subsequent growth.

Table 7: Test of Granger Causality

Hypotheses	Lag	Prob.	Decision
lnREMT does not Granger causes lnrGDP	2	0.143	Do not reject null hypothesis
lnrGDP does not Granger causes lnREMT		0.158	

5.1 Conclusion and Recommendation

The study examined the impact of remittance on economic growth in Ghana, using annual frequency data from 1970 to 2016. The Augmented Dickey Fuller unit root test procedure showed that the variables were integrated of order I (0) and order I (1). Results from the bounds test procedure revealed the presence of cointegration among the variables, hence economic growth, capital, foreign direct investment, remittance, terms of trade and inflation will converge to a long-run stable equilibrium. The long-run ARDL results showed that capital, foreign direct investment and remittance were the long-run drivers of economic growth in Ghana. The results further showed that remittance had an impact on economic growth in the long- and short-run in Ghana. However, the short-run drivers of growth were foreign direct investment, remittance and capital. We, thus,

conclude that in the long-run remittance has a negative effect on growth and a positive effect on growth in the short-run in Ghana. The results from the traditional Granger causality test found no direction of causality between economic growth and remittance in Ghana.

The empirical results indicated that remittance has a statistically-significant positive effect on economic growth in the short run. For practical and policy purposes, the study recommends that both growth and remittance be considered as interrelated targets, and the focus could be placed on policies that are in the effective control of financial institutions that facilitate the flow of remittance. The study also recommends, based on the Granger causality results, that Government builds the needed capacity that will ensure that receipts from remittance are channeled into pro-growth areas, so that the nation can enjoy the full benefits of remittance from abroad. Building strong institutions will also support a faster development of the under-developed financial sector to that which will offer expert advice to households on the utilisation of remittance receipt. Diaspora forums should be organised to engage remitting families in the country via the formation of 'Home Town Associations' to assist in the development of their localities through the funds they receive from their respective relatives.

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