

**POVERTY AND SUSTAINABLE DEVELOPMENT**



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**Do international remittances contribute to achieving the first Sustainable Development Goal (SDG1) in developing economies? Empirical evidence from Pooled Mean Group (PMG) estimator.**

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## **ABSTRACT**

Eradicating extreme poverty is a fundamental objective and concern for every economy in today's modernization epoch. Developed countries channel significant amount of financial support annually to poor economies with the core intention of improving their welfare and standard of living. Extreme poverty is also one of the most imperative target of the United Nations (UN's) Sustainable Development Goals for Agenda 2030. What role can international remittances play in helping countries accomplish the first goal of Sustainable Development (SDG1)?

Many empirical literatures have researched this phenomenon arriving at results in favor of the optimistic developmental view of remittances on poverty mitigation. However, most studies have merely investigated either the direct or indirect impacts of remittances on poverty separately. We aim to expand on this notion by exploring both the direct and indirect empirical nexus between international remittances and poverty using the Poverty-Growth-Inequality (PGI) framework suggested by Bourguignon (2014) and the Keynesian Harrod-Domar growth model (HDM). We test for the potential relationship between international remittances and SDG1 by running a panel econometric data analysis comprising of 14 selected developing countries between the fiscal period 2000-2017. Specifically, an Autoregressive Distributed Lag (ARDL) model with Pooled Mean Group (PMG) estimator was used to capture both long-run and short-run relationships concurrently.

Major findings from the PMG estimator confirmed our hypotheses. The empirical research found evidence for both direct and indirect (via economic growth) significant nexus between international remittances and the level of poverty in the long-run. Based on the empirical findings, the conclusion reached was that, international remittances can undeniably help developing economies accomplish SDG1.

**Keywords:** Remittance, Economic growth, Poverty, Sustainable Development, Autoregressive Distributed Lag (ARDL) model, Pooled Mean Group (PMG) estimator.

## LIST OF ABBREVIATIONS

<b>ARDL</b>	Autoregressive Distributed Lag
<b>ECT</b>	Error correction term
<b>FDI</b>	Foreign Direct Investment
<b>GDP</b>	Gross Domestic Product
<b>HDM</b>	Harrod-Domar growth model
<b>I</b>	Investment
<b>ICOR</b>	Increment capital output ratio
<b>IMF</b>	International Monetary Fund
<b>K</b>	Capital
<b>L</b>	Labor
<b>LMICs</b>	Low and middle income countries
<b>ODA</b>	Official Development Assistance
<b>PGI</b>	Poverty-Growth-Inequality triangle
<b>PMG</b>	Pooled Mean Group estimator
<b>RGM</b>	Remittance-Growth Model
<b>RPM</b>	Remittance-Poverty Model
<b>SDG1</b>	Zero poverty
<b>SDGs</b>	Sustainable Development Goals
<b>sY</b>	Savings as share of GDP
<b>TFP</b>	Total factor productivity
<b>UN</b>	United Nations
<b>UNDESA</b>	United Nations Department for Economic and Social Affairs
<b>UNDP</b>	United Nation Development Programme
<b>WDI</b>	World Development Indicator
<b>WEO</b>	World Economic Outlook

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## 1.0 INTRODUCTION

Poverty is an emergent concern for every nation in the world (Collier, 2007). Despite encouraging declines in extreme poverty rate in recent years, poverty still remains a prominent and a persistent issue in low-and middle income countries (LMICs). Over the past century, the global incidence of extreme poverty<sup>1</sup> has plummeted by almost 90 percent reaching a new historical low of 10 percent in 2015 (World Bank, 2018). Poverty is a detrimental condition that cannot be tolerated due to its harmful and depressing effect on the economic, social and political welfare of those trapped in its horrors (Collier, 2007; De Janvry et al, 2016). As a result of this, every country's government has a primary objective to purposefully implement poverty lessening policies (UN; IMF (WEO); World Bank). The United Nations (UN) as an organ is also actively working progressively to ensure that no individual is considered poor by the year 2030 through its Sustainable Development initiative, advocating for shared prosperity in a sustainable manner (UN, 2016).

The United Nations 2030 Agenda for Sustainable Development (SDGs) encompasses 17 distinctive objectives. The Agenda calls for global partnership between all member states to work collaboratively to ensure the fulfilments of these goals. At the core is the genuine desire to end extreme poverty and other deprivations. The United Nations realizes that achieving zero poverty must go together with other development initiatives, for example improving the level of human capital (education and health), reducing inequalities both in terms of gender and income and to incite economic growth and development whiles contemporaneously tackling climate change. Thus the 2030 Agenda for Sustainable Development does not only strive to exterminate extreme poverty but also to assimilate and balance the three dimensions of Sustainable Development, explicitly economic, social and environmental development (UN, 2016).

In this research we focus on the first goal of the Sustainable Development Agenda, namely worldwide eradication of extreme poverty (SDG1). In particular, the study addresses the impact of migrant remittances in helping to achieve SDG1 in their countries of origin. This therefore leads us to question whether, **“international remittances contribute to achieving the first Sustainable Development Goal (SDG1) in developing economies?”**

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<sup>1</sup> *The World Bank defines extreme poverty as the proportion of people living below the poverty threshold of \$1.90 a day.*

The hypotheses under scrutiny are that, remittances can mitigate the level of poverty and help emerging economies accomplish SDG1 (see Section 4.3 for formal representation of the hypotheses).

To test our hypotheses (see 4.3), we examine the influence of international remittances on economic growth and poverty in 14 selected developing countries over the period 2000-2017 using the Pooled mean Group (PMG)-ARDL econometric methodology.

The rest of the thesis is structured as follows: First, we present an overview of the state of international migration and remittances in Section 2, followed by a theoretical background of economic models in Section 3. Thereafter we briefly review earlier empirical studies examining the impact of remittances on economic growth and development in Section 4. Based on the theoretical discussion, the research question and hypotheses are generated. Section 5 describes the data and our estimation strategy, Section 6 report the empirical findings and finally, Section 7 presents the discussion and conclusion.

## **2.0 STATISTICAL BACKGROUND**

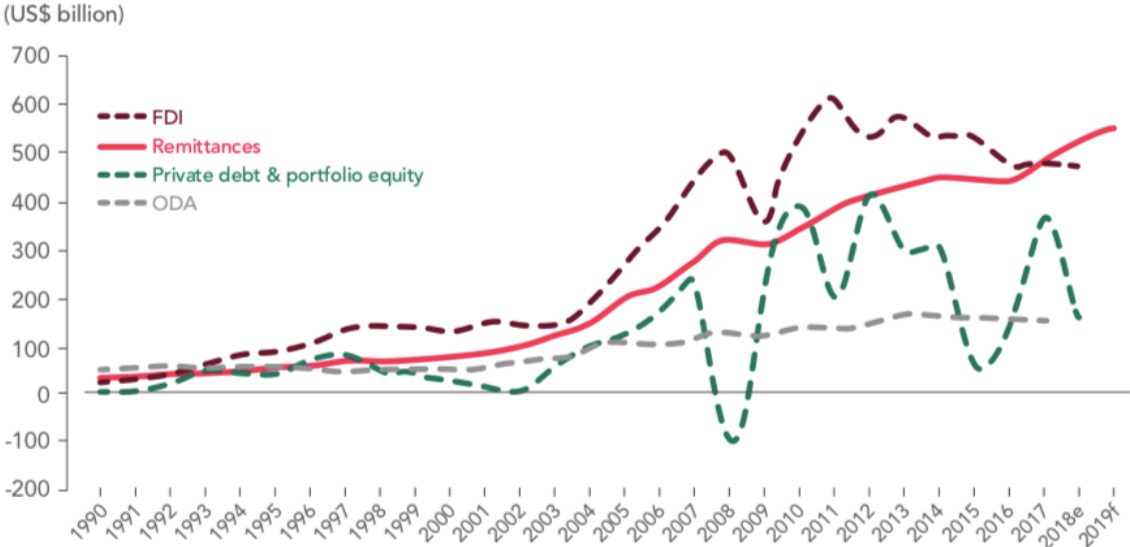
### **2.1: Overview of the state of international migration and remittances**

The United Nations Department for Economic and Social Affairs (UNDESA) annual report on international migration estimated in 2017 that, the worldwide stock of international migrants (inclusive refugees) was an estimation of 258 million (UNDESA, 2017). Putting this figure into perspective, if international migration was a country it would have been the fifth largest country in the world with respect to population size, falling only behind China, India, The United States and Indonesia (World Bank, 2018).

These migrants in turn sent about \$458 billion dollars in terms of documented remittances to their countries of origin (World Bank, 2018b). This implies that every migrant sent on average approximately \$1775 back home during the fiscal year 2017. Inward remittances flow in 2017 was further projected to upsurge by 10.8 percent, due to stronger economic performances in the European Union (EU), the United States (US) and the Russian Federation to reach a massive \$518 billion by the end of 2018 as reported in the Migration and Development Brief 30 (World Bank, 2018b). Remittances or what the head economist at the World Bank Group, Ratha Dilip terms “dollars wrapped with love” are financial flows which takes the form of money and/or

goods that diaspora migrants send to their countries of origin to support friends and families. These financial flows far exceed the level of official development assistance (ODA) sent to low and middle income countries during the same period. Official development assistance granted by donor countries to developing economies was estimated to the tally of \$146.6 billion in 2017 (OECD, 2018). Additionally, remittances are the second highest source of external financial flows to developing countries, excluding the People’s Republic of China (PRC) from the statistics, the flow of international remittances also exceed the level of foreign direct investment (FDI) sent to developing countries in 2018 (World Bank, 2018b). Remittances have thus grown to become an integral source of foreign finance for many developing economies in today’s globalized world.

**Figure 2.1: Evolution of international remittances and other financial flows, 1990-2019**



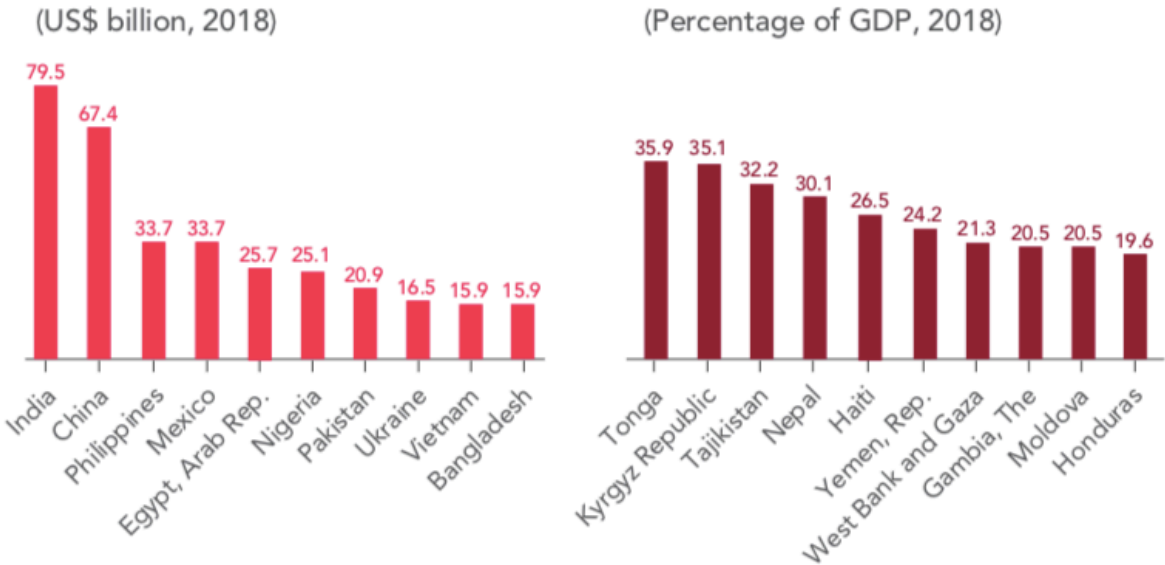
**Source: Migration and Development Brief 30. (World Bank, 2018)**

The graphical representation in figure 2.1 illustrates the development of international remittances, foreign direct investment, official development assistance and private capital flows over the period 1990-2019. The take home message from this graph is the stability of remittances over time. Remittances fluctuate less with little seasonality than for example FDI, it also has countercyclical attributes to resist external shocks making it a stable source of income for the poor (UNESCAP, 2007). The stability attribute of remittances can potentially play a fundamental role in alleviating some of the economic constraints faced by poor households and ultimately, enable the accomplishment of the first goal of the UN’s Sustainable Development Agenda. Since remittances are personal transfers, they are well targeted to the needs of their

beneficiaries. “Remittances directly augment the income of recipient households. In addition to providing financial resources for poor households, they affect poverty and welfare through indirect multiplier effects and also macroeconomic effects” (Ratha, 2007). Remittances may affect poverty indirectly through increasing economic growth by supplementing insufficient domestic savings and therefore investments promoting economic growth and development as predicted by the Keynesian Harrod-Domar growth model (see 3.2.1).

2.2: Where do the remittances go?

**Figure 2.2: Top remittance receivers (LMICs) 2018**



**Source: Migration and Development Brief 30. (World Bank, 2018)**

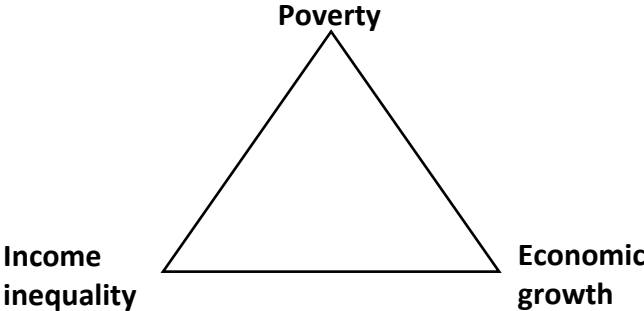
Statistics on remittances computed by the World Bank in year 2018 show that among low- and middle income countries, India was the recipient to most remittances, followed by China. These economies received approximately \$79.5 billion and \$67.4 billion respectively. Not only have international remittances grown in significance as a source of foreign exchange for many developing countries, but have also grown in significance relative to the size of the economy. In the year 2018, remittances as a percentage share of total gross domestic product (GDP) was highest in Tonga, making up about 35.9 percent of total GDP followed by the Kyrgyz republic with remittances solely making up around 35.1 percent of GDP. Hence, remittances have become an essential source of income for many poor economies. This can hypothetically enable countries to achieve higher growth rate (World Bank, 2018).



3.0 THEORETICAL BACKGROUND

3.1: Relationship between remittances and SDG1 (Triangle of development)

Considering the triangle of development framework established by Bourguignon (2014), the Poverty-Growth-Inequality triangle (PGI) can be used to explore the links between diaspora remittances and poverty reductions via the growth channel. The PGI framework argues that



there exists an interconnected relationship between poverty, income inequality and economic growth. The basic notion behind this theoretical framework is that, in order to achieve the first goal of the United Nations Sustainable Development Agenda (poverty alleviation), every country is required to actively adopt economic policies targeted at improving economic growth and income equality levels. This is because achieving economic growth is a necessary condition to reduce poverty but also depends on how the income derived from growth are distributed across different stakeholders in the society. The effect of the rate of growth therefore does not solely depend on the bidirectional relationship that exist between poverty and economic growth but also by the interactions between growth and distributional properties of income (Bourguignon, 2014).

3.2: How can economies achieve economic growth?

There are numerous economic models underlying different channels and or mechanisms through which economies can achieve economic growth and development. For example, the Solow growth model argues that output growth comes from two main sources, factor deepening and total factor productivity growth (TFP) and therefore, technology (the inhibiting factor to growth) is an international public good available to all countries permitting the possibility for long-term universal convergence of income (Solow, 1957; De Janvry et al, 2016). On the other end, are endogenous growth models which argue that due to increasing returns to scale in aggregate output, countries with initially higher levels of technology will grow faster than countries with initially lower levels of technology with the likely resulting outcome of

conditional convergence rather than universal convergence of countries (Romer, 1990; De Janvry et al, 2016). In this paper, we opt to use the Keynesian Harrod-Domar model to explain the factor determinants of growth and in addition to explore how international remittances can lead to higher rate of growth in developing countries.

### 3.2.1: The Keynesian Harrod-Domar model (HDM)

The Harrod-Domar model is a generic economic growth model that emerged in the 1930s and 1940s subsequent to the Great Depression. The model gained monumental popularity and was extensively deployed during a period where the main objective of economic development was believed to occur mainly through hastening economic growth (De Janvry et al, 2016). The model explicitly highlights the importance of capital accumulation in sustaining growth and further establishes two networks through which the level of capital accumulation is determined. It stresses that capital accumulation is determined by savings and technology (Domar, 1957). The policy implications of the Harrod-Domar model is that, essentially economic growth can be achieved via two channels, namely through increment in the rate of savings (investments) in the economy and also by increasing the level of technology used in production (Domar, 1957).

This research focuses on the beneficial role of savings (investment) in the accumulation of capital. Historically, evidence seems to suggest that the rate of savings is lower in less developing countries than in advanced developed economies (De Janvry et al, 2016) potentially causing economic stagnation in many poor countries. If domestic savings are insufficient to induce an appropriate level of desired savings in the economy, can international remittances be the solution that will help solve this problem by augmenting insufficient domestic savings to bring about economic growth and development in these economies and ultimately enable countries to achieve income convergence in the long-run? The answer to this question is “YES” according to the Harrod-Domar growth model.

To address the potential impact of international remittances in the growth process, i.e. the mechanisms through which international remittances can help supplement insufficient domestic savings to acquire an optimal savings rate in the economy, we need to first explore the basic assumptions underlying the Keynesian Harrod-Domar growth model.

The model makes five fundamental assumptions (Domar, 1957; De Janvry et al, 2016)

1. The model assumes a closed economy structure, therefore no occurrence of trade transactions with the rest of the world and also no existence of foreign direct investments (FDI). This means that all investments in the economy have to come from the domestic households and firms' savings. This implies that  $I = sY$ , where  $I$  is investments and  $sY$  is savings as a share of gross domestic product (GDP).
2. The factors of production labor (L) and capital (K) are used in fixed proportions. Hence no substitution possibilities among inputs.
3. Capital is a scarce resource and a limiting factor in growth. The input "labor" is in excess and hence not a limiting factor in growth.
4. Constant return to scale for each factor of production, namely capital and labor
5. Leontief fixed-proportions technology i.e. the production function is such that fixed quantity of extra capital ( $\Delta K$ ) gives a fixed proportional increment in output ( $\Delta Y$ ), where  $k = \Delta K / \Delta Y = ICOR$  (the increment capital output ratio). The higher the  $ICOR$  the less productive technology is in production.

The structural form of the model comprises in three equations:

1. An aggregate production function obtained from the definition of the increment capital output ratio ( $ICOR$ ):  $Y = \frac{1}{k} \Delta K$
2. A savings function:  $S = sY$
3. An investment function  $I \equiv \Delta K + \delta K = S$ , where  $\delta$  is the depreciation rate of capital.

The endogenous outcome of interest, i.e. the rate of economic growth can be derived from these three equations. The reduced form of the model will have the following specification:

$$\dot{Y} = \frac{\Delta Y}{Y} = \frac{1}{k} \frac{\Delta K}{Y} = \frac{1}{k} \frac{S - \delta K}{Y} = \frac{s}{k} - \frac{k\delta}{k} = \frac{s}{k} - \delta$$

The economic interpretation of this generic growth model is that the rate of growth in the economy ( $\dot{Y}$ ) increases with the rate of savings ( $s$ ) and decrease with the  $ICOR$  ( $k$ ) and the rate of depreciation of capital inputs ( $k$ ). Intuitively, there can be zero or even negative growth if the proportion of savings is deficient for  $S/k$  to surpass the rate of depreciation of capital.

Furthermore, we derive growth in per capita income  $y = \frac{Y}{P}$ . Taking the logarithms gives  $\ln y = \ln Y - \ln P$  and taking the derivative of the logarithms with respect to time gives the rate of growth of per capita income;

$$\dot{y} = \dot{Y} - \dot{P} = \frac{s}{k} - (\delta + n)$$

Consequently, the rate of growth in the per capita income model specification adds that growth in per capita income is boosted by the rate of savings, the efficiency of capital, decreased by the rate of depreciation of capital ( $k$ ) and the rate of population growth ( $n$ ).

### 3.2.2: The role of international remittances and the big push according to the Harrod-Domar Model.

International remittances can serve as a fundamental tool to supplement insufficient domestic savings. To incorporate migrants' remittances into the Harrod-Domar growth model, we need a remittance function. Let  $Rem = remY$ . That is, we attribute remittances as a share of gross domestic product and add it to domestic savings ( $sY$ ). Addition of remittances and domestic savings ( $sY + RemY$ ) give the growth rate of the economy equal to  $Y = \left(s + \frac{Rem}{k}\right) - \delta$  and the rate of growth in per capita income equal to  $\dot{y} = \left(s + \frac{Rem}{k}\right) - \delta + n$ . Furthermore, remittances can finance the gap between desirable savings ( $s^*$ ) and actual domestic savings ( $s$ ) to attain a preferred rate of per capita income growth ( $\dot{y}^*$ ). The financing gap provided by international remittances is the  $Rem = s^* - s$ . The combined effect of international remittances and domestic savings will initiate a "big push" effect by first accelerating the accumulation of capital in the economy, stimulating positive economy growth and per capita income growth. Potentially this can help diminish the rate of poverty, enabling poor countries to attain income convergence (De janvry et al, 2016).

Important to note is that, although foreign aid may have similar effects as remittances according to the Harrod-Domar growth model framework, foreign aid is only likely to stimulate economic growth if and only the aid is used for investments (Domar, 1957). This idea perhaps can explain why many poor countries who receive enormous amount of aid are still lagging. A conceivable explanation could be attributed to a lack of fundamental determinants of growth in these economies, for example, poor institutions and governments, openness, inequality etc. These factors may cause foreign aid to be misappropriated and therefore not serving its true purpose as suggested by the Keynesian Harrod-Domar growth model. Unlike foreign aid, remittances

are not misappropriated but rather reaches the desired receipts at great efficiency and often used for investments in human capital improvements (education and health) but also for consumption purposes, ultimately increasing GDP. The effect is more profound especially in countries with per capita income below \$1200 (Zieseimer, 2016).

## 4.0 EMPIRICAL LITERATURE REVIEW

### 4.1 Do international remittances promote economic growth? What does the empiric say?

Several economic researchers and scholars have investigated the ultimate impact of remittances on economic growth. The results have been ambiguous since statistical evidence have found verification both in favor of positive and negative impacts between diaspora remittances and economic growth. Remittances have in recent years been a controversial and a fiercely debated phenomenon as economist and econometricians attempt to study its fundamental role in the growth process. Many of the present-day empirical research papers addressing the impact of international remittances have only investigated either the direct or indirect effects of remittances on poverty separately, with very few papers considering both the direct and indirect impacts jointly. Our purpose in this empirical research is to fill the gap in the academic literature by exploring both the direct and indirect channels through which international remittances may mitigate the level of poverty and help developing economies accomplish SDG1.

#### 4.1.1 Empirical research showing positive impact

Islam et al, (2018) conducted a time series econometric analysis to investigate the impact of remittances on economic growth in Bangladesh, India and Pakistan between the fiscal years 1981 to 2015. The researchers found a one-way causal relationship between remittances and growth in Bangladesh, where higher remittances increase growth, but the inverse didn't hold. i.e. High growth didn't necessarily impact flows of remittances. In India, the relationship was bidirectional i.e. a two-way causal relationship indicating that remittances affect economic growth and economic growth in turn facilitate high levels of remittances. Furthermore, they found a one-way causal relationship between higher economic growth and remittances flow in Pakistan, which was opposite to the findings in Bangladesh. Jamel (2015) designed a research to probe causal associations between economic growth and remittances in Tunisia through financial development and investment, using a time series ARDL model. Jamel (2015) found support for co-integrated causal nexus between remittances, GDP growth, investment and

financial development and bidirectional associations between the variables, specifically between remittances and GDP growth in the short-run. Additionally, Das et al, (2011) used panel integration and pooled mean group (PMG) approach to examine the long-run impact of remittances on GDP growth. The researchers found a long-run positive relationship between remittances and GDP growth. However, remittances impact on GDP growth was weakly significant. Das (2012) in a follow up study discovered that the effect of remittances on growth was hugely positive if the remittances were used for financial investments. They also instituted that remittances correlated positively to growth via the consumption channel, however this relationship despite significant was very small. Nyamongo et al, (2012) employed panel econometric procedures to assess the effect of international remittances and financial development in 36 selected African countries over the monetary period 1980 to 2009. The researchers found positive relationships between flows of remittances and GDP growth, however high volatility in remittances flows was negative for growth. Additionally, they found a complementary link between remittances and financial development but the effect of financial development on GDP growth was weak. Meyer et al, (2017) conducted a research to investigate the impact of remittances on economic growth. They utilized panel data on six high remittances receiving countries in Europe including Moldova, Romania, Bosnia and Herzegovina, Albania, Bulgaria and Macedonia between the years 1999 to 2013. The researchers found migrants' remittances to be positively correlated to growth in all countries assessed. Finally, Jaffri et al, (2013) employed ordinary least squared regression to study whether worker's remittances promote economic growth in Pakistan? The researchers found that a one percentage increase in remittances increase GDP growth by approximately 0.07 percentage point.

#### 4.1.2 Empirical research showing negative or no impact

Lim et al, (2015) used both the Westerlund's and Pedroni's panel cointegration tests to examine the macroeconomic impacts of diaspora remittances on economic growth in the Caribbean Community and Common Market (CARICOM). The researchers found no long-run significant causal relationship between remittances and economic growth. They also found that remittances in these areas are used mainly for consumption purposes other than investments and therefore increasing spending rather than productivity, hence making the macroeconomic effects hard to establish. Siddique et al, (2012) research aimed to establish the causal links between migrants' remittances and economic growth in Bangladesh, India and Sri-Lanka over the period 1976 to 2006 using panel causality econometric procedures. Siddique et al, (2012) found no causal link

between remittances and growth in India, in Sri-Lanka they found a two-way causal effect and finally a unidirectional effect in Bangladesh from remittances to growth. Rao et al, (2011) conducted a panel analysis consisting of 40 countries between 1960 to 2007 to explore the direct effect of remittances on economic growth. The researchers found no direct long-term effect of remittances on economic growth. However, they found two channels through which remittances may have indirect effect on growth i.e. Through investment and financial sector development. Chami et al, (2005) utilized a panel data analysis to scrutinize migrants' remittances as a source of capital for development. The researchers found a negative impact between remittances and GDP growth. Gapen et al, (2009) found no significant impact of remittances on long-term economic growth.

Most empirical studies found that remittances influence growth positively if used for investments rather than consumption. This idea authenticates the predictions underlying the Harrod-Domar model. On the other hand, if remittances are used solely for consumption purposes, then there is no evident long-run causation with economic growth. It has micro effects rather than macroeconomic outcomes (Lim et al, 2015).

#### 4.2 Do international flow of remittances help mitigate poverty in developing countries?

Many of the current empirical papers examining the remittance-poverty nexus have found support in favor of the optimistic view of remittances on development. The underlying idea is that remittances, knowledge, skills as well as experience that migrants gain from abroad, can be transmitted back into their countries of origin, thereby benefiting economic growth and development positively (Adentsui, 2010).

Chong et al, (2018) conducted an empirical research examining the impact of migrants' remittances on poverty mitigation through the human capital channel in 54 developing countries. The researchers employed the system GMM technique developed by Arellano and Bond (1991) and Arellano and Bover (1995) to control for endogeneity. They found a strong negative relationship between remittances and poverty as well as a positive interaction between remittances and human capital i.e. a one percentage increase in remittances decrease the poverty headcount ratio by approximately 0.47 percent, while the reduction is 0.33 percent via education. They also found that the marginal effect of remittances is negatively related to the level of education, which shows a substitution effect whereby the human capital weakens the

impact of remittances on poverty and hence demonstrating that education alleviate the effect of remittances on poverty.

Adams et al, (2005) in their research on the influence of international migration and remittances on the level, depth and severity of poverty in 71 developing countries using ordinary least square (OLS) and instrument variable (IV) econometric procedures, found that a 10 percent increase in the level of migrants' remittances reduces the share of people living in poverty by approximately 3,5 percent after controlling for possible endogeneity. Further exploring the remittances and poverty nexus, Adam et al, (2006) again, used a nationally-representative household survey including 5998 households to study the impact of remittances and poverty in Ghana. The researchers employed a multinomial logit model and found that international remittances reduce both the level, depth and severity of poverty in Ghana and that the effect of remittances on poverty are heightened the more sensitive the poverty measure used. They found that, including international remittances in household expenditure reduces the squared poverty gap (depth of poverty) measure by 34.8 percent and the poverty gap (severity of poverty) by 4.1 percent heralding the important role remittances can play in achieving SDG1.

Pekovic (2017) using a panel data comprising of nine countries during the period 2002-2013 and the least square dummy variable (LSDV) econometric technique found that international remittances have significant reducing effect with regards to both the level, depth and severity of poverty. Similarly, Tajul et al, (2018) explored the remittances-poverty connection using panel data from 44 developing countries during the period 2006 to 2014. The researchers found using a dynamic panel estimator that countries who receive a high amount of remittances tend to have lower levels of poverty.

Lastly, Tsaurai (2018) examines the impact of remittances on poverty alleviation in emerging economies. The researcher compared the outcome of two estimation strategies, namely the pooled OLS and fixed effect model. Results from the fixed effect estimation showed that remittances reduce poverty whiles the pooled OLS estimator confirmed that remittances impede economic growth and therefore upsurge poverty (PG1 framework). The researcher concluded that, although remittances may reduce poverty, countries should not over-rely on it as it can potentially hamper per capita income growth and ultimately escalate poverty.



Accordingly, most of the empirical research examining the remittances-poverty nexus identifies international remittances as a potential mechanism that can help developing countries attain SDG1 and consequently signalling the importance of remittances in the development process. Remittances, growth and poverty have been a pivotal point of focus in emerging economies, providing the incentive to evaluate and scrutinize the remittance-growth and the remittance-poverty nexus to find out their inter-relationship.

#### 4.3 Research question and hypotheses

Based on the above mentioned economic models and theoretical discussion, the research question that this paper aims to answer is the following; “**Do international remittances contribute to achieving the first Sustainable Development Goal (SDG1) in developing economies?**”

In an endeavor to answer the research question, we investigate both the indirect and direct empirical nexus between international remittances and SGD1. This research aims at testing the following hypotheses;

##### ***Model 1: Remittance-economic growth model (RGM)***

$H_0$ : There is no significant long-term indirect relationship (via economic growth) between international remittances and poverty levels in the migrants’ countries of origin

$H_1$ : International remittances significantly reduce the level of poverty in the migrants’ countries of origin in the long-term indirectly via economic growth.

##### ***Model 2: Remittance-Poverty model (RPM)***

$H_0$ : There is no significant long-run direct relationship between international remittances and poverty levels in the migrants’ countries of origin

$H_a$ : International remittances significantly reduce the level of poverty in the migrants’ countries of origin in the long-run.

To test these hypotheses, we need data and an estimation strategy. The following section discusses the data and the econometric procedure employed.

## 5.0 DATA AND ECONOMETRIC METHODOLOGY

### 5.1.1 Data

To investigate the importance of remittances in helping to achieve Sustainable Development Goal 1 (SDG1) in developing countries (see appendix for list of countries<sup>2</sup>), we collected data over the fiscal period 2000-2017 from the World Bank (World development indicators), the United Nations Development Program (UNDP) and the International Monetary Fund (IMF) database. The different variables and its source are summarized in the table below;

**Table 5.1.1: Summary description of key economic indicators used**

Indicator	Proxy	Data source
<b>Economic growth</b>	GDP per capita, PPP (constant 2011 international \$)	World Bank (WDI)
<b>Poverty</b>	Headcount ratio at \$3.20 a day (2011 ppp) % of population	World Bank (WDI)
<b>International remittances</b>	Remittance as % share of GDP	World Bank (WDI)
<b>Income inequality</b>	GINI-index	World Bank (WDI)
<b>Human Capital</b>	Human development index (HDI)	UNDP
<b>Rate of unemployment</b>	Unemployment %	IMF (World Economic Outlook Database)

*Source: Authors' own tabulation.*

### 5.1.2 Definition of variables

#### **Economic growth ( $GDP_C$ )**

We proxy economic growth with gross domestic product per capita based on purchasing power parity (PPP), converted into international dollars using 2011 purchasing power parity rates. It is measured as the sum of all gross value added by all resident producers in the economy inclusive product taxes but exclusive subsidies divided by the total population. It is also

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<sup>2</sup> Due to sample restrictions, countries are selected mainly based on the availability of data. Poverty data contain gaps for Armenia year 2000, Bolivia 2003 & 2010, Colombia 2006 & 2007, Dominican Republic 2017, Ecuador 2001 & 2002, Honduras and Paraguay year 2000. Missing unemployment data for Armenia year 2000. These data restrictions may cause potential selection and estimation bias.

computed without making deductions for depreciation of fabricated assets or environmental detriment. (World Bank, WDI). The use of GDP per capita in constant dollars (i.e. real GDP) implies that the values have been adjusted for changes in inflation.

#### **Poverty (*Pov*)**

We use poverty headcount ratio at \$3.20 a day (2011 PPP) % of population as a proxy for poverty<sup>3</sup>. Poverty headcount ratio measures the proportion of poor, specifically, in the context of our research, the proportion of poor in the selected economies. Our choice of the headcount ratio is primarily driven by data availability but also the headcount ratio is a poverty measure widely used by most researchers. Important to note is that, the poverty headcount ratio as a poverty measure has the limitation that, it only measures the proportion of poor in a given economy but gives no indication of the severity and depth of poverty (De Janvry et al, 2016).

#### **International remittances (*Rem*)**

We estimate the level of international remittances using remittances sent through official channels. We express remittances as a percentage share of gross domestic product. These financial flows only consist of external inflows, with internal monetary transfers excluded.

#### **Income inequality (*GINI*)**

Since we cannot directly measure income inequality in the selected countries we proxy the distribution of income in the economy with the GINI-index. The GINI-index has a value between 0 and 100; the closer the value is to 0, the greater the level of income equality; the closer the value is to 100, the greater the level of income inequality.

#### **Human Capital (*HDI*)**

Due to lack of data discovery on literacy rate and educational attainment over the period of interest 2000-2017 for the selected countries, we use the United Nations Development Programme (UNDP) developed index for human capital (HDI) to represent the level of human capital and also as a measure of wellbeing. The HDI measures three important dimensions of human development, namely education, health and standard of living.

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<sup>3</sup> *Although the extreme poverty threshold is set at \$1.90 a day, we opt in this research to utilise poverty data measured at \$3.20 a day. A potential reason for this is that, we also aim to capture those living in transitional poverty, with high vulnerability of being extreme poor in the next period.*

## 🚧 Rate of unemployment (*Unemp*)

We use the percentage number of the labor force who are actively seeking for employment but are still unemployed as a proxy for the rate of unemployment in the selected countries.

**Table 5.1.2 Descriptive statistics of regression variables**

Variable	Observations	Mean	Standard dev.	Min	Max
<b>LGDPc</b>	252	8.917	0.490	7.637	10.012
<b>LPov</b>	242	2.934	0.670	0.993	4.381
<b>LGini</b>	252	3.804	0.206	3.288	4.121
<b>LRem</b>	252	1.385	1.177	-2.015	3.492
<b>LHDI</b>	252	-0.379	0.078	-0.591	-0.231
<b>LUnemp</b>	251	2.050	0.466	1.065	3.648

*Source: Authors' own computations. Note: The variables real GDP per capita (LGDPc), Poverty (LPov), Income inequality (LGini), International remittances (LRem), Human capital (LHDI) and Unemployment rate (LUnemp) are log transformed. The descriptive statistics estimations of the variables are done using the (xtsum) routine in Stata.*

Table 5.1.2 provide summary statistics of the determinants of economic growth and Poverty based on the theoretical discussion by the PGI and HDM framework. The small standard deviations suggest that the data for all countries included in the panel are fairly dispersed.

## 5.2 Empirical Model and Econometric Methodology

### 5.2.1 Effect of remittances on economic growth (RGM)

We test the Poverty-Growth-Inequality triangle (PGI) to investigate the effect of remittances on economic growth since positive effect of remittances on economic growth given redistributional (income distribution) policies will help reduce poverty. Following Ravillion and Chen (1997) and Ravillion (1997), the level of growth in an economy can be derived using the following model specification;

$$Y = F(Gini, Pov) \quad \text{EQ (1)}$$

We modify and extend this model by introducing remittances as an additional regressor in order to determine its effect on economic growth, given;

$$Y = F(Rem, Gini, Pov) \quad \text{EQ (2)}$$

The econometric linear log stochastic form of the **remittance-growth model** can be represented as;

$$\log(Y)_t = \beta_0 + \beta_1 \log(Rem)_t + \beta_2 \log(Gini)_t + \beta_3 \log(Pov)_t + \varepsilon_t \quad \text{EQ (3)}$$

Where  $Y_t$  denote GDP per capita,  $Rem_t$  represents migrants remittances,  $Gini_t$  is a measure of income equality/inequality and  $Pov_t$  denotes the level of poverty,  $\log$  is the natural logarithm which is important for consistency and efficiency purposes.  $\varepsilon_t$  denotes the stochastic error term.

Regarding equation (3), a priori expectation is that, increase in the flow of remittances promote the level of economic growth (Domar, 1957) and hence  $\beta_1 > 0$ . Whereas, increments in the Gini-index (as the Gini-coefficient approaches 100) and poverty usually reduces the level of growth, consequently  $\beta_2$  and  $\beta_3 < 0$  (Bourguignon, 2014).

### 5.2.2 Effect of remittances on Poverty (RPM)

We further investigate the direct effect of remittances on poverty. The assumption is that if remittances affect economic growth, then according to the PGI framework, remittances will have an indirect effect on poverty given income distribution via the growth channel. We are also interested in investigating whether there exist direct links between remittances and SDG1. For this purpose, we also estimate a remittance–poverty model (RPM).

For the RPM, we also consider the PGI framework by Ravillion and Chen (1997) and Ravillion (1997) and extend it to fit our research purpose. The level of poverty is determined by the following determinants;

$$Pov = F(\text{Remittance}, \text{Human capital}, \text{Income inequality}, \text{Unemployment}) \quad \text{EQ(4)}$$

The econometric linear log stochastic form of the **remittance-poverty model** is given by;

$$\ln(Pov)_t = \beta_0 + \beta_1 \ln(Rem)_t + \beta_2 \ln(HDI)_t + \beta_3 \ln(Gini)_t + \beta_4 \ln(Unem) + \varepsilon_t \quad \text{EQ(5)}$$

The variables are in log form. Logarithmic transformation of the variables is done to account for potential heteroscedasticity and other estimation problems (Salahuddin and Gow, 2015).

Regarding equation (5), a theoretical explanation is that, increases in remittances and human capital reduce the level of measured poverty and thus  $\beta_1$  and  $\beta_2$  are likely to be  $< 0$ , whereas increments in Gini-index and unemployment increase the level of measured poverty, therefore  $\beta_3$  and  $\beta_4$  are expected to be  $> 0$ . We use human development index as a measure of human capital (wellbeing) and as a result exclude GDP to avoid possible multicollinearity problems.

### 5.2.3 Autoregressive Distributed Lag ARDL(p,q,q,q) Model with Pooled Mean Group estimator (PMG)

In order to capture both the long-term and short-term relationship between international remittances and economic growth simultaneously, we express equation (3) and (5) as an autoregressive distributed lag (p,q,q,q) model and further employ the pooled mean group estimator as a decision criterion to establish the relationship between our variable of interest (International remittances) and the macroeconomic outcome variables (Economic growth & Poverty). We integrate the dynamic heterogenous panel regression into the error correction model exploiting the autoregressive distributed lag technique (Pesaran et al, 1999).

An ARDL representation of the remittance-growth model (RGM), EQ (3) in the error correction form can be formulated as follows (Salahuddin and Gow, 2015);

The Remittance – economic growth model (RGM)

$$\Delta(y_i)_t = \sum_{j=1}^{p-1} \gamma_{ij} \Delta(y_i)_{t-j} + \sum_{j=0}^{q-1} \delta_j^i \Delta(X_i)_{t-j} + \varphi_i [\Delta(y_i)_{t-1} - \{\beta_{0,i} + \beta_{1,i}(P_i)_{t-1}\}] + \varepsilon_{it} \quad M(1)$$

Where  $y_i$  denotes the dependent variable (economic growth),  $X_i$  represents the variable of interest (Remittances),  $P_i$  represent a set of two control variables namely income inequality and the level of poverty using the proxies Gini-coefficient and the headcount ratio (\$3,20 a day) respectively.  $\delta$  and  $\gamma$  are short-run coefficients and the betas ( $\beta$ 's) represent long-run dynamic coefficient estimates.  $\varphi_i$  measures the speed of adjustment to the long-run equilibrium,  $\varphi_i = 0$  will indicate no evidence for a long-run relationship.  $\varepsilon$  is a time-varying disturbance and the subscripts  $i$  and  $t$  represent country and time correspondingly. The term in the square brackets contain the long-run growth regression.

Additionally, An ARDL representation of the remittance-poverty model (RPM), EQ (5) in the error correction form can also be formulated as;

The Remittances – Poverty model (RPM)

$$\Delta(Pov_i)_t = \sum_{j=1}^{p-1} \gamma_{ij} \Delta(Pov)_{t-j} + \sum_{j=0}^{q-1} \delta_j^i \Delta(X_i)_{t-j} + \varphi_i [\Delta(y_i)_{t-1} - \{\beta_{0,i} + \beta_{1,i}(P_i)_{t-1}\}] + \varepsilon_{it} \quad M(2)$$

The parameters  $\sum$ ,  $\delta$ ,  $\gamma$ ,  $\beta$ 's,  $\varphi_i$ ,  $i$  and  $t$  have the same interpretation as in model 1. Here  $Pov_i$  denotes the dependent variable (the rate of poverty measured by the poverty headcount ratio),  $X_i$  denotes the level of remittances (variable of interest) and  $P_i$  represent control variables (Human capital, Income inequality, and Unemployment rate). The inclusion of the control variables will increase estimation precision and help reduce possible omitted variable bias (Wooldridge, 2016).

#### 5.2.4 Model justification

The pooled mean group (PMG) regression technique is used to estimate the long-run and short-run relationship between remittances and economic growth and between remittances and the level of poverty. The PMG estimator allows the intercept, the error variances and the short-run coefficients to wander freely (heterogenous) across groups (countries) in the short-term, but in the long-term are constrained to be identical (homogenous) between groups. This notion of the framework thus argues that, the long-run equilibrium relationship between the variables are the same across countries (Pesaran et al,1999). The PMG estimator is based on the following assumptions. Firstly, the error terms are serially uncorrelated. Secondly, there is a long-term relationship between the dependent variable and the independent variables and finally, the long-term parameters are homogenous across countries (Lee et al, 2015).

The pooled mean group (PMG)-ARDL econometric strategy fits into our research framework because we assume that, there exist both short-and long-term relationship between international remittances and economic growth and poverty. The short-term relationship between remittances and the macroeconomic variables, economic growth and poverty varies across countries due to country differences in terms of economic and/or policy lags but in the long-run, we expect the impact of remittances to be the same across countries. This therefore justifies the use of the PMG-ARDL methodology in this paper. Using the PMG-ARDL technique will enable us to estimate both the short-and long-run relationships contemporaneously. The econometric estimation strategy also provides consistent coefficient estimates even in the presence of possible endogeneity and serial correlation problems because of the inclusion of both lagged dependent and independent variables (Pesaran et al, 1999).

6.0 ESTIMATIONS AND EMPIRICAL RESULTS

6.1.1 Result estimation: The remittance-economic growth model (RGM).

**CROSS-SECTIONAL DEPENDENCE**

Countries have become economically and financially integrated than never before and as a consequence, economic shocks in one country are not solely absorbed by the country but may have unintended repercussions on other countries as well. There is a significant probability for panel data to exhibit strong cross-sectional interdependencies, which may occur as a result of common shocks and unobserved components that become part of the stochastic error term (De Hoyos et.al, 2006). The presence of cross-sectional dependence in panel data distort estimation efficiencies if ignored, therefore testing for cross-sectional dependence is important in estimating panel models. The test choice for cross-sectional dependence depends on the ratio between the time series observations (T) and the cross-sectional units (N). Since our study includes 18 years’ time period (T) and 14 cross-sectional units (N), the Lagrange multiplier (LM)-test proposed by Breusch and Pagan (1980) is used.

**Table 6.1.1: Breusch and Pagan (1980) LM test for cross sectional dependence**

Test	Test Statistics	Probability
LM	579.477	0.000

*Source: Authors’ own computations. Note: The null hypothesis of the test is that there is cross-sectional dependence. Estimations are done using the (xttest2) routine in stata.*

Results from the LM-test strongly reject the null hypothesis of no significant cross-sectional dependence in the panel in favor of the alternative hypothesis because the probability value (0.000) is less than the one percent critical level of significance. There is therefore cross-sectional dependence among the cross-sectional units in the panel that needs to be addressed in the unit root test.

**STATIONARITY TEST**

The autoregressive distributed lag model requires non-stationary series in order to estimate long-term relationships. A series is said to be non-stationary if the mean, variance and covariance differ over time (Brooks, 2008). The restriction posed on variables by the ARDL framework is that, they are either integrated of order I(0) or I(1). Typically, many macroeconomic variables follow a unit root process and are hence dependent on their present and past values (Salahuddin et al, 2015). It is therefore essential to check the order of integration



of macroeconomic variables. Importantly, we need to ascertain that no variable is integrated of order I(2), this is because series integrated of order I(2) influence consistency negatively and may possibly lead to the estimation of spurious regressions (Asteriou and Monastiriotis, 2004). Having confirmed the incidence of cross-sectional dependence by the LM-test, an appropriate panel unit root test (Pesaran's CADF) that account for cross-sectional dependence was carried out.

**Table 6.1.2 Pesaran's Unit root test in the presence of cross-sectional dependence**

Variable	Level	First Difference	Conclude
<b>LGDP<sub>c</sub></b>	1.351	-3.581***	I(1)
<b>LPov</b>	2.651	-1.767**	I(1)
<b>LGini</b>	-0.701	-2.298**	I(1)
<b>LRem</b>	-2.027**	-4.933***	I(0)

*Source: Authors' own computations. Note: \*\*\*, \*\* is statistically different from zero at 1% and 5% significance level, respectively. Estimations are done using the (pescadf) routine in Stata. The  $Z[t - \bar{t}]$  test statistic is distributed  $N(0,1)$ , under the null hypothesis of non-stationarity.*

The results show that, the regression variables are either stationary at level form I(0) or stationary at first difference I(1). LRem is stationary at level whiles LGDP<sub>c</sub>, LGini and LPov are stationary at first difference. Although Johansen (1995) argues that long-term relationship among variables can only be established in the context of co-integration among variables of the same order, Pesaran and shin (1999) opposes this idea by arguing that it's possible to use panel ARDL framework to establish long-term relationship even in situations where the integration among the variables are different, i.e. irrespective of whether the variables are integrated of order I(1) or I(0).

## COINTEGRATION TEST

To be able to establish a long-term relationship, there has to be co-integration among the variables. We perform co-integration test, one of the assumptions of the PMG autoregressive distributed lag model is that the long-run relationship between the variables is constant across countries. The idea behind co-integration is that, due to non-stationarity two series may differ (heterogenous) in the short-run but are tied together (homogenous) in the long-run (Granger, 1981). We test for co-integration by deploying the Pedroni's test for co-integration under the

following hypothesis to ascertain the possibility of capturing the long-term relationship in our specified model;

**$H_0$ : no cointegration**

**$H_a$ : All panels are cointegrated**

The results from the Pedroni's cointegration test shows that, five out of the seven test statistics provide strong evidence that the variables in the panel are strongly cointegrated at the 5% level of significance. We reject the null hypothesis of no cointegration and consider the alternative hypothesis. There is evidence in favor of cointegration and therefore potential long-term relationship between remittances and economic growth.

**Table 6.1.3 Pedroni's Residual Cointegration Test**

<b>Alternative hypothesis: common AR coefficient (Within dimension)</b>		
	Statistic	P-value
<b>Panel v-Statistic</b>	-3.672***	0.000
<b>Panel rho-Statistic</b>	0.310	0.378
<b>Panel PP-Statistic</b>	-2.849**	0.002
<b>Panel ADF-Statistic</b>	-2.918**	0.002
<b>Alternative hypothesis: individual AR coefficient (Between dimension)</b>		
<b>Group rho-Statistic</b>	1.294	0.098
<b>Group PP-Statistic</b>	-4.774***	0.000
<b>Group ADF-Statistic</b>	-3.883***	0.000

*Source: Authors' own computations. Note: \*\*\*, \*\* is statistically different from zero at 1% and 5% significance level, respectively. Estimations are done using the (xtcointtest) routine in Stata. All test statistics are distributed  $N(0,1)$ , under the null hypothesis of no cointegration.*

## **OPTIMAL LAG SELECTION CRITERIA**

To estimate the Autoregressive distributed lag (p,q,q,q) econometric model, we need to determine the optimal lag length. Pesaran et al, (2001) argues that the Schwarz information criterion is to be preferred when dealing with panel ARDL approach. For this reason, the Schwarz information criterion was used to determine the optimal lag structure.

**Table 6.1.4 Optimal lag selection using Schwarz information criterion (BIC)**

Variable	Optimal Lag
<b>LGDP</b>	1
<b>LPov</b>	0
<b>LGini</b>	0
<b>LRem</b>	0

*Source: Authors' own computations*

We use the unrestricted model and the Schwarz information criterion (BIC), to determine the optimal choice of lags for each country and per variable. We then choose the most common lag for each variable to represent the lag of the model. The optimal lag selection is done to avoid serial correlation both in the stationary test and in the ARDL model. The results are summarized above in table 6.1.4.

### 6.1.2 Empirical Results - The Remittance-economic growth model (RGM)

**Table 6.1.5 Pooled mean group estimation**

Dependent Variable $\Delta$ GDP Variable	Coefficient	Standard Error	Z-statistic
<i>Long-run coefficient</i>			
Remittance	0.101***	0.034	2.980
Income inequality	1.420***	0.267	5.330
Poverty	-0.295***	0.074	-4.010
<i>Error correction coefficient (EC)</i>			
	-0.033**	0.016	-2.060
<i>Short-run Coefficient</i>			
$\Delta$ Remittance	-0.013	0.012	-1.020
$\Delta$ Income inequality	0.096	0.074	1.290
$\Delta$ Poverty	-0.070***	0.017	-4.020
<b>Intercept</b>	0.182**	0.072	2.530
<b>Observations</b>	224	224	224

*Source: Authors' own computations. Note: \*\*\*, \*\*, \* is statistically different from zero at 1% 5% and 10% significance level, respectively. Estimations are done using the (xtpmg) routine in Stata. The lag structure is ARDL (1,0,0,0) and is determined by the Schwarz information criterion (BIC).*

For the remittance-economic growth model, empirical results from the Pooled mean group (PMG)-ARDL (1,0,0,0) model showed a significant long-term positive relationship between international remittances and economic growth at the 1% level of significance. In the short-run, this relationship is however, reversed and insignificant. The error correction coefficient (EC) gives the level of co-integration among the countries in the panel. The EC in the short-run is approximately -0.03 suggesting that any deviations from the long-run equilibrium is adjusted

at the 3 percent adjustment speed. A significant error correction term (EC) showing a significant long-run co-integration also indicate that we can infer joint causality of the variables, i.e. all the variables (poverty, income inequality and remittances) jointly influence the dependent variable (economic growth) in the long-run.

The remittance-economic growth model shows a significant relationship between inflow of remittance and economic growth benefiting the recipient country economies. Linking this finding to the Poverty-Growth-Inequality (PGI) framework, we can assume that if remittances promote growth then it also has a significant indirect effect on poverty via the growth channel given income distribution. We also want to further ascertain whether the effect of migrants' remittances also has a direct relationship on the attainment of SDG1. This brings us to estimating model 2, The remittance-poverty model.

### 6.1.3 Empirical Results - The remittance-poverty model (RPM)

Using similar procedures as in the estimation of the first model, we arrive at the following: (see appendix for calculation procedures).

**Table 6.1.6 Pooled mean group estimation**

<b>Dependent Variable <math>\Delta</math> Poverty Variable</b>	<b>Coefficient</b>	<b>Standard Error</b>	<b>Z-Statistic</b>
<i>Long-run coefficient</i>			
Remittance	-0.136***	0.036	-3.760
Human Capital	-5.332***	0.461	-11.560
Income inequality	0.177	0.315	0.560
Unemployment	0.623***	0.086	7.220
<i>Error correction coefficient (EC)</i>	-0.324***	0.079	-4.110
<i>Short-run coefficient</i>			
$\Delta$ Remittance	0.059	0.077	0.770
$\Delta$ Human Capital	0.914	2.588	0.350
$\Delta$ Income inequality	0.464	0.354	1.310
$\Delta$ Unemployment	0.069	0.105	0.650
<b>Intercept</b>	-0.316***	0.083	-3.790
<b>Observations</b>	224	224	224

*Source: Authors' own computations. Note: \*\*\*, \*\*, \* is statistically different from zero at 1% 5% and 10% significance level, respectively. Estimations are done using the (xtpmg) routine in Stata. The lag structure is ARDL (1,1,0,1,0) and is determined by the Schwarz information criterion (BIC).*

The empirical results from the pooled mean group (PMG)-ARDL (1,1,0,1,0) panel regression model indicate a strong negative significant relationship between remittances and poverty in the long-run. The relationship in the short-run is reversed and insignificant. The short-run insignificant results are likely to be due to country differences in terms of economic and/or policy lags between remittances and the macroeconomic variable poverty. Additionally, the short-run insignificant result can be attributed to high income inequality levels in the selected countries given the interrelated relationship that exist between poverty, economic growth and income inequality (Bourguignon, 2014). The error correction term (EC) is highly significant at the 1% significance level. The EC in the short-run is approximately estimated to -0.32, this suggest the speed of convergence to long-run equilibrium to around 32 percent per year. Based on the empirical results from the panel pooled mean group (PMG)-ARDL econometric regression, we can verify that remittances indeed have a significant long-term effect on poverty mitigation and can play a fundamental role to help realize the first goal of the United Nations Sustainable Development Agenda (zero poverty) in emerging economies.

## **7.0 DISCUSSION AND CONCLUSION**

This research paper examines the direct and indirect empirical nexus between international remittances and poverty using the most recent panel data (2000-2017) for a number of selected developing countries. We employed modern panel data econometric techniques such as stationarity test, error correction mechanism and co-integration test within the ARDL framework, which has been found to yield robust estimates (Antwi et al, 2013). Major findings from the pooled mean group estimations confirmed our anticipated hypotheses. We found a significant positive long-run relationship between international remittances and economic growth which is in line with previous findings by Islam et al, (2018); Jamel (2015); Das (2011 & 2012) and Nyamongo et al, (2012) to mention a few. This verifies the hypothesis for the remittance-growth model (RGM), that there exists a significant indirect relationship between remittances and poverty levels through the growth channel as predicted by the Poverty-Growth-Inequality (PGI) framework. Furthermore, results showed a significant negative long-run relationship between international remittances and the percentage of the population living under \$3.20 a day in migrants' countries of origin. This finding also ratifies the initial hypothesis for the remittance-poverty model (RPM) and is in addition consistent with empirical findings from previous research studies by Chong et al, (2018); Adams et al, (2005); Pekovic (2017); Tajul et al, (2018) etc.

It is important to keep in mind that, the actual effect of international remittances on economic growth and poverty could be even larger than estimated in this paper since the research only utilized international remittances sent through official channels. i.e. we use official international remittances as a proxy for the total level of international remittances (both official and unofficial). This may cause potential attenuation bias due to measurement error because, in reality, a significant proportion of remittances goes through unofficial channels<sup>4</sup> which are not accounted for in this analysis (Plaza and Ratha, 2017; Irving et al, 2010; World Bank, 2011). The coefficient estimates of remittances are thus a scaled down version of the true effect of remittances on economic growth and the level of poverty. It can be stressed that the long-run coefficient estimates of remittances have the same sign as the true effect but smaller in absolute value. Due to the limitation posed by possible attenuation bias we can argue that our estimate of the effect of remittances on economic growth and poverty is biased towards zero. In addition, the fact that remittances constitute a share of gross domestic product and the human development index may imply that its effect on economic growth and poverty could be overestimated. There is however a likelihood that this limitation and the shortcomings posed by attenuation bias could conceivably cancel out each other, bringing us closer to the true effect of remittances on the level of poverty.

The countries whose data are included in the analysis are selected mainly based on data availability and hence causing potential selection bias. The sample used may therefore not be representative of the general population. This makes it difficult to generalize the findings to all developing countries. However, this limitation does not necessarily mean that the findings lack validity, the estimations are still unbiased and consistent, we may have overestimated or underestimated the true effect of remittances on poverty and also the inferential limitations makes it difficult to generalize the outcome of the research to the entire population.

Our choice of an autoregressive distributed lag econometric model with error correction for this research enables us to predict both the short-term and long-term impacts of remittances on

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<sup>4</sup> *Significant amount of international remittances goes through unofficial channels and hence not included in the official statistics. This trend can be explained by the prevalence of illegal migrants who lack legitimate documentation that will enable them to undertake monetary transactions and also due to high transaction costs (High remittance fee) in sending money to some poor countries. This means that only a small proportion of the money reaches the poor reducing the incentive to remit. Ratha Dilip (2014) “the hidden force in global economics-sending money home”.*

achieving SDG1. Of interest are the long-run coefficients, this is because we realize that the effect of remittances on poverty is likely to be observed in the long-run, a potential explanation to this is that, it takes time for policies to affect macroeconomic variables. Using a PMG-ARDL econometric model also has the advantage that, it doesn't restrict the variables to be integrated of the same order, allowing us to combine variables of different integrational level while at the same time obtaining feasible estimates.

Thus the findings from this empirical research demonstrate that remittances can play a beneficial role in the process of achieving the first goal of Sustainable Development of Agenda 2030. If the remittance is an important mechanism for economic growth and poverty mitigation then, from a policy standpoint it is advisable for every government to adopt policies that increase its flow. There is however a potential drawback to this, that is the problem caused by brain drain. It is inevitable to talk about remittances without addressing the issue posed by brain drain. Migration give rise to remittances and so higher remittances will indicate higher rate of migration. This does not only benefit developing countries positively in terms of higher remittances but also negatively when a significant proportion of the educated population escape the country taking with them knowledge, education and skills which are needed for the development of their origin countries.

What causes migration of educated labor and consequently brain drain? The nature of brain drain is complex, the emigration of skilled labor occurs for various reasons including social-, political-, religious-, environmental factors etc. The different determinants are often classified in the academic literature under two broadly identified factors i.e. pull- and push factors. Pull factors are defined as external stimulus present in the receiving countries, that attracts skilled labor. The push factors on the other hand are internal factors within the migrants' countries of origin that consciously or unconsciously forces the educated population to migrate abroad (Filler et al, 1996; Krugman Obstfeld, 1991).

As long as there exist discrepancies between developing and developed countries in terms of economic development, migration of skilled youthful labor will be inevitable. The question that remains therefore is that, if international migration gives rise to international remittances which in turn promote economic growth and development and at the same time, if international migration gives rise to brain drain and loss of skills, knowledge and competence needed for the development of developing countries then, one may wonder if the benefits of remittances are

sustainable for developing countries or does migration do more harm than good due to the occurrence of brain drain? i.e. if migrants had stayed in their respective countries of origin would they have contributed more to their domestic growth and development than their remittances? Would the counterfactual state of development in developing countries be somewhat different if international migration never existed? There are unfortunately no clear cut answers to these questions, and as previously stated since the current state of development between economies makes international migration inevitable we can only aim or encourage migrants to invest their skills, knowledge and some wealth earned abroad in their home countries to help improve the current state of underdevelopment in many poor countries. Given that the opportunity cost of migration i.e. brain drain is difficult to put into monetary terms, makes the effect of migration on economic growth and development in poor economies equivocal, i.e. It's difficult to establish whether subtracting the positive effect from the negative yield a positive outcome.

Since the net effect of migration is difficult to establish, developing countries can only strive to maximise the flow of international remittances to help augment insufficient domestic savings and investments as predicted by the Keynesian Harrod-Domar growth model. This can be done by adopting economic policies that provide the incentive for diaspora migrants to invest more in their home countries. The policies may involve ensuring good investment climate in the migrants' home economies (providing financial security and high return on investments), reducing transaction costs (e.g. cutting remittance fees) this will not only increase remittances as a whole but also the amount sent through official and legal channels (Ratha, 2007) and in addition, to ensure economic and political stability to potentially spur migrant's aspirations to relocate back to their origin countries etc. These policies will translate into high level of remittances and also help mitigate the negative effect of brain drain, enabling developing countries to achieve economic development.

Even though empirical findings from this research paper are consistent with previous studies, further research addressing the remittance-poverty nexus is still needed to broaden our understanding of the ultimate role of remittances in the growth and development process. Since almost all present research addressing the issue of poverty have either used a monetary-or a consumption based poverty measure which mainly captures poverty in economic terms, these type of poverty measures may lead to distortions in estimations since the subject of poverty goes beyond economic deprivation. In reality poverty is multidimensional and a highly complex



phenomenon. This calls for a multidimensional poverty measure, for example the newly developed multidimensional poverty index (MPI) to complement the conventional income-based poverty measures to help provide a more comprehensive image of the true state of poverty and help policymakers to decide on effective poverty extenuating policies. This is however, beyond the scope of this research because of data unavailability. We therefore leave it for further research to probe the remittances-poverty nexus exploiting a multidimensional poverty measure.

In conclusion, international remittances have a significant impact on economic growth and poverty levels in developing countries. Evidence from this current empirical paper supports the fact that international remittances can play a substantial role in helping countries achieve sustainable development, particularly remittances can help developing economies to realize the first goal of the United Nations Sustainable Development Agenda, namely eradication of extreme poverty globally.

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## APPENDIX

### Result estimations: The Remittance-Poverty Model (RPM).

#### A1: Pesaran's Unit root test in the presence of cross-sectional dependence

Variable	Level	First Difference	Conclude
LHDI	1.351	-3.581***	I(1)
LPov	2.651	-1.767**	I(1)
LGini	-0.701	-2.298**	I(1)
LRem	-2.027**	-4.933***	I(0)
LUnemp	-0.417	-4.533***	I(1)

Source: Authors' own computations. Note: \*\*\*, \*\* is statistically different from zero at 1% and 5% significance level, respectively. Estimations are done using the (*pescadf*) routine in Stata. The  $Z[t - \bar{t}]$  test statistic is distributed  $N(0,1)$ , under the null hypothesis of non-stationarity.

#### A2: Pedroni Residual Cointegration Test

Alternative hypothesis: common AR coefficient (Within dimension)		
	Statistic	P-value
Panel v-Statistic	-0.844	0.199
Panel rho-Statistic	0.823	0.205
Panel PP-Statistic	-2.603	0.005
Panel ADF-Statistic	-2.189	0.014
Alternative hypothesis: individual AR coefficient (Between dimension)		
Group rho-Statistic	2.133	0.016
Group PP-Statistic	-2.737	0.003
Group ADF-Statistic	-1.518	0.065

Source: Authors' own computations. Note: Estimations are done using the (*xtcointtest*) routine in Stata. All test statistics are distributed  $N(0,1)$ , under the null hypothesis of no cointegration.

**A3: Optimal lag selection using BIC**

Variable	Optimal Lag
LPov	1
LRem	1
LGini	0
LHDI	1
LUnem	0

*Source: Authors own calculations*

**A4: Countries**

Country	Income Level
Armenia	Upper middle income
Bolivia	Lower middle income
Colombia	Upper middle income
Costa Rica	Upper middle income
Dominican Republic	Upper middle income
Ecuador	Upper middle income
El Salvador	Lower middle income
Georgia	Lower middle income
Honduras	Lower middle income
Indonesia	Lower middle income
Kyrgyz Republic	Lower middle income
Panama	High income
Paraguay	Upper middle income
Peru	Upper middle income

*Source: Authors own tabulation. Note: countries are categorized into income groups based on the World Bank definition.*