

# MIGRANT WORKERS' REMITTANCES AND OUTPUT GROWTH IN SUB-SAHARAN AFRICAN COUNTRIES<sup>1</sup>

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## Abstract

Economic growth and development processes affect and are affected by migration of people. While migration of skilled workers could potentially hurt the sending economies due to outright deprivation of vital human resources, the migrant sending countries of Africa can also benefit economically from migration through the inflow of workers' remittances. This study sheds new light on this relationship by examining the economic growth outcomes of workers' remittance flows to some selected Sub-Saharan African countries. The hypothesized link between workers' remittances and output growth was specified in a linear dynamic panel data model and estimated using the system Generalized Method of Moments. The study found a negative and statistically insignificant link between remittances and output growth across the sampled countries over the study period. This result suggests that workers' remittances may not be relied upon for now to promote economic growth in the SSA region.

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**Keywords:** Economic growth, Workers' Remittances, Sub-Saharan Africa, Dynamic Panel Data Model, System Generalized Method of Moments

## 1. Introduction

Economic growth and development processes affect and are affected by migration of people. In traditional viewpoint, people migrate when they are both pushed by lack of opportunities at home and pulled by the hope of economic gains elsewhere. Thus, the hope that migration will help associate migrants more closely with available economic

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opportunities, employment and services elsewhere is a major incentive for migration. Arguably, migration is necessarily a part of a family strategy to raise income, obtain new funds for investment, and insure against risks. It is not surprising therefore that thousands of African workers with relevant skill endowments leave their home country yearly to pursue better economic prospects within or outside Africa. However, migration of skilled workers could potentially hurt the sending countries if not well managed by appropriate policies.

As populations in advanced countries continue to age, shortage of labour in sectors such as health care continue to attract relatively cheap but qualified Labour from these developing countries of Africa. Migration of skilled workers in this sense contributes to the economic growth of receiving countries by responding to real labour needs in receiving countries. In addition, migrant workers help fulfill unmet labour requirements in many lower-pay and low-skill jobs such as those associated with domestic and agricultural work in developed countries. Migrants also contribute to the scientific and technological development of host countries. These factors partly provide the necessary impetus for international migration flows to continue to increase and for the process of globalization and the interdependence of nations to continue to deepen.

While the positive aspects of migration can lead to economic gains for the receiving countries, it can also lead to “unintended consequences” in both the sending and receiving countries. Some of these consequences include an outright deprivation of vital human resources in sending countries, and by implication the adverse impact of migration of skilled workers on the brain drain phenomenon in sending countries. Such deprivation of vital human resources is rather very alarming given that the United Nations predicts that the net number of migrants from developing to developed countries will increase by 2.2 million people annually, from 191 million or 3 per cent of the world population in 2005 (United Nations, 2004). This problem is even further compounded when the long gestation period for training skilled workers is taken into account by the migrant sending countries of Africa.

The emigration of people with scarce skills, such as entrepreneurs, scientists, technicians and health professionals reduces both the stock of human capital and the overall labour productivity of developing countries. However, if these highly skilled migrants return, they bring with them experience, knowledge contacts and capital, which have a positive impact on development. Thus, gains and losses from migration depend on whether it is temporary or permanent (Rena, 2008). In essence, African countries stand to

benefit from migration through the African Diaspora<sup>2</sup> expertise, knowledge, technology, professional capacity building and a great potential for trade and investment links. The migrant sending countries of Africa can also benefit economically from migration through the inflow of workers' remittances. Given these possibilities, migration is increasingly being regarded as an important instrument for growth and development in Sub-Saharan Africa (SSA).

Remittances flow is directly to households and they are widely distributed in small amounts throughout the economy. This makes remittances capable of having a much broader effect on home country economies than either Foreign Direct Investment (FDI) or Official Development Assistance (ODA). Official data on remittances inflow to Sub-Saharan Africa reveal that, the flow of remittances to the region has been far more stable than official aid flows and foreign direct investment (FDI). Besides, remittances do not decline even in conditions of instability and poor governance. Hence, remittance flows represent one of the least volatile sources of foreign exchange earnings. They are also more evenly spread among developing countries than capital flows. Workers' remittances represent one of the largest private sources of external finance for developing countries; thus, remittances are the main transmitter of migration's development benefits to sending country economies.

Workers' remittances are inter-household transfer of money within or across national boundaries. According to Reinke and Patterson (2005), workers' remittances cover current transfers by migrants who are employed in new economies and are considered residents there. Workers' remittances flow has steadily increased since the mid 1980s. Officially recorded remittances were an estimated US\$206 billion in 2006, compared to US\$19.6 billion in 1985 (World Bank, 2006). Remittances have been the second most important source of external finance for developing countries, being twice the size of ODA and almost as large as FDI. World Bank (2009) reports that recorded remittances to developing countries in 2008 were estimated to have reached US\$305 billion. This is equivalent to nearly two percent of aggregate developing country GDP and well over half of estimated FDI inflows (US\$490 billion). The 2008 estimated remittances to developing countries are over twice as large as ODA of US\$119 billion received by developing countries.

The importance of remittances for some countries in the SSA region can be best illustrated by expressing them as a ratio to GDP, while in others the absolute total of per-capita value of remittances flows are more revealing. Remittance flows is widely believed to

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<sup>2</sup>The African Diaspora consists of peoples of African origin that are living outside the continent, irrespective of their citizenship and nationality.

be much more sustainable as a source of development finance to many countries around the world. Two major forces are expected to ensure the growth and sustenance of these flows: Globalization and the aging populations (Olayiwola et al, 2008 and Olayiwola, 2010). Globalization and the aging of developed economy populations will ensure that demand for migrant workers remains robust for years to come. Consequently, the volume of remittances will most likely continue to grow, since migrants will continue to support the elderly and other dependants in their countries of origin.

However, challenges remain in determining how best to channel the flow of remittances through formal financial institutions to promote economic growth and development in sending countries (Chami, Barajas, Cosimano, Fullenkamp, Gapen, and Montiel, 2008). Consequently, a common theme motivating much of the research on remittances is the better understanding of their role as promoter of economic growth and development and how remittance flows can be channeled into productive investments by appropriate policies. Black (2003) noted that despite the glaring evidence on the extent of the flow of remittances, gaps still remain in the understanding of how remittances are or can be used to promote growth and development, especially given that existing policy incentives are not generally considered as having been very effective in channeling remittances towards economic growth.

The study is considered important to SSA countries in several ways as follows: the SSA region is widely regarded least among remittances recipients in the world. A good knowledge of the growth and developmental role of remittances will help encourage appropriate regional and national policies that will further boost the inflow of this very important source of foreign exchange to the region. In other words, this study is intended to help policymakers in the various SSA countries to better understand the phenomenon of remittances flows to the region and how best to manipulate related policies to optimize these flows. This hopefully will help loosen the foreign exchange constraint that has so far weakened the capacity of most of these African economies to operate effectively in the international market.

Besides, the literature on remittances is replete with inadequacies regarding an appropriate measure of remittances. Many researchers make use of an aggregate measure of remittances and this at best exhibit characteristics that are different from those which they intend to study. According to Chami et al (2008), the category ‘workers’ remittances’ in the balance of payments best represents what economists have in mind when modeling remittances. The properties of this series differ significantly from those of ‘employee

compensation' and 'migrants' transfers', so combining these three items into a single measure of remittances, as is common practice in the literature, can lead to invalid conclusions about the properties of remittances and, in turn, suboptimal policy decisions. Again, effort is made in this study to correct this inadequacy by isolating data on workers' remittances from the aggregate measure commonly used in the remittances literature.

Altruism is regarded in the literature as a dominant motive for remitting. Altruistic behaviour has always been a dominant culture in Sub-Saharan Africa and this has a key role to play in explaining the role of workers' remittances in the economic growth processes. However, the inevitable question here is: Does altruism as a motive for remitting play a dominant role in explaining the remittance-growth nexus in SSA? In other words, is remittance flows to SSA growth promoting or growth depressing? This study empirically examines the above question and sheds additional insight on it by exploring the macroeconomic impact of workers' remittances on economic growth in some selected SSA countries. It does this within the extended neoclassical growth framework using a balanced panel data set spanning from 2000 to 2011 for thirty one SSA countries.

The remainder of the paper is divided into sections as follows: section two comprises of the literature review while section three is concerned with data and methodology and it comprises of the empirical model, definition of variables, data sources, and model estimation technique. Section four deals with empirical results and discussions and this section also includes policy implications of findings. Section five is the last section and it provides some general concluding remarks.

## **2. Literature Review**

Remittances are defined by the World Bank (2007) as "the sum of workers' remittances, compensation of employees, and migrant transfers". The main sources of official data on migrants' remittances are the annual balance of payments records of countries, which are compiled in the Balance of Payments Statistics Yearbook published by the International Monetary Fund (IMF). It is therefore most logical to examine the definition of remittances as provided by the IMF. The IMF Balance of Payments Manual 5 (BMP5) does not define workers or migrants. Workers' remittance is defined in the IMF Balance of Payments Yearbooks as consisting of, "goods or financial instruments transferred by migrants living and working in new economies to residents of the economies in which the migrants formerly resided". It further states that workers' remittances are "transfers made by migrants who are employed by entities of economies in which the workers are considered residents" and such

transfers are usually money sent to country of origin by workers residing abroad for more than one year. Transfers of self-employed migrants “are not classified as workers’ remittances but as current transfers”. This distinction is necessary since “workers’ remittances, according to the balance of payments convention, arise from labor and not from entrepreneurial income”.

Remittances may also be viewed as transfers of money, goods and diverse traits by migrants or migrant groups back to their countries of origin or citizenship. The notion of remittances often conjures only monetary aspect; however, remittances embrace monetary and non-monetary flows, including social remittances. Social remittances are defined as ideas, practices, mind-sets, world views, values and attitudes, norms of behaviour and social capital (knowledge, experience and expertise) that the diasporas mediate and either consciously or unconsciously transfer from host to home communities (North-South Centre of the Council of Europe, 2006 cited in Ochoa, 2008).

Approaches to the theory of remittances identified and described various costs and benefits to remitting and these are well summarized and documented in Russell (1986). Stark and Bloom (1985) identify the family as the appropriate unit of analysis in migration and remittance questions. This is because the entire family is involved in sharing and trading-off the costs and benefits of remitting. The recent theoretical literature on the role of remittances has therefore focused on the possible roles that the family or family relationships can play in shaping remittance choices. While Johnson and Whitelaw (1974) mention altruistic motivations for remittances, Lucas and Stark (1985: 902) state that "certainly the most obvious motive for remitting is pure altruism- that is, the care of a migrant for those left behind. Indeed, this appears to be the single notion underlying much of the remittance literature." The question of whether remittances promote economic growth however, remains an inconclusive question within the theoretical and empirical literature. Unarguably, remittances lead to an increase in the level of income in the recipient country and plausibly help reduce poverty (Gupta et al., 2007), but it is not at all obvious that remittances increase output and promote long-term economic growth.

According to Buch et al (2002), remittances can influence economic growth directly or indirectly. However, the degree of the latter channel strongly depends on supporting governmental policies and a supporting economic environment for investment activities. At the household level, remittances may ease credit constraint of households and encourage entrepreneurial activity and private investment (Yang, 2004; Woodruff and Zenteno, 2004). Many households in developing countries have very limited access to credit markets.

Remittance inflows could help such households to set up their entrepreneurial activity. Apart from physical investment, remittances could also be used to finance education and health, which are also key variables in promoting economic growth. At the aggregate level, remittances could improve a country's creditworthiness and thereby enhance its access to international capital markets. World Bank (2006) clarified that the calculation of country credit ratings by major international creditors depends in part on the volume of remittance flows. The higher the volume of remittance flows, the better the credit rating rank the country could reach. Unarguably, access to more international credit potentially could increase both physical and human capital investment in a country, thereby enhancing economic growth.

Findings from the empirical literature on the remittance – growth nexus are in fact mixed. Chami et al. (2005) suggest that workers' remittances are compensatory transfers, that are likely to smooth household consumption, but that could depress production in the home country. Singh, Haacker and Lee (2009) found an overall effect of remittance on growth that is negative and significant. This result is consistent with the finding of Chami, Fullenkamp, and Jahjah (2003) who regressed per capita real growth on investment, change in remittances, and net private capital inflows as well as regional dummy variables and obtained positive coefficients for both investment and net private capital inflows, but found the coefficient of remittances to be negative. They therefore suggested that remittances are unlikely to promote economic growth because of a moral hazard problem (i.e., reduced labour market participation), as well as other factors.

Chami et al (2005) report a negative effect of remittances on growth and productivity using cross-country panel data. Their argument here is that migration deprives the economy of the most productive workers, or that remittances have adverse effects on those staying behind, or both. Chami et al. (2009) found evidence supporting the notion that remittance flows provide a stabilizing influence on output. If remittances are predominantly consumed rather than invested, any growth effects through higher investment could be subdued. But they further observed that even in this case, remittances could still foster investment by reducing the volatility of consumption and contributing to a more stable macroeconomic environment.

On the contrary, some empirical studies obtained findings in support of a positive link between workers' remittances and economic growth. They also identified a number of channels through which Workers' remittances can positively affect growth. Stahl and Arnold (1986) argued that the use of remittances for consumption may actually have a positive effect

on growth because of their possible multiplier effect. Ziesemer (2007) proposes a savings channel that relates remittances with growth. He finds that remittances have a positive impact on growth, due to the ability to increase saving rates in countries with a per capita income of less than US \$1200. Woodruff and Zenteno, (2004) identified a number of channels through which remittances could raise economic growth and these include: when an increase in remittances raises investment, remittances could be expected to affect growth positively. If this effect is large enough, then remittances could alleviate the credit constraints faced by most people in developing countries.

Giuliano and Ruiz-Arranz (2005) provide evidence of the positive effects of remittances on the growth of less developed countries. In a cross sectional study of 37 African countries, Fayissa and Nsiah (2008) explored the aggregate impact of remittances on economic growth and found that remittances boost growth in countries where the financial systems are less developed by providing an alternative way to finance investment and helping overcome liquidity constraints. Similarly, Fayissa and Nsiah (2010) found that remittances have a positive and significant effect on the growth of Latin American Countries where the financial systems are less developed by providing an alternative way to finance investment and helping overcome liquidity constraints. It is very clear from the literature that while most of the empirical works have focused on migrant-exporting countries with rather similar characteristics; the debate about the impact of remittances on economic growth is still ongoing.

### **3. Data and Methodology**

This study attempts to address the issue of finance-growth channels by following an extended neo-classical growth model proposed by Mankiw, Romer and Weil (1992). It introduces remittances into the model and then, empirically tests the impacts of remittance flows on economic growth and development using a dynamic panel data model. Specifically, this study evaluates whether remittance flow is a significant determinant of output growth when it is integrated into the neo-classical growth model.

The study assumes that remittances motivated essentially by altruism on the part of the sender will tend to be countercyclical in its effects on the receiving economy. In periods of economic boom, less remittances is likely to be received and in periods of economic downturn more remittances will be received to compensate loved ones of loss in income and general wellbeing. This argument is further supported with the assumption that the sending economy is stable. Within this context, remittances flow is likely to smoothen consumption

expenditure of recipient households at all times, increase per capita income and boost aggregate output in the receiving economy. Overall, the occurrence of remittance receipts motivated by altruism may positively impact on economic growth as well as the economic development of the receiving economy.

### 3.1 The Empirical Model

Many economic relationships are dynamic in nature. This fact is an essential underlying motivation for the specification of the empirical model in this study. In addition, panel data models have the advantage that they allow the researcher to better understand the dynamics of adjustment within most economic relationships. The assumption of altruistically motivated remittances is therefore captured within a system of equations characterized by two endogenous variables in two equations as follows:

$$GDPGR = f(A, L, K, WR, PCI) \quad (1)$$

$$PCI = f(GDPGR_{t-1}, INTR, INF) \quad (2)$$

The structural forms of equations (1 and 2) are rewritten in their linear forms as shown below.

$$GDPGR_{it} = \delta_{11i} + \delta_{12i}LL_{it} + \delta_{13i}LK_{it} + \delta_{14i}WR_{it} + \delta_{15i}PCI_{it} + \varepsilon_{1it} \quad (3)$$

$$PCI_{it} = \delta_{21i} + \delta_{22i}GDPGR_{i,t-1} + \delta_{23i}INTR_{it} + \delta_{24i}INF_{it} + \varepsilon_{2it} \quad (4)$$

$$i = 1, 2, \dots, 31 \text{ (countries)}; t = 1, 2, \dots, 12 \text{ (years)}$$

These variables are expected on *a priori* grounds to be signed as follows:

$$\delta_{11}, \delta_{12}, \delta_{13}, \delta_{14}, \delta_{15}, \delta_{21}, \delta_{22} > 0 \text{ and } \delta_{23}, \delta_{24} < 0$$

Without any loss of generality, equations (3) and (4) may now be transformed<sup>3</sup> by simple substitution, into a single linear dynamic panel data model to obtain the following:

$$GDPGR_{it} = \pi_1 GDPGR_{i,t-1} + \pi_2' X_{it} + \pi_3' W_{it} + v_i + e_{it} \quad (5)$$

<sup>3</sup> Details of the mathematical transformation is not reported here but can be made available on request

$X_{it}$  is a vector of strictly exogenous covariates (ones dependent on neither current nor past  $e_{it}$ ); such that:

$$X'_{it} = (LK, LL, INTR, INF)'$$

All variables in  $X_{it}$  are defined as follows:

$LL = \text{the logarithm of total labour force};$

$LK = \text{the logarithm of capital stock};$

$INF = \text{inflation rate};$

$INTR = \text{interest rate charged by banks on loans}$

Variable in  $W_{it}$  on the other hand is defined as follows:

$WR = \text{workers' remittances}$

The predetermined covariate includes:

$GDPGR_{t-1} = \text{first period lag of the dependent variable GDPGR}$

$v_i + e_{it}$  is the usual error component decomposition of the error term;

$v_i$  are unobserved individual-specific effects;

$e_{it}$  are the observation-specific (idiosyncratic) errors;

$\pi_i$  are vectors of parameters to be estimated.

The individual-specific effects,  $v_i$  are assumed to be uncorrelated across individuals,

$\{E(v_i, v_j) = 0; \forall i \neq j\}$  and with the disturbance of any individual at all leads and lags

$\{E(v_i, e_j) = 0; \forall i, j\}$ , but may be correlated with the explanatory variables

$\{E(X_{it} v_j) = \text{unknown}, \forall i, t\}$ . The mean of  $v_i$  is zero  $\{E(v_i) = 0, \forall i\}$  and its variance

$(\sigma_{vi}^2)$  may differ across individuals. The observation-specific disturbance has mean zero

$\{E(e_{it}) = 0, \forall i, t\}$  and is uncorrelated across individuals and  $\{E(e_{it} e_{js}) = 0 \forall i \neq j, t \neq s\}$ .

In general, its variance  $(\sigma_{eit}^2)$  may differ across both individuals and periods. The initial

observation  $YGR_{i0}$  is uncorrelated with the disturbance of any individual for all periods

$\{E(YGR_{i0} e_{jt}) = 0 \forall i, j, t\}$  but may be correlated with the individual

effects  $\{E(YGR_{i0} v_j) = \text{unknown} \forall i, j\}$ .

In order to get a consistent estimate of  $\delta$  as  $N \rightarrow \infty$  with  $T$  fixed, equation (3) may be rewritten in first differenced notations. This also eliminates the individual effects as follows:

$$D.GDPGR_{it} = \delta_1 D.GDPGR_{i,t-1} + \delta_2 D.X_{it} + \delta_3 D.W_{it} + D.e_{it} \quad (6)$$

The unobserved individual-level effects,  $v_i$  has now disappeared from the differenced equation (6) because it does not vary over time. The  $D$ s are the first difference operators. This transformation has effectively removed the fixed effect elements from the model.

### 3.2 Definition of Variables and Data Sources

Data for all variables in this study were sourced from either the World Bank, Africa development indicators online and or the International Monetary Fund, World Economic Outlook Database ( April, 2012). The study employs data on the variables listed above and covering a period of twelve years (2000-2011). The choice of this period is explained by the availability of data across the selected countries as well as the fact of a dramatic rise in recorded remittance flows to the region over this period. The definition of variables employed in the study and data sources are presented in the Table 1.

**Table 1:Definition of Variables**

Variable	Definition
Real Gross domestic product (GDP)	The broadest quantitative measure of a nation's total economic activity. It measures, in constant (2000 US dollars) prices, the value of economic activity within a country's geographic borders, including all final goods and services produced over a period of time (usually a year).
Growth rate of real GDP (GDPGR)	This is the annual percentage change in the value of the real GDP.
Labour Force (L)	Total labour force, also called the economically active population, "comprises all persons of either sex who furnish the supply of labour for the production of economic goods and services." Labour force includes people ages 15 and older who meet the International Labour Organization (ILO) definition of the economically active population.
Stock of physical capital input (K)	Stock of physical capital input per worker. The proxy for this variable is the gross fixed capital formation
Workers' remittances(WR)	Workers' remittances received comprise of current transfers by migrant workers. It is measured as a ratio of GDP

Inflation rate (INF)	This is the annual percentage change in consumer price index (CPI)
Interest Rate (INTR)	Prime lending rate charged by commercial banks on loans to private sector.

The study is limited to the thirty one SSA countries that reported inward remittances receipts for the period- 2000 and 2011. These countries are: *Benin, Botswana, Burkina Faso, Cameroon, Cape Verde, Congo, Côte d'Ivoire, Djibouti, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, Sierra Leone, South Africa, Swaziland, Tanzania, Togo.* Remittance flows will be restricted to inter-household unilateral and unrequited transfer of cash earnings, meaning that such transfer is void of any form of *quid pro quo* terms, across national boundaries only. The implication is that remittances in forms of material transfers by migrant workers to their home countries, compensation of employees, or unrequited inter-household cash transfers within each economy under investigation, are not covered in this study.

### 3.3 Model Estimation Technique

There are two major and important complications arising from efforts to estimate the dynamic panel data regression model referred to in equation (5) using macroeconomic panel data: first, the presence of endogenous and/or predetermined covariates, and second, the small time-series and cross-sectional dimensions of the typical panel data set. The dynamic panel data regression model is in fact further characterized by some sources of persistence over time. There is the problem of autocorrelation which is due to the presence of a lagged dependent variable among the regressors and the other is the problem of heteroskedasticity.

Working within the context of remittance flows, current country remittance realizations will affect future economic performance and this may, in turn, affect future country remittance realizations. Thus, giving rise to what may be termed as “dynamic endogeneity”. The argument here centers on the fact that cross-sectional variation in observed country economic structures is driven by both unobservable heterogeneity and the country’s history. As such, any attempt to explain the role of remittance flows or its effect on economic performances of selected countries that does not recognize these sources of endogeneity may be biased.

The problem of endogeneity that is often associated with the use of panel data analysis are however resolved in this study by the choice of the System GMM Estimator to estimate

the relation between remittance flows and output growth. This methodology not only eliminates any bias that may arise from ignoring dynamic endogeneity, but also provides theoretically based and powerful instruments that accounts for simultaneity while eliminating any unobservable heterogeneity. Dynamic panel data estimation is most useful in situations where some unobservable factor affects both the dependent variable and the explanatory variables, and some explanatory variables are strongly related to past values of the dependent variable. This is likely to be the case in regressions of remittance flows on output growth.

In the presence of heteroskedasticity and serial correlation, the two-step System–GMM uses a consistent estimate of the weighting matrix, taking the residuals from the one-step estimate (Davidson and MacKinnon, 2004). Though asymptotically more efficient, the two-step GMM presents estimates of the standard errors that tend to be severely downward biased. However, it is possible to solve this problem using the finite-sample correction to the two-step covariance matrix derived by Windmeijer (2005), which can make two-step robust GMM estimates more efficient than one-step robust ones, especially for System–GMM (Roodman, 2009).

As emphasized by Bun and Windmeijer (2009), the good performance of the system GMM estimator relative to the difference GMM estimator in terms of finite sample bias and root mean square error, has made it the estimator of choice in many applied panel data settings. In multivariate dynamic panel models, the System–GMM estimator is also known to perform better than the Differenced–GMM when series are persistent and there is a dramatic reduction in the finite sample bias due to the exploitation of additional moment conditions (Blundell, Bond and Windmeijer, 2000).

Bond, Hoeffler and Temple (2001) provide a useful insight in the GMM estimation of dynamic panel data models, arguing that the pooled OLS and the LSDV estimators should be considered respectively as the upper and lower bound. As a result, whether the Differenced–GMM coefficient is close to or lower than the within group one; this is likely a sign that the estimates are biased downward (maybe because of a weak instrument problem). Thus, if this is the case, the use of System–GMM is highly recommended and its estimates should lie between OLS and LSDV.

In view of the obvious strengths of the Blundell and Bond (1998), extended version of the GMM estimator, (also known as *system* GMM estimator) in overcoming complications that may arise from efforts to estimate the usual linear dynamic panel data models, this estimator was considered appropriate and applied to estimate the specified model for this study.

#### 4. Empirical Results and Discussions

Summary of the dynamic panel data model estimation results for equation (5) are presented in Table 2. The system GMM estimator is categorized into the one-step and two-step options, these are reported in columns 2 and 3 respectively. The pooled ordinary least square (OLS) and the least square dummy variable (LSDV) results are reported in columns 1 and 4 respectively. Apart from providing some additional robustness check, the results in columns 1 and 4 will also provide a guide based on the position of Bond, Hoeffler and Temple (2001) that suggests the pooled OLS and the LSDV estimators should be considered respectively as the upper and lower bound for the system GMM coefficients. With this guide in place, it will be easy to tell when each coefficient estimate is either downward or upward biased.

All estimations are robust to heteroskedasticity or autocorrelation. This is irrespective of the option under which the estimates are considered. The related predetermined and endogenous variables on the right hand side of this specification include the lagged YGR and WR respectively. To control for endogeneity of these variables that appear as regressors, internal instruments are utilized; and these include the lagged levels of the standard differenced equation (equation 6) and lagged differences of the levels equation (equation 5). Correlation coefficients<sup>4</sup> between residuals from the base regression and independent variables were computed as an additional check of potential endogeneity problems. An investigation of these coefficients of correlations suggests that none of the independent variables is highly correlated with predicted residuals.

Table 2: Estimated Empirical Results

Dependent Variable: GDPGR				
	Pooled OLS	SYSTEM-GMM		LSDV
		One-Step	Two-Step	
Instrument		collapsed	collapsed	
Weight				
Regressors	(1)	(2)	(3)	(4)
GDPGR(-1)	0.279***	-0.266	-0.112	0.054
	(0.142)	(0.642)	(0.305)	(0.082)

<sup>4</sup> Details of these results are not reported here but can be made available on request

Log(labour)	0.496*	0.771***	0.867**	-7.319
	(0.180)	(0.436)	(0.325)	(10.812)
Log(capital)	0.136	-0.108	0.112	-0.089
	(0.395)	(0.892)	(0.467)	(0.356)
INTR	-0.049	-0.044	0.028	-0.128***
	(0.053)	(0.078)	(0.055)	(0.073)
INF	-0.028	-0.082	-0.102***	-0.104**
	(0.064)	(0.092)	(0.058)	(0.048)
WR	-1.54e-09**	-2.01e-09***	-1.91e-09	1.53e-09
	(7.01e-10)	(9.89e-10)	(8.8e-10)	(1,74e-09)
Constant	-2.981	-2.323	-3.098	= =
	(3.351)	(6.929)	(6.50)	
Time Dummy	No	Yes	Yes	Yes
Country Dummy	No	No	No	Yes
No. of Instruments	-	18	18	-
F-stat (Wald $\chi^2$ )	4.64	11.99	13.83	-
F-stat (p-value)	[0.0002]	[0.000]	[0.000]	-
AR(2)	-	[0.470]	[0.472]	-
AR(3)	-	[0.351]	[0.335]	-
Sargan Test (OIR)	-	[0.834]	[0.834]	-
Hansen Test (OIR)	-	[0.754]	[0.754]	-

*Notes:* Robust standard errors, consistent in the presence of any pattern of heteroskedasticity and autocorrelation within panels are reported in curly brackets.

Robust standard errors are with Windmeijer (2005) finite-sample correction for the two-step covariance matrix

P-values are reported in square brackets

\* indicates significant at 1 percent level

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\*\* indicates significant at 5 percent level

\*\*\* indicates significant at 10 percent level

An examination of results in Table 2 begins with some specification or diagnostic tests. As a starting point, the system GMM estimators assume that the idiosyncratic errors  $v_{it}$  are serially uncorrelated for consistent estimations. The presence of autocorrelation will indicate that lags of the dependent variable (and any other variables used as instruments that are not strictly exogenous), are in fact endogenous, thus bad instruments. Arellano and Bond develop a test for this phenomenon that would potentially render some lags invalid as instruments. Of course, the full disturbance  $\varepsilon_{it}$  is presumed autocorrelated because it contains fixed effects, and the estimators are designed to eliminate this source of trouble.

The Arellano-Bond test for autocorrelation is applied to the differenced residuals in order to purge the unobserved and perfectly autocorrelated idiosyncratic errors. These results are reported as AR(2) and AR(3) in the lower portion of table 2. The null hypothesis here that  $cov(\Delta v_{it}, \Delta v_{i,t-k}) = 0$  for  $k = 1, 2$  and  $3$  is rejected at a level of  $0.05$  if  $p < 0.05$ . If  $v_{it}$  are serially uncorrelated, then the null of no serial correlation will be rejected at order 1 but not at higher orders. This indeed is the case with results in columns 2 and 3. Here, it can be concluded that there is no evidence of serial correlation at the five percent level of significance. Given these results, the estimates can be regarded as consistent.

The next specification test is a test of over-identifying restrictions of whether the instruments, as a group, appear exogenous. This test of instrument validity has to do with a comparison of the number of instruments used in each case and the related number of parameters. It is implemented by the Sargan and Hansen J tests. For one-step, non-robust estimation, the Sargan statistic which is the minimized value of the one-step GMM criterion function, is applicable. The Sargan statistic in this case is however not robust to autocorrelation. So for one-step, robust estimation (and for all two-step estimation), the *xtabond2* (STATA command) also reports the Hansen J statistic, which is the minimized value of the two-step GMM criterion function, and is robust to autocorrelation. In addition, *xtabond2* still reports the Sargan statistic in these cases because the Hansen J test has its own problem: it can be greatly weakened by instrument proliferation. Only the respective *p-values* are reported for this test results in the lower part of table 2. Here, the null hypothesis that the population moment condition is valid is not rejected if  $p > 0.05$ . The summary statistics in columns 2 and 3 indicate that the one-step and two-step system GMM dynamic panel models

of the selected 31 SSA countries have 18 instruments and 17 parameters each. This represents a total of 1 over-identifying restrictions in each case. In both specifications, the Hansen–J statistic does not reject the Over-Identifying Restrictions (OIR), thus confirming that the instrument set can be considered valid.

The F-statistic is the small-sample counterpart of the Wald (Chi Squared) statistic and it is a measure of the overall significance of the estimated models and the values here in each of the specifications are considerably satisfactory with level of significance being one percent in each case. This of course is indicative that all the exogenous variables jointly explained significantly, the economic growth process across the sampled SSA countries over the study period.

Although the results on the control variables are broadly satisfactory, it is not all the coefficient estimates that are consistent with theoretical expectations. The Blundell–Bond (system-GMM) robust estimates (in specifications 2 and 3) indicate that growth dynamics are wrongly signed but statistically insignificant across the sampled SSA countries. In other words, past realizations of economic growth do not really produce some significant contemporaneous impact on economic growth.

Size of labour force produced some very meaningful and interesting results in the Blundell–Bond robust estimates. One striking observation here is that labour input produced a contemporaneous positive impact on economic growth across the sampled countries over the study period. This variable is also statistically significant at the five percent level in the two–step system GMM option. In more definitive terms, a one hundred percent increase in size of labour force under the two–step system GMM estimates, explains about 86.7 percent of the increase in economic growth across the study group. This result is not surprising since labour supply is in relative abundance in most of the SSA countries. It is therefore expected that the average production function in these economies will be characterized by enormous labour intensity. The transmission mechanism here is such that additional labour input in any of the selected SSA countries will directly impact on output growth. However, this argument will only hold as long as these economies operate within the positive region of the production function (that is before diminishing returns set in). The implication of this result for theory is that economic growth inducing role of labour input is mostly applicable in the selected SSA economies.

Surprisingly, capital input is positively signed and statistically insignificant even at the ten percent level when the two-step system GMM with collapsed instrument option is considered. Capital input in this sense turns out not to be a major consideration in driving

economic growth in the sampled SSA economies. This fact may not be unconnected with the relative dominance of the labour intensive sectors in most SSA economies. The lending rate variable is unexpectedly positively signed but statistically insignificant. Inflation rate variable has a negative sign and is statistically significant at the ten percent level. This variable under the two-step system GMM with collapsed instrument option specifications produced a contemporaneous negative impact on economic growth across the sampled countries over the study period. As can be seen, a 100 percent increase in inflation rate explains about 102 percent reduction in economic growth in the selected SSA economies. A negatively signed coefficient for inflation rate is of course not unexpected as can be explained by the following transmission mechanism.

Finally, the workers' remittances variable has an insignificant contemporaneous negative impact on economic growth across the sampled countries over the study period. What this finding suggests is that a significant proportion of remittances inflow to SSA is directed (intentionally or otherwise) at some economically unproductive uses. This result is in agreement with findings in Chami et al (2005).

#### **4.1 Policy Implications of Findings**

A number of policy issues naturally arise from the empirical findings in this study. First, the positive role of labour in the economic growth process is highlighted in the results. The relative abundance of labour supply in most SSA economies can be taken advantage of as a viable demographic dividend or surplus to accelerate the process of economic growth in these countries. Relevant authorities can in this wise embark on policy measures that tackles the recurring low economic growth problem in SSA through sustained investment in human capital. This will hopefully harness the abundant labour resource and boost the human capital base of these economies. This policy option will consequently raise the productivity of labour in these economies. Overall, this will help address the concern for non-inclusive growth (by increasing local content of employee within the industry in SSA) and also drive a sustained economic growth agenda for SSA countries.

Workers' remittances flow to SSA is found to negatively impact on economic growth in the selected SSA countries over the study period suggesting that most remittance receipts are not channeled into productive uses. Policy measures must therefore be put in place to enhance tracking of these flows and to encourage its channeling into more economically productive uses. A policy that enables the banking system to use current and future remittances flow as security in extending credit facilities to potentially enterprising

remittance recipients will encourage channeling of remittances into more economically productive uses. In the alternative, SSA monetary authorities should design a policy that guarantees loan facility to every regular remittance recipient who indicates interest to use such credit for investment purposes only. Such recipients must of course demonstrate convincing and viable business ideas to the participating banks (in the credit guarantee scheme) and the stream of flows to the beneficiary must have been regular and stable over a specified minimum period of time.

## **5. Conclusion**

The question of whether workers' remittances constitute at the aggregate level, a significant determinant of economic growth in the selected developing countries within the Sub-Saharan African region has been extensively explored in this study. The application of the system GMM estimators to the dynamic panel data model in investigating the research problem has proved quite intuitive and immensely suitable. The empirical study sheds new light on the growth-remittances nexus that are useful in the design of macroeconomic policies in the SSA region and also provide the basis on which the policies can be evaluated. The results of this study clearly highlight the role of workers' remittances in the growth of the economies of the selected SSA countries and the policy options available to the governments of these countries. The study clearly reveals that workers' remittances may not be relied upon for now to promote economic growth in the SSA region.

The sustenance of workers' remittances inflows and the productive use of all such flows to SSA region, demand a central role for governments and monetary authorities in terms of the provision of relevant policy direction. Every related policy measure therefore should be targeted towards the reorientation of senders and recipients of remittances so as to ensure that these flows are regularly engaged productively. Moreover, it will not be out of place if policy incentives are given a sectoral focus such that remittances are used productively in sectors that are of greatest interest to the recipients. This will hopefully allow for a stable and sustainable economic growth and development in the SSA region.

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