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Reneé van Eyden

University of Pretoria

Emmanuel Owusu-Sekyere

University of Pretoria

Francis Kemegue

University of Pretoria

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Department of Economics
University of Pretoria
0002, Pretoria
South Africa
Tel: +27 12 420 2413

Remittance Inflows to Sub-Saharan Africa. The Case of SADC.

Reneé van Eyden, Emmanuel Owusu-Sekyere & Francis Kemegue¹

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Abstract

This paper investigates the factors that drive or constrain remittances from South Africa to the countries in the Southern African Development Cooperation (SADC) region. Using annual data for 10 SADC countries from 1994 to 2008, System GMM by Arellano and Bover (1995) and seemingly unrelated regressions by Zellner (1962), we find that when cross-sectional dependence and individual effects are controlled for, the quality of financial service delivery, investment opportunities in the home country and migrant expectations of home country exchange rates are the main drivers of remittance inflows to the SADC countries in the panel. However country-specific differences exist.

Keywords: migration, remittances, Southern Africa Development Cooperation.

JEL Classification: F22, F24, O55

1. Introduction

Remittance inflows into Sub-Saharan Africa are not only from developed countries. It is estimated that about 20% of Sub-Saharan African migrants are within the region and also remit regularly (Barajas et al. 2010). As at end 2006, 33% of remittance inflows

¹ The authors are respectively Associate Professor, PhD Candidate/Assistant Lecturer and Senior Lecturer (PhD), at the Faculty of Economics and Management Sciences, University of Pretoria. South Africa. Corresponding Author, email: emmanuel.sekyere@up.ac.za

within Sub-Saharan Africa were from South Africa, 18% from Cote D'Ivoire, 11% from Uganda, 7% from Angola, 4% from Botswana and 27% from other sources in the region (Migration Policy Institute, 2006). It needs to be mentioned though that migration patterns within Sub-Saharan Africa are equally driven by political factors and economic factors. The Southern African Region has had its share of political conflict from the prolonged rebel wars in Angola and Mozambique, pre-apartheid South Africa and political instability in Zimbabwe. These conflicts had spillover effects within the region as people were forced to relocate to neighbouring countries, sometimes settling permanently. Currently, most countries in the sub-region are relatively stable making migration for economic reasons more prevalent than for political reasons. This consists of skilled and unskilled labourers that work, consume, save and invest in both host and home countries² as well as send money home to support the basic needs of their families.

Migrants have been found to remit for different reasons. Migrants remit home to help the family meet basic needs and wants - referred to as altruism (Chami et al. 2005). Migrants also remit home as a socio-cultural duty that further enhances their standing for inheritance purposes, referred to as "enlightened self interest" by Lucas and Stark (1985). Migrants have also been known to travel solely for the purpose of raising capital for a business venture, to acquire physical assets such as land, housing or for investment into some interest bearing asset. These profit seeking remittances are said to be for self-interest purposes (Docquier et al. 2006). In this regard temporary migrants have been known to be more oriented towards self interest motives while permanent migrants are more geared towards altruistic remittances (Glystos, 1997; Pinger, 2007). Proximity of the SADC countries to South Africa also fosters a great deal of temporary migration. Consequently, it is expected that self-interest remittances would dominate altruistic remittances in the SADC region.

The degree of economic integration between countries has also been found to influence remittance patterns. When countries are highly integrated economically, they

² Home country is the migrant's country of origin and the host country is his country of sojourn.

sometimes replicate each other's business cycle trends. Consequently, an improvement in one country's economic conditions translates to some extent into an improvement in the other country's economic conditions. Migrants have generally been found to remit more money home when their incomes increase as a result of an improvement in the economic conditions of the host country (Elbadawi and Rocha, 1992; El-Sakka and McNabb, 1999). However with a high degree of integration between the migrant's host and home countries the improvement in the migrant's income might not necessarily translate into increased remittances sent back home since economic conditions of the migrant's family back home might also have improved to some extent (Coulibaly, 2009). Consequently since the degree of economic integration between the SADC countries and South Africa is quite high, an improvement in South Africa's economic conditions would either have no effect or be negatively related to remittances sent home by SADC migrants in South Africa.

The rate of return on investments in the migrant's home and host countries also influences the migrant's portfolio choices. In this case the migrant allocates his portfolio between investment opportunities at home and his host country. This is further dependent on the interest rate differential between the home and host countries, economic stability, political stability and confidence issues (Chami et al. 2005). Under such circumstances remittance inflows act as another type of capital inflow. The migrant is better placed to invest in his home country from his higher income and savings - (financial capital) and his knowledge of new business models obtained in the host country - (cultural capital) (Gallina, 2006). In the short run Katseli and Glystos (1986) found that an increase in the host country interest rates results in a decline in remittances sent home as migrants take advantage of these investment opportunities in the host country. However in the medium to long term as his wealth position improves due to returns on his investments, remittances sent home by the migrant increases. On the contrary, migrants would be reluctant to take advantage of an increase in home country interest rates except it is accompanied by a strong or an appreciating real exchange rate (Higgins et al., 2004) since returns on investment are assumed to be in home country currency units (Katseli and Glystos, 1986)

Besides Sub-Saharan Africa in general, very limited literature exists on intra African remittance flows, what drives and constrain them and their impact on macroeconomic variables. This is because most work relating to foreign inflows have mainly focused on foreign direct investment, official development assistance and portfolio investments which are entirely external to the African continent.

This paper fills this gap in the African remittances literature by addressing remittance patterns within the Southern Africa region. Using annual data for 10 SADC countries from 1994 to 2008 and dynamic panel data estimation techniques - specifically the two-step system GMM by Arellano and Bover (1995) and the seemingly unrelated regressions (SUR) by Zellner (1962) - we seek to ascertain what drives or constrain formal remittance inflows from South Africa to the SADC countries in the panel. We again add to the literature by ascertaining the empirical relevance of cross-sectional dependence and controlling for it, thereby addressing one major critique of panel data estimations. Cross-sectional dependence implies that the error term is serially correlated across cross-sections. In the presence of cross-sectional dependence of the error terms, methods that assume cross-sectional independence could result in estimators that are inefficient with biased standard errors, which may lead to misleading inference (Baltagi, 2008). We also employ a micro-foundations approach to our model derivation using optimisation theory following Bougha-Hagbe (2004), Funkhouser (1995) and Lucas et al. (1985). Furthermore the use of real GDP per capita alone as a measure of host country economic conditions is also improved on in this paper. Using a similar approach in Huang et al. (2006) we measure host country economic conditions using a composite variable consisting of the real GDP per capita, end of period inflation rate, M2 and the prime rate of South Africa. The basis for this is that the rate of inflation affects the migrant's cost of living in the host country. Real GDP per capita is an acceptable measure of income level in the host country. The prime rate is a policy signal of the cost of borrowing or returns on investment while M2 measures the deposit gathering ability or quality of financial service delivery in the host country. These variables together better captures the economic conditions of the migrant in the host

country, his level of income, his portfolio allocation choices between the host and home countries and therefore his ability to remit back home.

We find that for the sample as a whole when cross-sectional dependence and individual effects are controlled for, formal remittance inflows from South Africa to the SADC countries in the panel are mainly driven by the quality of financial service delivery and investment opportunities in the home country and migrant expectations of home country exchange rates. As a result of the close proximity of the countries to South Africa, the high degree of economic integration in the region and the relative size of the South African economy, we find that home country income and host country economic conditions are not the main drivers of remittances from South Africa to the SADC countries in the panel. However country specific analysis reveal significant country level differences indicating that the policy direction aimed at addressing the use of informal channels or harnessing remittances as an alternative source of finance for development will differ between countries.

The rest of this paper is organised as follows; section 2 addresses the theoretical framework, section 3 data and methodology, section 4 empirical results and section 5 concludes with recommendations for policy and future research.

2. Theoretical framework

Following the literature on why migrants remit home (see Bougha-Hagbe, 2004; Funkhouser, 1995; Lucas and Stark, 1985), we assume that the representative migrant's expected lifetime utility is maximised by allocating his resources between his consumption, his family's consumption back home and investment opportunities in the home and host countries. These investments include both financial holdings (interest bearing assets) and non-financial assets such as physical property. We differ from previous work by considering only the migrant's financial holdings in the host country in this model and not the possibility of the migrant acquiring physical assets in the host

country. This is based on the assumption that the migrant's primal objective is to improve his standard of living and future prospects and that of his family back home and not in the host country. Thus the level of investments required to acquire physical assets in the host country is detrimental to the achievement of this primal objective. The representative migrant therefore solves the problem.

$$\text{Max } U_t = \sum_{t=1}^T \beta^t (\gamma_t \text{Ln}A_t + \theta_t \text{Ln}C_t^m + \delta_t \text{Ln}C_t^h) \quad (1)$$

where A_t denotes the size of the representative migrant's non-financial assets in his home country, C_t^m is the migrant's consumption in the host country, C_t^h is the consumption of the migrant's family back home. β is the discount factor applied to the expected stream of future returns, γ represents the extent of the migrant's "attachment" to his home country, θ represents the migrant's marginal propensity to consume out of current income, while δ represents the migrant's degree of altruism towards his family back home. The migrant's degree of attachment to his home country and his family is capable of varying overtime by changes in confidence levels or the relationship with his family. The migrant is constrained in each period t by the following budget constraints and income flows.

$$P_t^m C_t^m + R_t^m + F_t^m - F_{t-1}^m = Y_t^m + i_t^m F_{t-1}^m \quad (2)$$

$$F_t^h = F_{t-1}^h (1 + i_t^h) + e_t R_t^m - P_t^h (A_t - A_{t-1}) - e_t r_t^m \quad (3)$$

$$A_t > 0 \quad (4)$$

$$P_t^h C_t^h = P_t^h Y_t^h + e_t r_t^m \quad (5)$$

R_t^m denotes the total amount of remittances sent home by the migrant in foreign currency, P_t^m the price level in the host country, F_t^m denotes the migrant's end of period net financial assets held abroad in foreign currency. The migrant's income in the host country in foreign currency is Y_t^m while i_t^m is the host country interest rate. Nominal income in the home country is denoted by Y_t^h , P_t^h is the home country level of prices and F_t^h the migrant's net financial assets in the home country in home country currency units. The exchange rate is e_t while r_t^m is the remittances sent by the migrant to his family for altruistic reasons in host country currency units³.

The migrant's budget constraint is given by equation (2), which shows that his total income in the host country is allocated between his consumption; total remittances sent home and his financial asset accumulation in the host country. The migrant's financial holdings in the home country is depicted by equation (3). It is an increasing function of home-country interest rates, the net of total remittances and the remittances for altruistic reasons, and decreases with the need to acquire or maintain non financial assets which is assumed positive in equation (4). To simplify the model equation (5) assumes that the migrant's family back home does not build any significant financial assets out of their income or the remittances received from the migrant.

Let $\lambda_{1,t}$, $\lambda_{2,t}$ and $\lambda_{3,t}$ be the Lagrangian multipliers for constraints (2), (3) and (5). The Lagrangian for optimizing equation (1) is given by

$$L = \sum_{t=1}^T \beta^t [(\gamma_t \text{Ln} A_t + \theta_t \text{Ln} C_t^m + \delta_t \text{Ln} C_t^h) + \lambda_{1,t}(Y_t^m + i_t^m F_{t-1}^m - P_t^m C_t^m - R_t^m - F_t^m + F_{t-1}^m) + \lambda_{2,t}(-F_t^h + F_{t-1}^h (1+i_t^h) + R_t^m - P_t^h (A_t - A_{t-1}) - e_t r_t^h) + \lambda_{3,t}(P_t^h Y_t^h + e_t r_t^m - P_t^h C_t^h)] \quad (6)$$

³ This entire model is from the perspective of the representative migrant. Thus altruistic remittances r_t^m is viewed in host-country currency units converted by the exchange rate e_t to tell the migrant how much his family actually receives in home-country currency units.

From first order conditions and at the optimum⁴

$$\theta_t C_t^h P_t^h = P_t^m C_t^m \delta_t \quad (7)$$

Equation (7) shows a direct relationship between the migrant's consumption expenditure and that of his family back home underling the assumption that the representative migrant's utility includes the consumption of his family back home. For a given level of the migrant's consumption expenditure, the consumption of his family back home is increasing in the degree of altruism (δ_t) the migrant attaches to his family back home. There is also a negative relationship between change in remittances sent home for altruistic reasons and change in the income of his family back home expressed in equation (8) as.

$$\frac{\delta r_t^m}{\delta Y_t^h} = - \frac{P_t^h}{e_t} \quad (8)$$

This is consistent with the altruism literature that migrant remittances mitigate adverse economic conditions back home to help smooth the family's consumption and income level. Equation (9) below yields a positive relationship between change in the migrant's income in the host country and change in remittances sent home for altruistic reason.

$$\frac{\delta r_t^m}{\delta Y_t^m} = \frac{\delta_t}{\theta_t e_t} \quad (9)$$

This aligns with the literature that an improvement in the migrant's income position impacts positively on his ability to remit his family back home. It is an increasing function

⁴ Details of the framework available in the Appendix to this paper.

of the degree of altruism the migrant attaches to his family back home and a decreasing function of how much he consumes out of each rand of income in the host country as well as the exchange rate. An appreciation of the local currency denotes favourable economic conditions back home and this has a decreasing effect on altruistic remittances.

3. Data and methodology

Table 1 details the variables used for this study and how they are defined. The data used in this paper was acquired from the World Development Indicators of the World Bank, International Monetary Fund and the South African Reserve Bank.

INSERT TABLE 1

3.1 Descriptive statistics and stylised facts

Descriptive statistics of the variables used in this paper are detailed on Table 2. For the 10 countries in the panel remittances as a percentage of GDP averaged 6.2% from 1994 to 2008. There are however wide disparities between individual countries with remittances to Lesotho averaging 27% of GDP. Malawi and Mauritius follow with an average of 5% while remittances to the rest of the countries range between 1 and 4% of GDP over the period. M2 as a ratio to GDP averaged 34%, which is higher than the Sub-Saharan African average of 25.3%. Real GDP per capita for South Africa averaged almost twice as much as the rest of the SADC⁵ countries put together. This explains

⁵ The SADC countries in this panel are: Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Seychelles, Swaziland, Tanzania, Zambia.

why most migrants in the sub-region migrate to South Africa in search for better work and living conditions.

INSERT TABLE 2

The interest rate differential between the countries in the panel and the host country South Africa averages -1.34 across the period indicating an averagely higher interest rate in South Africa as compared to the countries in the panel. Figure 1 depicts remittances as a percentage of GDP in the 10 SADC countries in the panel.

INSERT FIGURE 1

As a ratio to other foreign inflows and key aggregates in the SADC region as at end 2008, remittances were approximately 46% of ODA and 47% of FDI to the region (Figure 2). As at end 2008, remittance inflows to SADC countries in the panel were 11% and 8% of regional exports and imports of goods and services as a percentage of GDP respectively and exceeded the regional current account surplus by 36%. This shows the potential of remittance inflows in supplementing financing of the external gap in recipient countries and regions.

INSERT FIGURE 2

3.2 Cross-correlation analysis

Tables 3 details cross-correlations between remittances and other variables in the model. There is a high positive correlation between remittances in the current period and remittances in the previous period, statistically significant at the 1% level. This strong persistence behaviour of the dependent variable indicates the need for a dynamic model specification for the empirical estimation in this paper. Remittances also have a low negative correlation with home country economic conditions and statistically significant at the 5% level. This indicates the existence of some degree of altruistic motives in remittances sent home by migrants from SADC countries in the panel.

INSERT TABLE 3

As expected the degree of market sophistication (M2) is positively correlated with remittance inflows. This depicts the relevance of the quality of financial services to formal remittance inflows (Singh et al. 2010). However the correlation coefficient of M2 with remittances is not statistically significant. M2 is highly positively correlated with real GDP per capita in the SADC countries and statistically significant at the 1% level. This indicates the positive effect of a well-developed financial services industry on the real income per capita of countries due to its impact on access to finance. Host-country economic conditions are negatively correlated with remittance inflows. This is consistent with the literature that when the degree of integration between two countries is high, an increase in the migrant's income due to an improvement in the host country's economic conditions might not necessarily translate into increased remittances sent home, especially for altruistic reasons. This is because the economic conditions back home might have improved as well (Coulibaly, 2009).

The interest rate differential is negatively correlated with remittance inflows and statistically insignificant to remittances inflows to the countries in the panel. This seems to align with the findings of Katseli and Glystos (1986) that a higher home country

interest rate has no relationship with remittance inflows. Remittances are also negatively correlated with the real exchange rate but not statistically significant. This has different implications for different reasons why migrants remit home. A real exchange rate depreciation which denotes adverse economic conditions in the home country would have a positive relationship with altruistic remittance inflows and a negative relationship with self-interest/returns-seeking inflows. On the contrary, a real exchange rate appreciation which denotes strong economic fundamentals would have a positive relationship with self-interest remittance inflows since return on investment are assumed to be in home country currency units (Higgins et al. 2004)

INSERT TABLE 4

Table 4 uses the sign and magnitude of the correlation coefficients as a proxy to determine the main driver of remittance inflows to each country. With the exception of Botswana, Mauritius, Seychelles and Zambia, home country income is negatively correlated with remittances and statistically significant at various levels of significance signifying some degree of altruism in remittances to the rest of the countries. M2 is positively correlated with remittance inflows to Lesotho and Malawi and statistically significant at the 1% and 5% levels respectively. This indicates that the quality of financial service delivery is key to remittance inflows to Lesotho and Malawi. M2 is also negatively correlated with remittance inflows and statistically significant at 5% level for Mauritius and Zambia but insignificant for the rest of the countries in the panel. This aligns with the literature that remittances sometimes smooth access to finance constraints in countries with underdeveloped financial systems (Gupta et al. 2007). Thus for Mauritius and Zambia, remittances mitigate access to finance constraints due to under developed financial systems characteristic of these two countries. The interest rate differential is negatively correlated with remittances for Mauritius and statistically significant at the 1% level. This shows that investment opportunities in Mauritius do not

drive remittance inflows back home. It is however insignificant for the rest of the countries. The correlation between remittances, host country economic conditions and the real exchange rate are also not statistically significant.

There is however the need to ascertain these trends empirically and whether the dynamics of the theoretical framework are consistent with an empirical estimation of the data.

3.3 Model specification and estimation technique

The model takes a dynamic form which includes one or more lags of the dependent variable due to the strong persistence behavior of the dependent variable as depicted by the cross-correlation analysis in the previous section. Initial diagnostic tests reveal that cross-sectional specific effects are valid but time effects are not valid. Consequently the error term takes a one-way error component form and the model is specified as

$$y_{it} = \delta y_{it-j} + X'_{it} \beta + \mu_i + v_{it} \quad (10)$$

where $Y_{it} = NT \times 1$ vector of dependent and endogenous variables. X'_{it} represents an $NT \times k$ vector of lagged endogenous regressors other than the lag of the dependent variable, β denotes a $k \times m$ vector of slope coefficients, μ_i represent country-specific effects and v_{it} the idiosyncratic error term. Results of Breusch and Pagan (1980) Lagrange Multiplier Test for cross-sectional dependence of the error term show that the cross-sections in the panel are inter-dependent, meaning the errors of the cross-sections are correlated. The Breusch and Pagan (1980) LM Test is used when $T > N$ with a H_0 : cross-sections are independent. To test for the order of integration of these variables we use the Im, Pesaran and Shin Test (2003), ADF-Fisher Chi-square Test and PP- Fisher Chi-square (1932) since these unit root tests assume individual unit root

processes and accommodate cross-sectional dependence to some extent (Madala et al. 1999; Baltagi, 2008). Beside remittances and the interest rate differential which are stationary, the rest of the variables are $I(1)$. See Table 5 for the order of integration of the variables.

INSERT TABLE 5

See Table 6 for initial diagnostic tests performed on pooled OLS and fixed effects models.

INSERT TABLE 6

The model as specified in equation (1) above raises additional issues. First of all, it is based on the assumption of strict exogeneity of the regressors $E(v_{it} | x_{i1}, \dots, x_{in}, \mu_i) = 0$. The Hausmann test for endogeneity rejects the null of exogeneity, meaning the regressors and the fixed effect error terms are correlated. Secondly, the Lagrange Multiplier test for first order serial correlation given fixed effects rejects the null of no first order serial correlation. Meaning the lag of the dependent variable $y_{i,t-1}$ is correlated with the fixed effects (μ_i) or idiosyncratic error term. This violates classical OLS assumptions required for unbiased and consistent estimators (Nickell, 1981).

The results of initial diagnostics as detailed above warrant the use of an estimation technique that preserves homoscedasticity, prevents serial correlation and controls for cross-sectional dependence of the error term and also preserves the orthogonality between transformed variables and lagged regressors (Arellano and Bover, 1995).

Empirical literature posits a number of approaches. A few of these estimation techniques are employed in this paper to allow for cross comparison of findings and also for robustness. First the LSDV estimation technique with the Kiviet (1995) bias

correction⁶ of up to order $O(1/T)$ and bootstrapped standard errors is used to estimate the model. This is to eliminate the cross-sectional specific effects and also address the small sample bias associated with LSDV dynamic panel estimations (Nickell, 1981). However this does not effectively address the endogeneity problem or cross-sectional dependence of the error term.

Consequently, the two-step system GMM estimation technique of Arellano and Bover (1995) with forward orthogonal deviations is employed for robustness. Cross-sectional specific effects are eliminated using forward orthogonal deviations instead of the usual differencing approach. This is because the differencing approaches have been found to either maximise data loss due to the use of higher lags of regressors as instruments or generate weak instruments due to their inability to effectively eliminate serial correlation. Using forward orthogonal deviations instead of differencing makes it possible to use one-period lags of the regressors as valid instruments since they are not correlated with the transformed error term (Love and Zichinno, 2006; Amuedo-Dorantes and Pozo, 2007; Coulibaly, 2009). Additionally, the forward orthogonal deviations approach preserves homoscedasticity, prevents serial correlation and also preserves the orthogonality between transformed variables and lagged regressors (Arellano and Bover, 1995). It is also more resilient to missing data since it is computable for all observations except the last for each cross-section, hence minimising data loss (Roodman, 2006).

The LSDV and two-step system GMM estimation approaches however assume cross-sectional independence of the error term. To address the cross-sectional dependence of the error term and also for robustness we employ the seemingly unrelated regressions (SUR) approach by Zellner (1962). To maintain the dynamic framework of the panel estimation and avoid serial correlation we instrument for the one-period lag of the dependent variable with a two-period lag of the dependent variable. The SUR is best suited for estimations with cross-sectional dependence since it captures the efficiency due to the correlation of the error terms across cross-sections especially

⁶ The bias correction is initialised through a Blundell and Bond (1998) estimator

when $T > N$ (Baltagi, 2005). It also allows for detailed country-specific analysis in comparison to full sample results.

4. Empirical results

The empirical results are detailed in Tables 7 (sample wide results) and 8 (country specific results) below. From the two-step system GMM results in Table 7 the coefficient of lagged remittances is positively signed and significant at 1% level. This confirms the persistence behavior of remittance inflows from South Africa to the SADC countries in the panel as depicted by the cross-correlation analysis.

INSERT TABLE 7

Contrary to earlier expectations from the cross-correlation analysis and the theoretical framework, the coefficient of home country income is not statistically significant. Host country economic conditions are negatively signed and statistically significant at the 1% level. This is consistent with the full sample cross correlation analysis and *a priori* expectations. It also confirms the literature that when the degree of integration between the home and host country is high, an increase in the migrant's income due to an improvement in the economic conditions of the host country does not necessarily translate into an increase in remittances sent home since conditions back home might also have improved as well (Coulibaly, 2009). The same results are acquired when composite business cycle indicators are used as a measure of home and host country economic conditions.

The coefficient of interest rate differential is positive and significant at 1% level depicting the potential of SADC migrants to take advantage of investment opportunities back

home. This contradicts the cross-correlation analysis and modifies initial findings by Katseli and Glystos (1986), who found no relationship between remittances and a positive interest rate differential. As expected the degree of market sophistication (M2) is positively signed and statistically significant at the 1% level. This aligns with the a priori expectations as well as earlier trends in the cross-correlation analysis. The real exchange rate is statistically insignificant to remittance inflows from South Africa to the SADC countries in the panel. The coefficients of the two step system GMM compare favourably with OLS and LSDV estimates. This shows that they are likely good estimates of the true parameters of the variables. The results of the two step system GMM seem quite similar to the LSDV2 results and also meets all post-estimation diagnostic requirements. The Arellano and Bond (1991) test for second order serial correlation fails to reject the null of no autocorrelation. The Hansen (1982) test for over-identification fails to reject the null that the over-identification restrictions are valid while the Difference in Hansen test also fails to reject the null that the instrument subset is strictly exogenous.

The result of the SUR estimation in Table 8 addresses the problem of cross sectional dependence and also enables country-specific analysis. This is very relevant as regional studies of this nature are often criticized as lacking country specificity.

INSERT TABLE 8

Besides the results of the full sample country level differences exist. It can be observed from Table 8 that for Botswana, Lesotho, Madagascar, Malawi and Swaziland home country income is not statistically significant. Host country economic conditions are either insignificant or negatively signed and statistically significant. This implies that home country income and host country economic conditions are not the main drivers of remittance inflows from migrants of these five countries in South Africa. This is consistent with the sample wide results. A similar pattern can be observed for Mauritius

and Mozambique in terms of home country income however migrants from these two countries would remit more money home when their incomes increase as a result of improvements in host country economic conditions. The interest rate differential is positively signed and statistically significant at the 1% level for Lesotho and Malawi with the coefficient of real exchange rate also negatively signed and statistically significant for these two countries. This implies that migrants from Lesotho and Malawi would take advantage of investment opportunities back home under the right conditions such as a stable exchange rate, on the assumption that returns on investment are in home country currency units. The quality of financial service delivery is positively signed and statistically significant for Lesotho, Madagascar, Malawi and Swaziland. This underlines the key role of financial services to directing remittance inflows through formal channels and thereon for more productive uses in these four countries (Gupta et al. 2007). M2 is however negatively signed and statistically significant for Mauritius, Mozambique, Seychelles and Zambia. This is consistent with the literature that sometimes remittances mitigate access to finance constraints for the poor and financially excluded in countries with under developed financial systems (Gupta et al. 2007). For Seychelles both home country income and host country economic conditions are positively signed and statistically significant at 1% and 5% levels respectively. The coefficient of the real exchange rate for Seychelles is also negatively signed and statistically significant at the 1% level. This implies that migrants from Seychelles will remit more money home when their incomes improve in the host country, when economic conditions back home are good, and when the real exchange rate is appreciated. Remittances to Seychelles therefore exhibit strong self interest patterns. The coefficient of the real exchange rate is positively signed and statistically significant Madagascar, Swaziland and Zambia implying that remittances to these three countries increase when the exchange rate depreciates⁷. This is consistent with altruistic motives since a depreciating exchange rate is consistent with adverse economic conditions. On the contrary, the coefficient of the real exchange rate is negatively signed and statistically significant for Botswana,

⁷ It could also be that the same amount is remitted but converts into a higher amount in home country currency units due to the depreciated exchange rate.

Lesotho, Malawi, Mauritius, Seychelles and Tanzania which is consistent with self interest motives. It is however not significant for Mozambique.

5. Conclusion, policy implications and future research

The empirical results show that when cross-sectional dependence of the error and individual effects are controlled for home country income and host country economic conditions are not the main drivers of formal remittances from South Africa to all the SADC countries in the panel. This is characteristic of countries with a high degree of economic and policy integration as found by Coulibaly (2009). The close proximity of the countries in the panel to South Africa and the degree of their economic integration with South Africa creates a high incidence of temporary migration to South Africa. Consequently the income level of the family back home is not much of a driving force for remittances since the migrant has access to additional income across the border on frequent basis over short periods. The mean income per capita of South Africa over the sample period is twice that of all the countries in the panel, making South Africa an economically superior destination for migrants in the region even under adverse economic conditions in South Africa.

In almost all the countries in the panel the quality of financial service delivery is a key factor in the ability of countries to harness remittances through formal channels. This corroborates earlier findings by Gupta et al. (2007). Thus to attract informal inflows through formal channels financial service providers need to design the right products and services that are compatible to the needs and wants of migrants and their families. Despite this similarity between the full sample results and some countries in the panel, further analysis of country specific results from the SUR estimation show that the policy direction aimed at harnessing remittances as an alternative source of finance for development would differ between countries.

Due to strong self interest patterns in remittance inflows to Lesotho, Malawi and Seychelles policy makers in these countries would have to focus on ensuring a stable exchange rate while financial service providers would have to design products and services that facilitate the acquisition of physical assets and investment into financial assets. This is evidenced by the positive and statistically significant relation between remittances, interest rate differential and host country economic conditions coupled with the negative relationship with the real exchange rate. On the contrary, financial service providers in Madagascar, Swaziland and Zambia would have to focus on designing products and services that sustain household income and consumption due to the altruistic nature of remittance inflows to these countries.

These country-specific results add more value to empirical findings from large sample studies. It also gives deeper insight to policy makers in the region as to which specific policy direction is optimal in each country's attempt to harness remittances through formal channels as an alternative source of finance for development. This further highlights the fact that joint regional policy measures are not always optimal in addressing macroeconomic policy issues. The optimal country specific policy pathways might differ although the ultimate policy objective is the same.

In terms of future research it would be useful to look at other sub-regions within Sub-Saharan Africa such as Francophone West Africa, Anglophone West Africa or the CEMAC region in relation to their dominant migration destinations and the main source of remittances to these regions in Sub-Saharan Africa. This would further address the lack of literature on remittances to Sub-Saharan Africa and also enhance effective corridor specific policy interventions.

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APPENDIX

Table 1: Sources and definition of variables

Variable	Source	Definition	
GDPC	Home country income in SADC Countries	World Bank	Annual GDP per capita in 2000 US constant prices.
Ym	Economic conditions of the host country (S.A)	World Bank, South African Reserve Bank	A composite variable created using principal component analysis. It consists of the real GDP per capita, end of period inflation rate, M2 and the prime rate for South Africa ⁸
REM	Remittances as a percentage of GDP	World Bank	Worker's remittances and compensation of employees as a percentage of GDP in current prices (US\$ Millions).
Idif	Interest rate differential	IMF, World Bank	Differential between the deposit interest rate in SADC countries and in South Africa.
RER	Real exchange rate	IMF, World Bank	Product of the nominal exchange rate to the rand and the ratio of the CPI of South Africa (2000 = 100) to the aggregate price level (GDP deflator 2000 = 100) for the SADC countries.
M2	Market sophistication	World Bank	Money and quasi money as a percentage of GDP in home country.

⁸ Composite business cycle indicators (leading, coincident and lagging) were also used as an alternative measure of economic conditions in the host country. However the results were not meaningful.

Table 2: Descriptive statistics of variables

Variable	Mean	Min	Max	Obs.
REM	6.22	0.09	46.11	150
GDPC	1 772.88	123.56	8 208.23	150
Ym	3 195.05	2933.72	3 795.95	150
M2	34.32	11.89	117.36	150
Idif	-1.34	-14.29	25.59	150
RER	249.39	-656.58	11554	150

Table 3: Cross-correlations of variables (contemporaneous)

Variables	REM	REM(-1)	Idif	M2	GPCC	Ym	RER
REM	1						
REM(-1)	0.98***	1					
Idif	-0.09	-0.10	1				
M2	0.01	-0.01	-0.10	1			
GDPC	-0.20**	-0.20**	-0.15**	0.83***	1		
Ym	-0.08	-0.08	0.10	0.09	0.08	1	
RER	-0.10	-0.10	-0.10	-0.10	-0.14*	-0.08	1

Note: (*), (**), (***) denotes 10%, 5% and 1% level of significance respectively.

Table 4: Country-specific cross-correlations of remittances and other variables:

	BOT	LES	MDG	MLW	MUS	MOZ	SEY	SWZ	TAN	ZAM
GPCC	-0.32	-0.73***	-0.80***	-0.48*	-0.35	-0.60**	0.22	-0.94***	-0.65***	0.11
M2	-0.22	0.68***	0.25	0.56**	-0.57**	-0.19	-0.21	-0.25	-0.34	-0.59**
Idif	-0.04	0.33	-0.33	0.24	-0.65***	0.25	0.11	0.301	-0.21	-0.32
Ym	0.05	-0.69	-0.63	-0.55	-0.29	-0.36	-0.47	-0.73	-0.56	-0.05
RER	-0.16	0.29	-0.07	-0.53	0.46	-0.32	-0.15	0.29	-0.83	-0.07

Note: (*), (**), (***) denotes 10%, 5% and 1% levels of significance respectively.

Table 5: Order of integration of the variables

Variable	I(d) Levels	I(d) Difference	Obs.
REM	I(0)		150
Ym	I(1)	I(0)	150
GDPC	I(1)	I(0)	150
M2	I(1)	I(0)	150
DC	I(1)	I(0)	150
RER	I(1)	I(0)	150
Idif	I(0)		150

Table 6: Initial diagnostic tests

Test	Test Statistic	Critical Value	Inference
Joint validity of cross-sectional effects			
$H_0: \mu_1 = \mu_2 \dots \mu_{N-1} = 0$ $H_A: \text{Not all equal to } 0$	F = 3.38	$F_{(0.05, 10, 135)} = 1.90$	Cross-sections are heterogeneous.
Joint validity of time (period) fixed effects			
$H_0: \lambda_1 = \dots \lambda_{T-1} = 0$ $H_A: \text{Not all equal to } 0$	F = 1.23	$F_{(0.05, 13, 132)} = 1.79$	Time-specific effects are not valid. Error term takes a one way error component form.
Serial correlation (two-way model)			
(Durbin Watson Test for first order serial correlation, given fixed effects) $H_0: \rho = 0; \quad H_A = \rho > 0$	$d_p = 1.517$	$d_p < 1.8164$	First order serial correlation given fixed effects.
Heteroscedasticity			
$H_0: \sigma_i^2 = \sigma^2$ $H_A: \text{Not equal for all } i$	LM = 47.83	$\chi^2_{(10)} = 18.31$	There is heteroscedasticity present.
Hausman specification test			
$H_0: E(\mu_{it}/X_{it}) = 0$ $H_0: E(\mu_{it}/X_{it}) \neq 0$	$m_3 = 15.72$	$\chi^2_{(6)} = 12.59$	There is endogeneity between the regressors and the fixed effects error term.
Breusch-Pagan LM Test for Cross sectional dependence			
$H_0: \text{corr}(\mu_{i,t}, \mu_{j,t}) = 0 \text{ for } i \neq j$ $H_A: \text{corr}(\mu_{i,t}, \mu_{j,t}) \neq 0 \text{ for some } i \neq j$	LM = 78.43	Prob = 0.0015	Cross-sections are inter-dependent

Table 7: Empirical results: OLS, LSDV1, LSDV2 and two-step system GMM.**Dependent variable REM⁹**

Variable	OLS	LSDV1	LSDV2	Two-Step System GMM
REM(-1)	0.76***	0.95***	0.78***	0.84**
GDPG	-0.0007**	-0.0004***	-0.0001	0.0001
Ym	-0.00007	0.0002	-0.0003***	-0.0009***
Idif	0.05	0.05***	0.03***	0.04***
M2	0.06**	0.02***	0.02***	0.07***
RER	0.0001	0.00008	0.00003	0.0002
Adjusted R ²	0.64	0.97	0.98	
ABond test for second order serial correlation				Prob > z = 0.29
Hansen test for over-identification				Prob > χ^2 = 0.62
Diff. in Hansen test for exogeneity of instrument set				Prob > χ^2 = 0.98

Note: (*), (**), (***) denotes 10%, 5% and 1% levels of significance respectively.

⁹ LSDV1 employed the Kiviet (1995) LSDV small sample bias correction. LSDV2 involves fixed effect with cross-sections SUR. The two-step system GMM estimation involved forward orthogonal deviations instead of differencing (Arellano and Bover, 1995).

Table 8: Seemingly unrelated regressions**Dependent variable REM**

	BOTS	LES	MDG	MLW	MUS	MOZ	SEY	SWZ	TAN	ZAM
REM(-2)	0.32	0.34***	-0.14	-0.25***	0.23***	0.34***	-1.37***	0.53***	-0.29**	-0.06
GDPC	-0.0001	0.08	-0.0008	0.02	-0.0001	-0.003	0.007***	0.001	-0.09***	0.21***
Ym	0.0004	-0.02**	-0.0002**	0.0009	0.004***	0.0007*	0.003**	-0.001	0.009***	-0.016***
Idif	0.001	2.02***	-0.006**	0.06***	0.036	0.034	0.03	-0.16	-0.06	0.08
M2	0.005	1.83***	0.06***	0.27**	-0.112***	-0.03	-0.08***	0.17***	0.13	-0.96***
RER	-0.78**	-1.46*	0.0002**	-0.24***	-0.08*	-0.0001	-0.034***	1.34***	-0.013***	0.003**

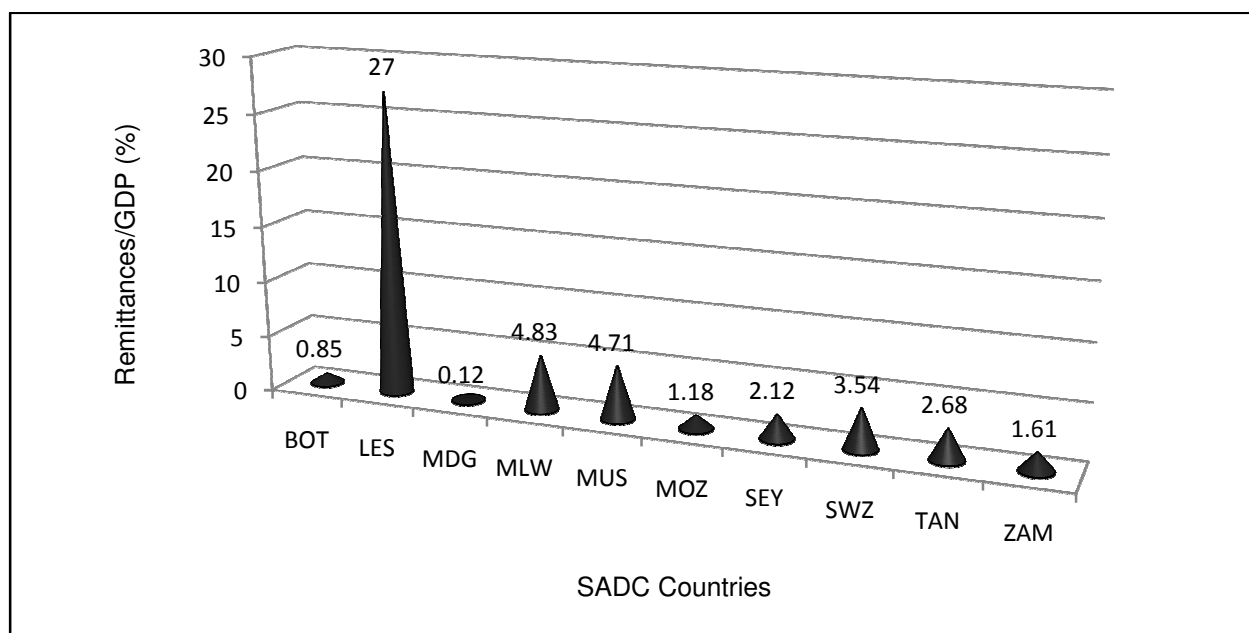
Breusch-Pagan test of independence: $\chi^2_{(45)} = 48.95$ *Prob = 0.32*

Correlation matrix of residuals (Remittances)

Botswana	1									
Lesotho	-0.08	1								
Madagascar	0.01	0.19	1							
Malawi	-0.13	0.34	-0.04	1						
Mauritius	0.21	0.05	-0.07	-0.45	1					
Mozambique	-0.01	0.59	-0.04	0.47	-0.27	1				
Seychelles	0.13	-0.03	0.33	0.08	-0.32	0.11	1			
Swaziland	0.65	-0.02	0.15	0.01	0.02	-0.25	0.19	1		
Tanzania	-0.11	0.23	0.36	0.34	-0.67	-0.07	0.26	0.36	1	
Zambia	-0.23	0.15	0.25	-0.06	-0.13	0.24	0.76	-0.41	-0.03	1

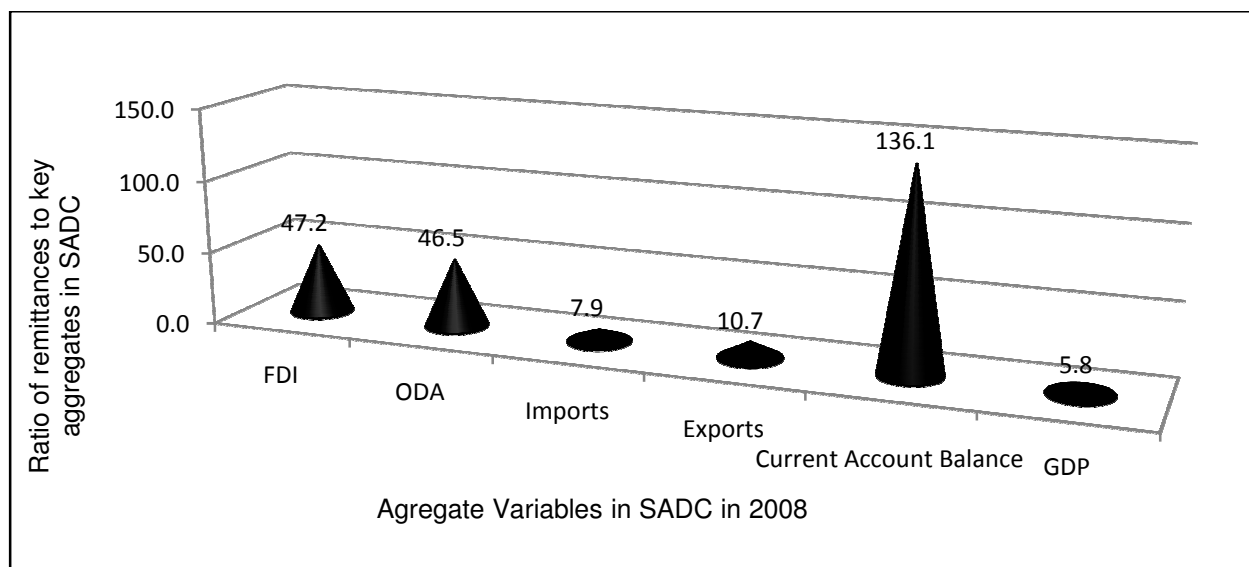
Note: (*), (**), (***) denotes 10%, 5% and 1% levels of significance respectively

Figure 1: Remittances as a ratio to GDP in SADC countries in the panel in 2008



Data Source: World Development Indicators, World Bank

Figure 2: Ratio of remittances to regional aggregates in SADC countries in 2008



Data Source: World Development Indicators, World Bank

II. Theoretical framework

The representative migrant therefore solves the problem

$$\text{Max } U_t = \sum_{t=1}^T \beta^t (\gamma_t \text{Ln} A_t + \theta_t \text{Ln} C_t^m + \delta_t \text{Ln} C_t^h) \quad (1)$$

Subject to the following constraints

$$P_t^m C_t^m + R_t^m + F_t^m - F_{t-1}^m = Y_t^m + i_t^m F_{t-1}^m \quad (2)$$

$$F_t^h = F_{t-1}^h (1 + i_t^h) + e_t R_t^m - P_t^h (A_t - A_{t-1}) - e_t r_t^m \quad (3)$$

$$A_t > 0 \quad (4)$$

$$P_t^h C_t^h = P_t^h Y_t^h + e_t r_t^m \quad (5)$$

Let $\lambda_{1,t}$, $\lambda_{2,t}$ and $\lambda_{3,t}$ be the Lagrangian multipliers for constraints (2), (3) and (5). The Lagrangian for optimizing equation (1) is given by

$$\begin{aligned} L = \sum_{t=1}^T \beta^t [& (\gamma_t \text{Ln} A_t + \theta_t \text{Ln} C_t^m + \delta_t \text{Ln} C_t^h) + \lambda_{1,t} (Y_t^m + i_t^m F_{t-1}^m - P_t^m C_t^m - R_t^m - F_t^m + \\ & F_{t-1}^m) + \lambda_{2,t} (-F_t^h + F_{t-1}^h (1 + i_t^h) + R_t^m - P_t^h (A_t - A_{t-1}) - e_t r_t^m) + \lambda_{3,t} (P_t^h Y_t^h + \\ & e_t r_t^m - P_t^h C_t^h)] \end{aligned} \quad (6)$$

From first order conditions

$$\frac{\delta L}{\delta A_t} = \frac{\beta^t \gamma_t}{A_t} - \beta^t [\lambda_{2,t} P_t^h - \beta \lambda_{2,t+1} P_{t+1}^h] = 0 \quad (7)$$

$$\frac{\delta L}{\delta C_t^m} = \beta^t \left[\frac{\theta_t}{C_t^m} - \lambda_{1,t} P_t^m \right] = 0 \quad (8)$$

$$\frac{\delta L}{\delta C_t^h} = \beta^t \left[\frac{\delta_t}{C_t^h} - \lambda_{3,t} P_t^h \right] = 0 \quad (9)$$

$$\frac{\delta L}{\delta \lambda_{1,t}} = Y_t^m + i_t^m F_{t-1}^m - P_t^m C_t^m - R_t^m - F_t^m + F_{t-1}^m = 0 \quad (10)$$

$$\frac{\delta L}{\delta \lambda_{2,t}} = -F_t^h + F_{t-1}^h (1 + i_t^h) + R_t^m - P_t^h (A_t - A_{t-1}) = 0 \quad (11)$$

$$\frac{\delta L}{\delta \lambda_{3,t}} = P_t^h Y_t^h + e_t r_t^m - P_t^h C_t^h = 0 \quad (12)$$

$$\frac{\delta L}{\delta R_t^m} = \beta^t [-\lambda_{1,t} + \lambda_{2,t}] = 0 \quad (13)$$

$$\frac{\delta L}{\delta r_t^m} = \beta^t [-\lambda_{2,t} e_t + \lambda_{3,t} e_t] = 0 \quad (14)$$

From equations (8), (13) and (14) $\lambda_{1,t} = \lambda_{2,t} = \lambda_{3,t} = \frac{\theta_t}{P_t^m C_t^m}$. (15)

Into equation (9)
$$\frac{\delta_t}{C_t^h} = \lambda_{3,t} P_t^h = \frac{\theta_t P_t^h}{P_t^m C_t^m}$$

$$\Rightarrow \theta_t C_t^h P_t^h = P_t^m C_t^m \delta_t \quad (16)$$

From equation (10)

$$R_t^m = Y_t^m + F_{t-1}^m (1 + i_t^m) - F_t^m - P_t^m C_t^m \quad (17)$$

Equation (13) into (14)
$$R_t^m = Y_t^m + F_{t-1}^m (1 + i_t^m) - F_t^m - \frac{\theta_t}{\delta_t} P_t^h C_t^h \quad (18)$$

From equation (18)
$$\frac{\delta R_t^m}{\delta C_t^h} = -\frac{\theta_t}{\delta_t} P_t^h \quad (19)$$

Equation (12) into (18)
$$R_t^m = Y_t^m + F_{t-1}^m(1 + i_t^m) - F_t^m - \frac{\theta_t}{\delta_t}(P_t^h Y_t^h + e_t r_t^m) \quad (20)$$

From equation (20)
$$r_t^m = \frac{\delta_t}{\theta_t e_t} [Y_t^m - F_t^m + F_{t-1}^m(1 + i_t^m) - R_t^m] - \frac{P_t^h Y_t^h}{e_t} \quad (21)$$

$$\frac{\delta r_t^m}{\delta Y_t^h} = -\frac{P_t^h}{e_t} \quad (22)$$

Again from equation (16)

$$\frac{\delta r_t^m}{\delta Y_t^m} = \frac{\delta_t}{\theta_t e_t} \quad (23)$$

From equation (11)

$$R_t^m = \frac{1}{e_t} [F_t^h - F_{t-1}^h(1 + i_t^h) + P_t^h(A_t - A_{t-1})] + r_t^m \quad (24)$$

$$\frac{\delta R_t^m}{\delta A_t} = \frac{P_t^h}{e_t} + \beta \frac{P_{t+1}^h}{e_{t+1}} \quad (25)$$

$$\frac{\delta R_t^m}{\delta i_t^m} = F_{t-1}^m \quad (26)$$

$$\frac{\delta R_t^m}{\delta i_t^h} = \frac{1}{e_t} [-F_{t-1}^h] \quad (27)$$