UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

FOREIGN INFLOWS OF REMITTANCES INTO SUB-SAHARAN AFRICA

by

EMMANUEL OWUSU-SEKYERE

Submitted in fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY (ECONOMICS)

in the

Faculty of Economics and Management Sciences

at the

UNIVERSITY OF PRETORIA

PRETORIA **AUGUST 2011**

ACKNOWLEDGEMENTS

I wish to first of all express my sincere gratitude to the Department of Economics at the University of Pretoria for offering me admission and financial support to pursue my doctoral study in Economics.

Special recognition goes to Prof. Reneé van Eyden and Dr. Francis Kemegue for their excellent supervision and guidance in the preparation of my dissertation. Special thanks to Ethan for sharing his Mum's time with me. My sincere thanks to Prof. Steve Koch for his personal encouragement and support as well as the opportunity to lecture undergraduate economics; Prof. Rangan Gupta for challenging me to my wits end; as well as Dr. Ruthira Naraidoo and Prof. Nicola Viegi for their occasional input. To Louise Cromhout and Sonia Laing for their exceptional hospitality that makes foreign students feel very welcome away from home.

Many thanks to my postgraduate colleagues for their friendship and encouragement during these challenging years.

Special thanks to my family for their support and above all to God Almighty for His grace and mercy that saw me through.

FOREIGN INFLOWS OF REMITTANCES INTO SUB-SAHARAN AFRICA.

by

EMMANUEL OWUSU-SEKYERE

SUPERVISOR: PROF. RENEÉ VAN EYDEN

CO-SUPERVISOR: DR. FRANCIS KEMEGUE

DEPARTMENT: ECONOMICS

DEGREE: DOCTOR OF PHIOSOPHY (ECONOMICS)

Abstract

This study starts with an investigation into the factors that drive or constrain formal remittance inflows to Sub-Saharan Africa (SSA). The aim is to facilitate a better understanding of what is required to direct remittances through formal channels, mitigate the use of informal remittance channels and its attendant negative externalities, as well as harness remittance inflows as an alternative source of finance for development. It has been estimated that approximately 45-65 percent of formal inflows to Sub-Saharan Africa come through informal channels (Freud and Spatafora, 2005) with strong negative externalities such as fraud, money laundering, illegal forex markets and terrorism financing. Informal inflows also adversely affect effective management of macroeconomic variables such as money supply growth, inflation and the

exchange rate. Consequently, the use of informal channels for remittance inflows is a key challenge to financial sector policy globally. This study posits that having adequate insight into what drives or constrain remittance inflows through formal channels is a prerequisite to directing remittances through formal channels and thereon for more productive uses.

Secondly, the economic impact of remittance inflows has been found to vary from region to region. It is capable of having either a positive or a negative impact on the recipient economy. Whiles remittances have smoothed consumption, income and reduced poverty in some countries (Ratha, 2003) it has also widened the poverty gap in other countries (Carrasco and Ro, 2007). Remittances have contributed to employment creation by providing capital for microenterprises in some countries (Woodruff and Zenteno, 2000) and at the same time reduced labour supply in other countries aggravating unemployment (Funkhouser, 1992; Amuedo-Dorantes and Pozo, 2004). Remittances have increased economic growth by providing finance for investment in some countries (Guiliano and Ruiz-Arranz, 2005) and in others reduced economic growth due to a fall in labour supply by recipient households (Chami et al. 2003). This dual economic impact of remittance inflows makes it imperative that its exact impact on macroeconomic variables in recipient economies be ascertained. One key indicator through which remittances influence the macro-economy is the exchange rate. This is because the exchange rate is the one important price that affects the prices of all other goods and services (Singer, 2008). Maintaining a stable exchange rate that ensures export competitiveness and a sustainable current account deficit is core to the monetary policy outlook in most Sub-Saharan African countries. However high levels of foreign inflows, such as remittances, are known to appreciate the underlying real exchange rate of the recipient economy, adversely affect export competitiveness, contracts the tradable sector and consequently worsens the trade deficit. This has been referred to as the Dutch-disease effect of remittance inflows (Corden and Neary, 1982). Consequently, the current levels of remittance inflows to developing countries, in excess of foreign direct investment and official development assistance, and its possible appreciating effect on the real exchange rate needs to be critically examined. This study therefore also examines the relationship and direction of causality between remittances and the real exchange rate in recipient Sub-Saharan African countries.

Thirdly, research has shown that approximately 20 percent of African migrants live and work in Africa, and also send significant remittances back home (Barajas et al. 2010). Additionally, one key finding of this study is that different factors drive remittances to different countries. This gives merit to an intra-African study into remittance patterns within Sub-Saharan Africa in relation to their dominant migration destination. Consequently, this study further looks at intra-African remittance flows, focussing on the Southern African Development Cooperation (SADC) whose main migration destination (both permanent and temporary) is South Africa.

Most studies on foreign inflows to Sub-Saharan Africa have largely focused on aid or foreign direct investment (FDI) and, to a very limited extent, remittances. This study therefore fills this gap in the foreign inflows literature by looking at remittance inflows to Sub-Saharan Africa and its relationship with macroeconomic variables. Additionally Sub-Saharan Africa consists of a number of sub-regional divisions, all of which adhere to different policy frameworks aimed at achieving a stipulated macroeconomic convergence criteria, a single currency and a single market at a future date. These are Francophone West Africa (UEMOA), Anglophone West Africa (ECO), the Southern Africa Development Cooperation (SADC) and the East African Community (EAC). Very little literature exists on intra-African studies on remittances and any disparities in its transmission mechanism within the different regions. This study again fills this gap in the African remittances literature by analysing the effect of remittance inflows on each of these regions separately, country-specific differences within each of these regions and implications for policy. In the regional-specific estimations we also identify which specific countries drive the regional spatial dynamics and the direction of spill-over effects in each region. This addresses the criticism of lack of specificity in such large sample studies.

Annual time series data for 35 SSA countries, 8 UEMOA countries, 5 ECO countries and 5 EAC countries from 1980 to 2008 and 10 SADC countries from 1994 to 2008 are used in this study. Dynamic panel data estimation techniques, specifically the least square dummy variable (LSDV) with Driscoll and Kraay (1998) corrected standard errors, LSDV with Kiviet (1995) correction, generalised method of moments (GMM) by Arellano and Bover (1995), feasible generalised

least squares by Park (1967) and Kmenta (1971, 1986) and seemingly unrelated regressions by Zellner (1962) are used in this study.

Furthermore, one major critique of panel data estimation techniques is the assumption of cross-sectional independence. Recent literature has established that when cross-sectional dependence is not controlled for, panel data estimations using instrumental variables and generalised method of moments approaches would provide very little efficiency gain over OLS estimators (Coakley et al. 2002; Baltagi, 2008; Phillips and Sul, 2003). Cross-sectional dependence is therefore tested for in this study using the Pesaran (2004) CD test for the full sample estimations and the Breusch and Pagan (1980) test for the regional estimations. This addresses one major critique of panel data estimations.

Empirical evidence from this study reveals that when cross-sectional dependence and individual effects are controlled for, host country economic conditions and self-interest motives override altruism and home country economic conditions as determinants of remittance inflows to Sub-Saharan Africa. Economic conditions in the home country are therefore not the main determinant of remittance inflows to SSA or the SADC countries in the panel. Consequently, altruism is reduced to a socio-cultural duty whiles profit-seeking motives serve as a stronger motive for remitting home. This modifies earlier findings by Singh et al. (2010). This is however conditioned on a stable or strong real exchange rate based on the assumption that return on investment is in home country currency units and exchange rate uncertainty (as a measure of risk) is a constraint to self-interest remittance inflows (Katseli and Glystos, 1986; Higgins et al., 2004). The degree of market sophistication (i.e. quality of financial service delivery) and investment opportunities in the home country are significant to remittance inflows to both SSA and the SADC countries in this study. Although overall the full sample estimation reveals that self-interest motives prevail, the country-specific analysis show that for some countries altruism is a stronger factor than self-interest motives. In that respect the direction of market positioning would differ from country to country. In countries where altruism is dominant, financial service providers would have to design products and services that smooth consumption and income for

recipient households. In countries where self-interest prevails, financial service providers would have to focus on products and services that facilitate investment into physical assets and financial instruments with attractive yields. Policy makers in these countries would then have to ensure strong economic fundamentals such as a stable real exchange rate since returns on investments are assumed to be in home country currency units.

The close proximity of countries in the southern African region to South Africa leads to a high incidence of temporary migration in the region. Glystos (1997) found that temporary migrants remit more for self-interest reasons whiles permanent migrants remit more for altruistic reasons. This coupled with the degree of economic integration between the SADC countries are additional reasons for the self-interest remittance patterns observed in the SADC region. This is consistent with earlier findings by Coulibaly (2009) looking at 16 Latin and Caribbean countries and Pinger (2007) on Moldova.

With respect to the relationship between the exchange rate and remittance inflows in Sub-Saharan Africa, we find that when cross-sectional dependence and individual effects are controlled for, remittances to SSA as a whole appreciate the underlying real exchange rate of recipient countries with a lagged impact of two periods. This is consistent with earlier findings by Opoku-Afari et al. (2004) on the effect of aid on the real exchange rate in Ghana; Elbadawi (1999) looking at aid to a panel of 62 developing countries and White and Wignaraja (1992) on Sri Lanka. This result however contradicts earlier findings by Sackey (2001) on aid to Ghana, Ogun (1995) on aid to Nigeria and Nyoni (1998) on aid to Tanzania. However the Dutch-disease effect is not experienced via the loss of export competitiveness, because the exchange rate appreciation is mitigated by monetary policy positioning and overdependence on imports due to low levels of domestic production in these countries. The worsening of the current account deficit is more driven by overdependence on imports due to low domestic production capacity than the loss of export competitiveness emanating from an appreciation of the real exchange rate due to remittance inflows.

Furthermore, overdependence on imports implies that there is a greater probability that remittances are spent on tradables than non-tradables whiles fiscal expenditure is also more

geared towards tradables than non-tradables. With time this would generate increased demand for imports which could result in a depreciation of the real exchange rate due to demand for foreign exchange. This could stimulate export revenue over time which has an appreciating effect on the real exchange rate. Additionally, increased demand for imports would have a feedback effect on domestic inflation, which could also result in an appreciation of the real exchange rate. The extent to which this latter appreciation, caused by increased export revenue and domestic inflation, mitigates the initial depreciation of the domestic currency, would determine the total effect of remittance inflows on imports and exports and therefore the direction of the trade balance in the long run (Singer, 2008). If the latter appreciation effect alleviates the initial short-run depreciation effect, then there would be a net deterioration of the trade deficit in the long run due to loss of export competitiveness. On the contrary, if the latter appreciation effect does not mitigate the initial depreciation effect, then the current account deficit would not worsen from the loss of export competitiveness perspective.

There are however country-specific differences. Consistent with its dual economic impact remittances depreciates the real exchange rate in some countries and appreciates the real exchange rate in other countries. Countries in which remittances depreciate the real exchange rate are associated with import dominated foreign sectors and terms of trade. This raises the likelihood of remittances being spent more on tradables, rather than non-tradables. Fiscal expenditure in these countries is also geared more towards traded goods than non-traded goods. Consequently, monetary policy is positioned to strengthen the real exchange rate. In countries where remittances have an appreciating effect on the real exchange rate, monetary policy is positioned to mitigate this appreciating effect. An import dominant terms of trade further strengthens this depreciating effect on the real exchange rate, mitigating the appreciating effect of remittance inflows. We also find reverse causality between remittances and the real exchange rate. Whiles the real exchange rate Granger-causes remittances contemporaneously, remittances Granger-cause the real exchange rate asynchronously with a two-period lag.

In spite of a common macroeconomic policy convergence framework, spatial dynamics are mainly driven by specific countries in each region. In the EAC region a shock to the real exchange rate of Uganda will impact the real exchange rates of Rwanda and Burundi in the

same direction. Similarly in the UEMOA region a shock to the real exchange rate of any of the countries will impact the real exchange rates of the other countries in the region in the same direction, in the absence of any intervention by monetary authorities. In the SADC region, the real exchange rate of Botswana, South Africa, Swaziland and Mozambique are positively correlated whiles for the ECO region the real exchange rates of Gambia, Sierra Leone and Guinea also tend to move in the same direction. Hence the regional-specific analysis adds tremendous value to the full sample estimation by clearly identifying the impact of remittances on the real exchange rate in each of these regions, which countries drive the regional spatial dependences and the direction of spill-over effects in regional exchange rate dynamics.

Consequently, SSA countries seeking to mitigate the negative externalities of remittance inflows or harness remittances through formal channels for more productive purposes must ensure adequate market sophistication in terms of the right financial products and services that align with the needs and wants of migrants and their households. There must be adequate and attractive investment opportunities coupled with strong economic fundamentals such as exchange rate stability. There is however a tradeoff between a strong exchange rate, export competitiveness and what level of current account deficit is sustainable. Although monetary policy positioning in most of the Sub-Saharan African countries in the panel is focused on preventing the loss of export competitiveness as a result of foreign inflows (in this case remittances) and its adverse effect on the current account deficit, the Dutch-disease effect of remittance inflows could equally be caused by monetary positioning that over-emphasises a depreciated exchange rate. The depreciated exchange rate could stimulate exports. Again excess demand for imports could generate a feedback inflationary effect on domestic prices. Both of these two outcomes have an appreciating effect on the real exchange rate. Additionally, this monetary positioning could also be the reason why Sub-Saharan African countries have hitherto failed to harness diaspora remittances as an alternative source of finance for development. This is because profit seeking migrants would prefer a strong exchange rate since return on investment is assumed to be in home country currency units. A depreciating exchange rate means loss of value in return on investments. This is consistent with Higgins et al. (2004)

that exchange rate uncertainty (as a measure of risk) is an important determinant of remittance inflows.

In light of these factors Sub-Saharan African countries would have to deal with a complex tradeoff between what level of exchange rate is strong enough to attract diaspora remittances for investment, maintain export competitiveness and at the same time a sustainable current account deficit. The current depreciation biased monetary positioning defeats this purpose. Furthermore, knowing which specific countries drive regional spatial dependences and the direction of spill-over effects makes policy makers aware of which country's macroeconomics trends impact their economies directly, either in the same or opposite direction. This enables more focused and optimal monitoring of regional macroeconomic trends and the ability to forecast ahead and strategise for unwanted developments.

In terms of future research, there is the need to research into other sub-regions within SSA in relation to their dominant migration destination to better facilitate corridor-specific policy interventions towards the realisation of policy goals and objectives relating to remittance inflows. Additionally, it would be interesting to know what has been the impact of the global financial crisis on remittances to developing countries and its impact on economic growth and development.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. Introduction

1.1 Background

The issue of migration is at the core of global policy dialogue today as developed countries grapple with unexpected arrivals of migrants from different countries and by various means. Sub-Saharan Africa (SSA), one of the poorest and economically deprived regions of the world is no exception to this trend. Sub-Saharan Africa lags behind in several human development indicators as compared to other developing regions (Human Development Indicators, 2009). These factors among others have resulted in consistent migration of both skilled and unskilled labour in search of better working and living conditions. The heaviest toll of this brain drain is mostly felt in the health and education sectors of Sub-Saharan African countries **(**Kapur, 2005). According to the International Labour Organisation, the total global stock of migrants increases by six million annually, faster than world population growth. One of the outcomes of migration is remittance inflows, which has emerged as a key link between human mobility and development.

Despite the steady increases in migration globally, it cannot be the sole reason for the increasing levels in remittance inflows. Other developments such as technological improvements in financial infrastructure**,** capital account liberalisation including the relaxation of restrictions on foreign exchange deposits and inflows, expansion of money transfer services, improvements in financial service delivery leading to increased market competition and remittance country partnerships in several remittance corridors have all contributed to an increase in the level of remittance inflows to developing countries (Singer, 2008).

There have been challenges in the universal definition of remittances, however the fifth edition of the International Monetary Fund's Balance of Payment Manual (BMP5) definition is what is universally used to define and record remittance inflows. In this manual standard measures of remittances are based on three main items, namely workers' remittances (money sent by workers residing abroad for more than one year), compensation of employees (gross earnings of foreigners residing abroad for less than a year and migrant transfers (net worth of migrants moving from one country to another) (IMF, 2006).

Besides balance of payment estimates, other methods such as micro or household surveys and banks or financial institution records in origin countries are also used to complement measurement efforts (Addison, 2004). The widely used balance of payment statistics in most countries are unfortunately only capable of partially capturing remittance inflows due to the fact that substantial amounts flow in through informal channels and therefore are not officially captured. This is estimated to be at least 50 percent of globally reported flows. Very poor records are kept by institutions involved in remittance transfers, which affect the accuracy and quality of reporting to Central Banks or the respective oversight authority. There are also inadequate linkages and levels of cooperation between sender end institutions and demand end institutions to facilitate the capture of remittances data from the leading sources of remittances to developing countries (World Bank, 2006).

Despite these challenges to accurate measurement, remittances have attracted immense research and policy attention over the last two decades as a result of its current levels in excess of official development assistance (ODA), portfolio investments and in some cases foreign direct investment (FDI), its characteristics and its diverse economic impact on recipient countries.

In terms of levels, remittances to developing countries as at end 2008, stood at 330 billion US dollars, thrice the value of official development assistance and also exceeded 10 percent of GDP in 23 developing countries worldwide (Mohapatra et al., 2009). In Sub-Saharan Africa remittance inflows have steadily increased from 1.4 billion US dollars in 1980 to 21.3 billion US dollars in 2008, approximately 2.2 percent of the regional GDP (World Bank, 2008).

Regarding its characteristics, remittances have been found to be relatively more stable than other forms of foreign inflows (Ratha, 2003) even during the recent global financial crisis. Contrary to a projected decline of 6.7 percent between 2007 and 2008, remittance inflows to developing countries increased by 28 percent from 265 billion US dollars in 2007 to 338 billion US dollars in 2008, and declined by a meager 6 percent to 316 billion US dollars from 2008 to 2009. FDI on the other hand fell by approximately 30 percent, coupled with a total collapse in private portfolio investment and scarce donor funds to developing countries due to the credit crunch during this period (World Bank, 2010). Remittances are also unrequited funds, thus they

do not result in any contractual or debt servicing obligations (Kapur, 2005). Furthermore, unlike other forms of foreign inflows, remittances are not usually withdrawn *ex post* from a recipient economy. Consequently, they have been found to sometimes mitigate volatility and reversibility in other capital inflows (Bugamelli and Patterno, 2006).

With respect to its economic impact, remittances have emerged as both a positive and negative externality to migration. As a positive externality, remittances have been found to smooth consumption and income for households thereby reducing poverty (Ratha, 2003). Remittances have contributed to employment creation by providing capital for microenterprises (Woodruff et al., 2000). In countries with underdeveloped financial systems remittance inflows have enhanced access to finance for the poor and financially excluded (Gupta et al., 2007). Furthermore, remittances have increased economic growth by providing finance for investment (Guiliano and Ruiz-Arranz, 2005). Due to the multiplier effect of remittance inflows, non-recipient households have also benefited indirectly through labour income and payment for goods and services by recipient households (Durand et al., 1986). Remittances have served as a vital source of foreign exchange for some developing countries in the Euro-Mediterranean region, improved their sovereign rating and enhanced their access to international capital markets to raise finance for development (Herzberg, 2006).

As a negative externality remittance inflows have been known to widen the poverty gap due to the creation of pockets of more affluent remittance receiving households in relatively poor neighbourhoods (Carrasco and Ro, 2007). Recipient households have sometimes supplied less labour than non-recipient households, thereby aggravating unemployment (Funkhouser, 1992; Amuedo-Dorantes and Pozo, 2004). From the labour supply perspective remittance inflows have been found to reduce economic growth (Chami et al., 2003). Most remittances are spent on consumption goods, thereby generating inflationary pressures on the domestic economy (Gupta et al., 2007). Remittances could also appreciate the domestic exchange rate in small open economies. This adversely affects export competitiveness thereby worsening the current account deficit (Corden and Neary, 1982). As a result of high transaction costs, eligibility and identification constraints, informal channels are often used by migrants to remit home. This

remains a major policy challenge worldwide with serious implications for money laundering, terrorism finance, illegal foreign exchange markets and fraud (Pearce, 2006).

These trends, characteristics and varying economic impact of remittances have generated substantial research and policy interest. The aim is to ascertain the specific impact of remittance inflows on various regions and corridors and how the benefits of these inflows could be optimised, whiles effectively addressing the associated negative externalities. This research posits that a critical step to achieving this is to first of all establish which factors drive and constrain these inflows and how remittance inflows respond to changes in these factors. Countries which have been able to achieve this critical step have realised substantial net benefits from remittance inflows by implementing the necessary regulatory, market and technological reforms at the required levels (Ratha, 2006; Ketley, 2006; Herzberg, 2006).

Sub-Saharan Africa lags woefully behind other regions in efforts at effectively harnessing the benefits of remittance inflows whiles minimising negative externalities associated therewith. This has been attributed to several factors such as inadequate awareness of the drivers and constraints to these inflows through formal channels, overregulation, underdeveloped financial systems and markets, lack of the requisite structures and enabling environment (Ketley, 2006; Bokkerind, 2006; Bester, 2006). Consequently, Sub-Saharan Africa receives only 5 percent of formal global remittances to developing countries as compared to 25 percent that goes to Latin America, 14.4 percent to the Middle East and North Africa, 24 percent to East Asia and Pacific, 20 percent to South Asia and 13 percent to East and Central Asia. Informal inflows to Sub-Saharan Africa have been estimated to be between 45 to 65 percent of formal inflows, as compared to 5 to 20 percent for Latin America (IMF, 2006; Freud and Spatafora, 2005).

1.2 Problem Statement

Despite the fact that the characteristics of remittance inflows are highly favourable to the economic disposition of developing countries (i.e. unrequited, irreversible, and more resilient to adverse shocks than other inflows e.g. FDI, ODA portfolio investments) its economic impact

differs from region to region. It is capable of having either a positive and negative impact on the recipient economy.

An estimated 45 to 65 percent of formal inflows to Sub-Saharan Africa come through informal channels (Freud and Spatafora, 2005) with strong implications for fraud, money laundering, illegal foreign exchange markets and terrorism financing. This further adversely affects effective management of macroeconomic variables such as money supply growth, inflation, exchange rate stability and the current account balance. This makes the use of informal remittance channels a key challenge for financial sector policy worldwide.

Most studies on foreign inflows to Sub-Saharan Africa have more often related to Aid, FDI and to a very limited extent remittances. This has constrained the depth and insight required by policy makers to minimising its negative externalities or harness remittance inflows as an alternative source of external finance for development.

Despite strong migration and remittance dynamics within Sub-Saharan Africa, studies on intra African flows are quite limited. Research has shown that approximately 20 percent of African migrants are within Africa and also remit back home (Barajas et al., 2010). This merits the need for intra African studies as well, in relation to the respective dominant migration destination.
One major critique of panel data estimations is the assumption of cross-sectional dependence of the error term (Baltagi, 2008). The empirical relevance of cross-sectional dependence of the error term in estimations on Sub-Saharan Africa has not been given specific mention in empirical literature. In the presence of cross-sectional dependence panel data estimations using instrumental variable and generalised method of moments approaches would provide very little efficiency gain over OLS estimators (Coakley et al. 2002; Baltagi, 2008; Phillips and Sul, 2003).

1.3 Objectives of this study

The objective of this study therefore is to;

- investigate which factors drive or constrain remittance inflows through formal channels into Sub-Saharan Africa and how remittances respond to changes in these factors,

- ascertain the effect of remittance inflows on macroeconomic variables of recipient economies in Sub-Saharan Africa, with a specific focus on the real exchange rate, its effect on the tradable sector, export competitiveness and consequently the current account balance. The aim is to ascertain whether there is a Dutch-disease effect due to remittance inflows or not. If not, is it due to the role of other fundamental determinants of the real exchange rate or monetary policy positioning?

- conduct regional and country-specific analysis within Sub-Saharan Africa using the Southern African Development Cooperation (SADC) region, Francophone West Africa (UEMOA), Anglophone West Africa (ECO) and East African Community (EAC) regions. This is due to strong intra-African migration patterns coupled with the varying impact of remittance inflows from region to region,

- ascertain the policy, institutional and market positioning required by stakeholders and policy makers to direct remittances through formal channels and thereon to more productive uses,

- investigate the empirical relevance of cross-sectional dependence in this study thereby addressing one major critique of panel data econometric estimation.

1.4 Importance and benefits of the study

- The findings of this study give very relevant insight to policy makers into what drives/constrain remittance inflows to Sub-Saharan Africa in the first place and how remittances respond to changes in these factors.

- The findings inform the requisite policy, institutional and market positioning required of key stakeholders to maximise the benefits of remittance inflows, whiles minimising its negative externalities. Results from country-specific analysis clearly show that the direction of remittances related policy would differ from country to country.

- The effect of remittances on the real exchange rate of the recipient economy is clarified in this study. Its effect on the tradable sector, export competiveness and the current account deficit is ascertained by the research findings. The role of other fundamental determinants of the exchange rate and monetary policy positioning which mitigate this effect and their policy implications are informed by the findings of this study.

- Country-specific analysis also clearly identifies which factors are relevant for policy attention in each country thereby giving detailed insight into what the direction of policy should be in each country. This addresses the lack of specificity in large sample estimations.

- This study contributes to scarce literature on remittance inflows to Sub-Saharan Africa and also fills the gap in the literature on intra-African remittance inflows.

- It also confirms the relevance of cross-sectional dependence in panel data estimations on sub-Saharan Africa and helps identify which specific countries in each region drive regional spatial dynamics.

- The findings of this study give the required insight into the tradeoffs that would be encountered by Sub-Saharan Africa countries looking to harness remittance inflows for more

productive purposes as has been done by several countries in South East Asia, South Asia, the Euro-Mediterranean Region and Latin America.

1.5 Delimitations

The data on remittance inflows used in this study only covers formal inflows as detailed on the World Bank and the International Monetary Fund data websites. This study acknowledges the fact that a significant amount of remittances flow through informal channels and have not been captured in this study.

Available data on remittances to Sub-Saharan Africa does not detail how much is sent for altruistic or self-interest purposes. Neither is there detailed data for all 35 countries on sources of inflows and patterns of use in the recipient countries across the entire sample period (1980-2008). This study therefore uses total remittance inflows for each country as a percentage of GDP, irrespective of source or patterns of use.

The use of the USA as a host country in this study is not the best choice for each country in the panel. However for a panel estimation of 35 Sub-Saharan Africa countries, the USA is the one single country where at least one representative economic agent from each of the 35 Sub-Saharan African countries can be found. Hence the justification for the recommendation for further research into other sub-regions within Sub-Saharan Africa using the dominant migration destination as the host country. This study does one such intra-African analysis using South Africa as the host country for countries in the SADC region.

Data on trade weighted real effective exchange rate from 1980 to 2008 is only available for 15 out of the 35 countries in the panel. Consequently this study follows precedence by existing literature and uses the real exchange rate in its analysis.

1.6 Outline of the Study

The rest of this study is organised as follows:

Chapter 2 addresses what drives remittance inflows to Sub-Saharan Africa using the LSDV approach with Driscoll and Kraay (1998) corrected standard errors and the two-step system GMM by Arellano and Bover (1995).

Chapter 3 looks into the effect of remittance inflows on the real exchange rate and whether the Dutch-disease effect is supported for Sub-Saharan Africa or not. The two-step system GMM by Arellano and Bover (1995) and feasible generalised least squares (FGLS) by Parks (1967) and Kmenta (1971, 1986) are used for the full sample estimations. Additionally, seemingly unrelated regressions (SUR) by Zellner (1962) are used for regional/country-specific analysis on the SADC, UEMOA, ECO and EAC regions.

Chapter 4 further fills the gap in the limited literature on intra African studies on remittances by looking into the case of the SADC region using South Africa as the host country. The LSDV approach with Kiviet (1995) correction and the two-step system GMM by Arellano and Bover (1995) are used for the full sample estimation and seemingly unrelated regressions (SUR) by Zellner (1962) used for country-specific estimations and analysis.

Chapter 5 concludes and makes recommendations with regards to policy implications and future research.

2. What drives remittance inflows to Sub-Saharan Africa. A dynamic panel approach

2.1 Introduction

The literature identifies two main reasons why migrants remit money home, which are altruism and self-interest motives. Altruism refers to the migrant's assistance to the family back home to meet basic family needs (Chami et al., 2005) whiles self-interest motives refer to returns-seeking purposes for remitting back home (Docquier and Rapoport, 2006). Remittance inflows sometimes involve a complex arrangement that incorporate features of both self-interest and altruism, such as risk diversification, consumption smoothing and intergenerational financing of investments (Docquier and Rapoport, 2006). Migrants also remit home, aimed at maintaining good family ties to improve their standing for inheritance purposes or ensure that their assets back home are properly taken care of. This is referred to as "enlightened self interest" (Lucas et al. 1985).

Remittances are also sent by migrants to reimburse their families for the cost of migration and education abroad and also serves as a co-insurance mechanism in which remittances sent home helps to support the migrant's family in times of crisis. This is based on the assumption that crisis times in the host and home countries are negatively correlated. Conversely for the migrant, having a family doing well back home to return to if need be is reassuring as "bad times" could also occur in the host country (Solimano, 2003; Addison, 2004).

Differences in patterns of migration have also been found to impact on migrant remittances with temporary migrants more geared towards returns-seeking purposes whiles permanent migrants display more altruistic behaviour (Glystos, 1997). Additionally, the degree of integration between the economies of host and home countries also plays a role. Where the degree of integration is high, an improvement in the host country's economic conditions results in some improvement in home country economic conditions. Consequently, although the income position of the migrant might have improved, from the altruistic perspective it does not trigger increased remittances back home since economic conditions of the migrant's family back home might also have improved (Coulibaly, 2009).

There is also the portfolio allocation choice perspective in which investment opportunities in the home country drive remittance inflows (Katseli and Glystos, 1986). Consequently, such inflows are influenced by the interest rate differential between home and host country, exchange rate expectations, institutional quality and economic policies in the home country. This is based on the assumption that the migrant maximises the total returns on his portfolio in the home country currency units. The relationship between the host country interest rate and remittance inflows *a priori,* has been found to be ambiguous. In the short run, an increase in the host country interest rates could cause the migrant to increase his investments in the host country, adversely affecting remittances sent back home. However in the medium to long term, returns on his investments would improve his level of income and wealth, which is likely to have a positive impact on remittances sent home. In terms of high home country interest rates Katseli and Glystos (1986) found no relationship with remittance inflows.

The factors that drive remittance inflows into Sub-Saharan Africa as well as specific corridors within Sub-Saharan Africa have been addressed to a much lesser extent than other foreign inflows such as FDI, aid and portfolio investments (Opoku-Afari et al., 2004; Quartey and Blankson, 2004; Sackey, 2001). However this is not the first paper to address the determinants of remittance inflows into Sub-Saharan Africa. Recently, the determinants and macroeconomic impact of remittance inflows have been looked at by Singh et al. (2010) for 36 Sub-Saharan African countries from 1990 to 2005. Using fixed effects/fixed effects 2SLS they found that remittances to Sub-Saharan Africa were largely altruistic in nature, consistent with the countercyclicality literature on remittance inflows, and that countries with more citizens in the diaspora or in wealthier host countries received more remittance inflows. Singh et al. (2010) also found that although remittances negatively affected economic growth countries with well functioning domestic institutions were better placed to optimise the benefits of remittance inflows towards enhancing economic growth.

Using a wider dataset than in Singh et al. (2010), from 1980 to 2008, this paper seeks to add to scarce literature on remittance inflows to Sub-Saharan Africa by determining which of these factors identified in the literature drive remittances into Sub-Saharan Africa and how remittances

respond to changes in these factors. Secondly, we differ from most previous work by testing for cross-sectional dependence between the countries in the panel using the Pesaran (2004) CD test[1] and controlling for it, thereby addressing one major critique of panel data estimations. Cross-sectional dependence implies that the error term is contemporaneously correlated across cross-sections. In the presence of cross-sectional dependence of the error terms, methods that assume cross-sectional independence would result in estimators that are inefficient with biased standard errors which lead to misleading inference. Consequently, panel data estimations using instrumental variable and generalised method of moments approaches would provide very little efficiency gain over OLS estimators (Coakley et al. 2002; Baltagi, 2008; Phillips and Sul, 2003). Thirdly, 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 as in Huang et al. (2006) we measure host country economic conditions using a composite variable created by principal component analysis. It consists of the real GDP per capita, end of period inflation rate, M2 and the Federal Fund Rate (FFR) of the US. 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 FFR is a policy signal of the cost of borrowing or returns on investment whiles M2 measures the deposit gathering ability or quality of financial service delivery in the host country which has a bearing on the migrant's access to finance. 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.

2.2 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

[1] The properties of other tests such as the Frees (1995) test and Friedman (1937) test for cross-sectional dependence are suited for static panel data estimations and not dynamic panel estimations.

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.

$$\text{Max } U_t = \sum_{t=1}^{T} \beta^t \left(\gamma_t LnA_t + \theta_t LnC_t^m + \phi_t LnC_t^h\right) \quad (1)$$

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, whiles ϕ 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.

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

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

$$A_t > 0 \tag{4}$$

$$P_t^h C_t^h = P_t^h Y_t^h + e_t r_t^m \tag{5}$$

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 whiles 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 whiles r_t^m is the remittances sent by the migrant to his family for altruistic reasons in host country currency units[2].

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 holding 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

[2] 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.

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

From first-order conditions and at the optimum[3]

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

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 (ϕ_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 reasons.

[3] See Appendix 1 for details of the framework

$$\frac{\delta r_t^m}{\delta Y_t^m} = \frac{\phi_t}{\theta_t e_t} \tag{9}$$

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 (Katseli and Glystos, 1986). It is an increasing function 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 dollar 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.

$$\frac{\delta R_t^m}{\delta A_t} = \frac{P_t^h}{e_t} - \beta \frac{P_{t+1}^h}{e_{t+1}} \tag{10}$$

Equation (10) above shows that the need to finance or acquire physical assets back home has a positive relationship with remittances sent home by the migrant besides for altruistic reasons alone.

The migrant's allocation of financial assets between the host and the home countries depend on the returns on his financial holdings in the home and host countries. The migrant's response to investment opportunities in the host country as represented by host country interest rates is expressed in equation (11) as,

$$\frac{\delta R_t^m}{\delta i_t^m} = F_{t-1}^m \tag{11}$$

whiles his response to investment opportunities in the home country as represented by home country interest rates is given in equation (12) as

$$\frac{\delta R_t^m}{\delta i_t^h} = \frac{1}{\mathrm{e_t}} \left[-F_{t-1}^h\right] \tag{12}$$

Thus from equations (11) and (12) the theoretical framework indicates that the migrant would remit less if the host country interest rate is high relative to the home country interest rates if the purpose for remitting is for investment.

2.3 Data and methodology

Table 2.1 details the data used and how variables are measured. Data on all variables for the 35 Sub-Saharan African[4] countries included in the panel are obtained from the World Development Indicators of the World Bank, complimented with data from the International Monetary Fund.

[4] Benin, Burundi, Botswana, Burkina Faso, Cameroun, Cape Verde, Comoros, Cote D'Ivoire, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritius, Mauritania, Mozambique, Niger, Nigeria, Republic of Congo, Rwanda, Senegal, Seychelles, Sierra Leone, Swaziland, South Africa, Tanzania, Togo, Uganda, Zambia.

Table 2.1: Sources and definition of variables

	Variable	Source	Definition
GDPC	Home country income level in Sub-Saharan Africa	World Bank	Annual GDP per capita in 2000 US constant prices.
Ym	Economic conditions of the host country	IMF, World Bank	A composite variable created using principal component analysis. It comprises of the real GDP per capita, end-of-period inflation rate, M2 and the Federal Fund Rate of the US.[5]
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 SSA countries and the US.
RER	Real exchange rate	IMF, World Bank	Nominal exchange rate to the US dollar multiplied by the ratio of the CPI of US (2000 = 100) to the aggregate price level (GDP deflator 2000 = 100) for the SSA countries
M2	Market sophistication	World Bank	Money and quasi money as a percentage of GDP.

[5] 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 no different.

2.3.1 Descriptive statistics and stylised facts

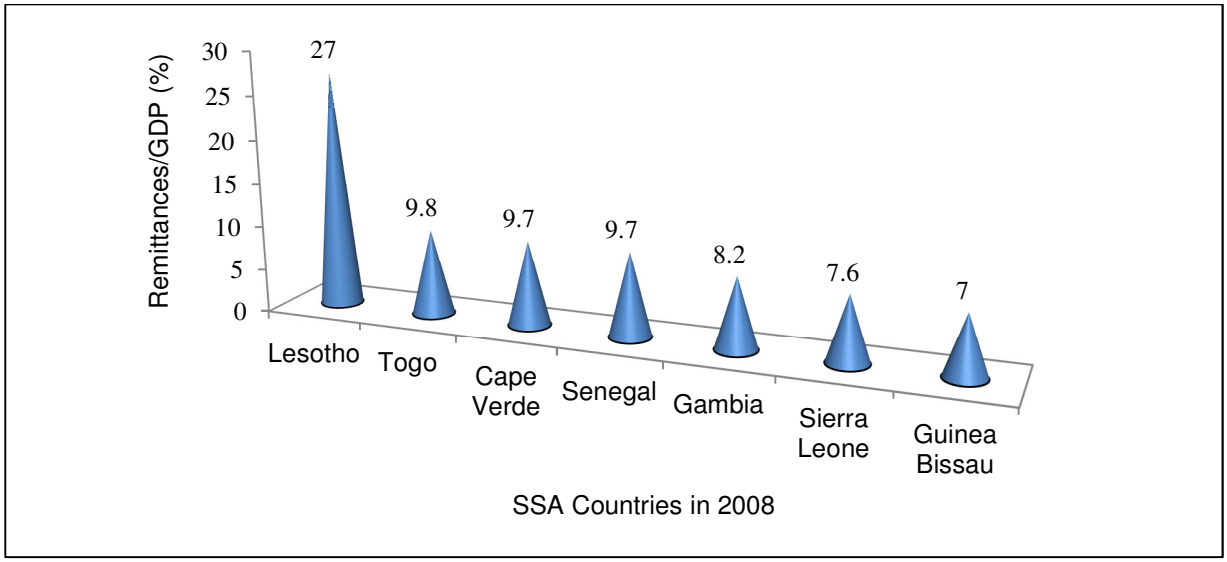
Table 2.2 contains a summary of descriptive statistics of variables used in this study. Remittance as a percentage of real GDP per capita averaged 5.4 percent in sub-Saharan Africa from 1980 to 2008. However certain countries exceeded the regional average. Remittances to Lesotho as a percentage of GDP averaged 58.7 percent over the period, followed by Cape Verde 12.2 percent and Swaziland 7.1 percent. West Africa generally registered higher remittance inflows as a percentage of GDP (between 3.3 and 4.3 percent) than East and Southern Africa (between 0.6 to 2.5 percent, and 0.02 to 1.8 percent, respectively). It is known that West Africa generally registers lower economic growth levels and higher rates of inflation than Southern and Eastern African countries. This trend is consistent with the altruism literature that bad economic conditions attract more remittance inflows from migrants. M2 as a percentage of GDP averaged 25.3 percent across the period.

Table 2.2: Descriptive statistics of variables

Variable	Mean	Min	Max	Obs.
REM	5.40	0.00111	227.70	1015
Ym	987.15	-2.71	43 943.34	1015
GDPC	897.40	102.29	8 208.32	1015
M2	25.30	0.25	117.36	1015
RER	462.64	1.76	8 302.57	1015
Idif	-0.79	-26.65	51	1015

As a ratio to GDP in 2008, remittances to Lesotho ranks highest at 27% of GDP. Togo, Cape Verde and Senegal follow with approximately 10% of GDP, The Gambia 8.2%, Sierra Leone 7.6%, and Guinea Bissau 7% (World Bank, 2009). Figure 2.1 depicts remittances as a ratio to GDP in the 7 highest remittance recipient countries in Sub-Saharan Africa in 2008.

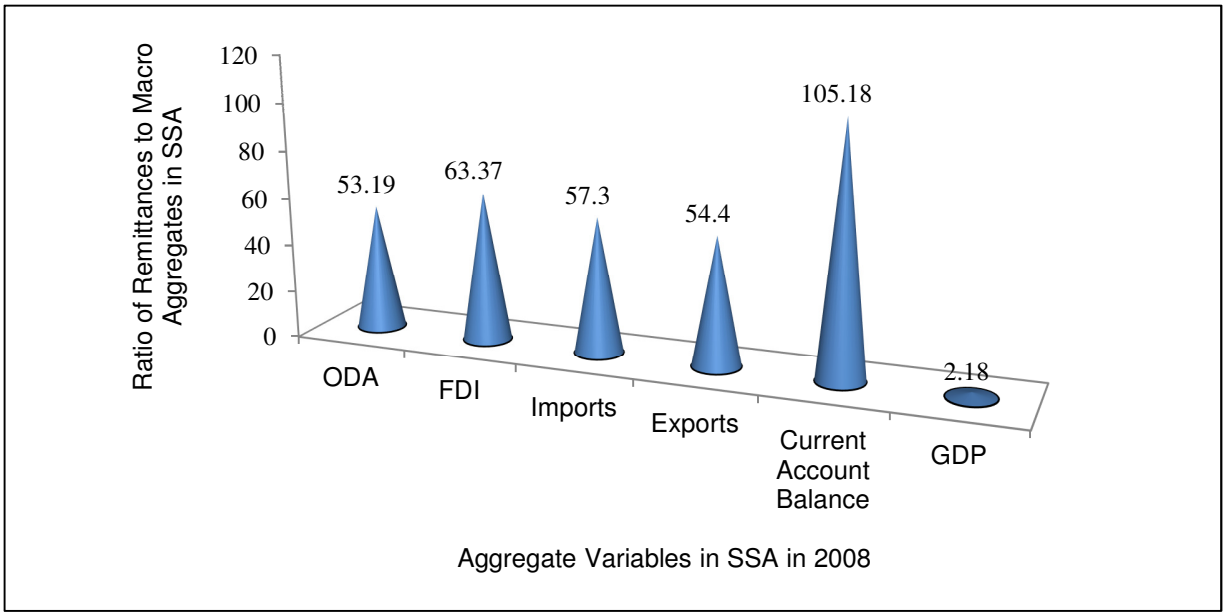
Figure 2.1: Remittances as a ratio to GDP in highest remittance recipients in SSA in 2008



Data Source: World Development Indicators, World Bank

As at end 2008, remittances to Sub-Saharan Africa were 53 percent of ODA and 63 percent of FDI to the region (see Figure 2.2). As at end 2008, remittance inflows to Sub-Saharan Africa were 54 percent and 57 percent of regional exports and imports respectively and exceeded the regional current account surplus by 5 percent. This underlines the relevance of remittance inflows to the balance of payments and its potential to supplement financing of the external gap in recipient countries and regions.

Figure 2.2: Ratio of remittances to regional aggregates in SSA in 2008



Data Source: World Development Indicators, World Bank. WDI Online

2.3.2 Cross-correlation analysis

Cross-correlation analysis is used to ascertain the correlation between remittances and the other variables. From Table 2.3, remittances are negatively correlated with real GDP per capita in the home country and statistically significant at the 1 percent level.

Table 2.3: Cross-correlations of variables

Variables	REM	REM(-1)	Idif	M2	RER	GPCC	Ym
REM	1						
REM(-1)	0.81***	1					
Idif	0.02	0.02	1				
M2	0.15***	0.15***	-0.03	1			
RER	-0.08***	-0.08**	0.04	-0.14***	1		
GDPC	-0.09***	-0.09***	0.01	0.57***	-0.15***	1	
Ym	0.07**	0.07**	0.01	0.08**	-0.05	-0.06*	1

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

This is consistent with the altruism literature that remittance inflows mitigate economic downturns in the home country. Host country economic conditions are positively correlated with remittance inflows and statistically significant at the 5 percent level, denoting that Sub-Saharan Africa migrants remit more when an improvement in host country economic conditions improves their income positions. M2 is positively correlated with remittance inflows at the 1 percent level. This underlines the relevance of the quality of financial services to formal remittance inflows and confirms the literature that countries with quality institutions and well-developed financial sectors are better placed to receive more remittances through normal channels and thereon harness them for more productive uses (Singh et al., 2010). There is also a negative and statistically significant correlation between remittances and the real exchange rate. This needs to be interpreted cautiously. An increase in the real exchange rate, which denotes a depreciation of home country currency, is associated with adverse economic trends and would therefore have a positive relationship with altruistic remittance inflows and a negative relationship with self-interest/returns-seeking inflows. On the contrary, a decrease in the real exchange rate which denotes an appreciation and consequently strong economic fundamentals would have a positive relationship with self-interest remittance inflows. The interest rate differential is positively correlated with remittances but statistically insignificant.

Besides these general trends, there are country-specific differences. Focusing on the seven highest recipient countries of remittances as a percentage of GDP in Sub-Saharan Africa in 2008 we report on some of these differences. First of all, the cross-correlation coefficients are much higher than in the sample wide analysis.

Table 2.4: Country-specific cross-correlations of remittances and other variables

	CVE	GAM	GNB	LES	SEN	SLE	TOG
Idif	0.47**	0.67*	-0.35***	0.01	0.38**	-0.30	0.38**
GDPC	0.31	0.19	-0.49*	-0.61*	0.74*	-0.48*	-0.39**
RER	0.39**	0.52**	0.56*	0.61*	0.87*	0.79*	0.49*
M2	0.30	0.61*	0.46**	0.53*	0.89*	0.03	-0.20
Ym	0.43*	0.57*	0.61*	-0.60*	0.74*	0.75*	0.83*

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

Table 2.4 uses the sign, magnitude and significance of the correlation coefficients as a proxy to determine the main driver of remittance inflows to each country. For Lesotho the negative and high correlation between remittances and home country income denotes strong altruistic patterns. For Togo and Guinea Bissau the positive and high correlation between remittances and host country income shows that host country economic conditions is the driver of remittance inflows to these two countries. Similarly, investment opportunities in the home country evidenced by the positive correlation between remittances and the interest rate differential mainly drives remittances to Cape Verde and Gambia. Exchange rate expectations and host country income feature strongly for Sierra Leone and Senegal, however for Senegal, the quality of the financial services sector ranks highest among the other variables. This can be seen from the high and positive correlation between M2 and remittance inflows to Senegal. These results give useful insight into what the policy target should be in each of the respective countries in

their efforts to harness remittance inflows as an additional source of external finance for development.

Since correlation does not necessarily imply causality, there is the need to ascertain these trends empirically. We also need to establish that the relationships derived from the theoretical framework are consistent with an empirical estimation of the data

2.3.3 Model specification and estimation technique

As a result of the strong persistence behavior of remittance inflows the model is specified as a dynamic panel model which includes one or more lags of the dependent variable.

$$y_{it} = \delta y_{i,t-j} + X_{it}^{'} \beta + \varepsilon_{it} \quad (13)$$

where $Y_{i,t}$ = *NT x1* vector of dependent and endogenous variables. $X_{it}^{'}$ represents an *NT x k* vector of lagged endogenous regressors other than the lag of the dependent variable, β denotes a *k x m* vector of slope coefficients and ε_{it} the error term. An OLS estimation of equation (13) as specified above depicts that all the variables are relevant to changes in remittance inflows and together explain as much as 64 percent of variations in remittance inflows to Sub-Saharan Africa. Table 2.5 details the results of initial diagnostic tests performed on pooled OLS and fixed effects models.

Table 2.5: Initial diagnostic tests

Test	Test statistic	Critical value	Inference
Joint validity of cross-sectional individual effects $H_0: \mu_1 = \mu_2 \ldots . \mu_{N-1} = 0$ H_A : *Not all equal to 0*	F Stat = 15.12	$F_{(0.05,\ 34,\ 939)}$ = 1.442	Cross-sectional specific effects are valid.
Joint validity of time (period) fixed effects $H_0: \lambda_1 = \cdots \lambda_{T-1} = 0$ H_A: *Not all equal to 0*	F Stat = 44.51	$F_{(0.05,\ 27,\ 947)}$ = 1.498	Time-specific fixed effects are valid. The error term takes a two way error component form.
Serial correlation (two-way model) LM test for first order serial correlation, given fixed effects $H_0: \rho = 0; \quad H_A = \rho > 0$	LM = 3.44	N(0,1) = 1.645	First order serial correlation, given fixed effects.
Heteroscedasticity $H_0: \sigma_i^2 = \sigma^2$ H_A : *Not equal for all i*	LM = 817.59	$\chi^2_{(34)}$= 48.60	The variance of the error term is not constant. Heteroscedasticity is present.
Hausman specification test H_0 :$E(\mu_{i,t}/X_{i,t}) = 0$ H_A :$E(\mu_{i,t}/X_{i,t}) \neq 0$	m_3 = 160.11	$\chi^2_{(6)}$= 12.60	Regressors not exogenous.
Pesaran CD (2004) test for cross-sectional dependence H_0 : *corr* $(\mu_{i,t}, \mu_{j,t}) = 0$ *for i* $\neq j$ H_A : *corr* $(\mu_{i,t}, \mu_{j,t}) \neq 0$ *for some i* $\neq j$	CD = 1.66 (0.37)	Prob = 0.90	Results inconclusive. While we fail to reject the null of cross-sectional independence, a cross-correlation coefficient of 0.37 is reported.

Tests for joint validity of individual effects reveal that both cross-sectional and time specific effects are valid. This implies that equation (13) is mis-specified and the OLS estimators are biased. Consequently the error term takes a two-way error component form and the model is re-specified as

$$y_{it} = \delta y_{i,t-1} + X_{it}^{'} \beta + \mu_i + \lambda_t + v_{it} \quad (14)$$

where μ_i represent country-specific effects, λ_t time effects and v_{it} the idiosyncratic error term.

Tests for cross-sectional dependence of the error terms using the Pesaran (2004) CD test are inconclusive. Although the test results show a correlation coefficient of 0.37 of the error term across cross sections, we fail to reject the null of cross-sectional independence. For robustness Frees (1995) and Friedman (1937) tests were also conducted but again yield conflicting results. While the Frees test rejects the null of cross-sectional independence, the Friedman test fails to reject the null of cross-sectional independence. It is however recognised in this study that the properties of the Frees (1995) and Friedman (1937) tests for cross-sectional dependence are suited for static panel data estimations and not dynamic panel estimations. Thus the results of the Frees and Friedman Tests are unreliable for dynamic panel estimations. Only the Pesaran (2004) test under FE/RE is suited for dynamic panel estimations (De Hoyos and Sarafidis, 2006). Thus on the basis of the Pesaran (2004) test results we fail to reject the null of cross-sectional independence in this study[6].

[6] As a result of the correlation coefficient returned by the Pesaran (2004) test we still provide for the possibility of the existence of cross-sectional dependence with a LSDV estimation using the Driscoll and Kraay (1998) robust standard errors.

Table 2.6: Tests for cross-sectional dependence

Test	Test statistic	Prob. Value	Distribution	Inference
Frees (1995, 2004) test	6.01	α = 0.10:0.09 α = 0.05:0.12 α = 0.01:0.17	Frees' Q distribution	Cross-sections are dependent
Friedman (1937) test	25.472	Pr=0.85	$\chi^2_{(T-1)}$	Cross-sections are independent

Note: for all test H_0: corr $(\mu_{i,t}, \mu_{j,t}) = 0$ for $i \neq j$; H_A: corr $(\mu_{i,t}, \mu_{j,t}) \neq 0$ for some $i \neq j$

To determine the order of integration of the variables we take preference to unit root methods that assume individual unit root processes due to the validity of fixed effects. These are the Im, Pesaran and Shin test (2003), ADF-Fisher Chi-square test and PP-Fisher Chi-square (1932) tests (Maddala et al. 1999; Baltagi, 2008). Table 2.6 details the results of the tests for cross-sectional dependence.

Table 2.7: Order of integration of variables

Variable	In levels	In first-differences	Obs.
REM	I(0)		1015
Ym	I(1)	I(0)	1015
GDPC	I(1)	I(0)	1015
M2	I(1)	I(0)	1015
RER	I(1)	I(0)	1015
Idif	I(0)		1015

Equation (14) is based on the assumption that there is no serial correlation present in the error term and the regressors are strictly exogenous E (v_{it} | x_{i1}….,x_{in}, μ_i) = 0. The Hausmann test for endogeneity rejects the null of exogeneity, meaning the regressors and the fixed effect error terms are correlated. All the regressors in this model are assumed to be endogenous. This is because they are all determined by additional factors that are not specifically captured in this model and are likely to be reflected in the error term. Additionally, by construction the lag of the dependent variable $y_{i,t-1}$ is correlated with the fixed effects μ_i error term. The Lagrange Multiplier test for first order serial correlation given fixed effects rejects the null of no first order serial correlation. This violates an assumption necessary for consistency of OLS estimators resulting in biased and inconsistent estimators (Nickell, 1981).

Empirical literature posits a number of approaches to addressing this endogeneity problem. One such approach is the Within Group Estimation which transforms each variable into deviations from the mean. However the standard errors of the coefficient estimates are biased because they do not take into account the loss of degrees of freedom prior to the transformation process. Additionally, under the Within Group transformation, the lagged dependent variable correlates negatively with the lagged error term whiles the dependent variable is also symmetrical to the idiosyncratic error term. Thus the endogeneity problem still persists after the Within Group transformation. Nickell (1981) also demonstrated that the Least Square Dummy Variable approach (LSDV) to dynamic panel estimations generates biased estimates when *T* is small but the bias approaches zero as *T* approaches infinity. Thus LSDV performs well only when the time dimension of the panel is large. Although a large *T* sometimes corrects this situation, Judson and Owen (1999) found in simulations that in LSDV dynamic panel estimations there was still a twenty percent bias of the coefficient of interest even when *T = 30.* However errors of this magnitude still results in estimates with the correct sign (Judson et al. 1999). Kiviet (1995) suggests using higher order asymptotic expansion techniques to correct for the LSDV bias. The latter technique is most suitable for small *T* and moderate *N(10 < N < 20).*

Alternatively, the lag of the dependent variable $y_{i,t-1}$ and other similarly endogenous variables could be instrumented for with instruments that are uncorrelated with the fixed effects. To circumvent the difficulty of finding appropriate instruments, instruments are drawn from within the dataset. The Anderson & Hsiao (1981) two-stage least squares approach suggests first differencing the model to remove the unobserved heterogeneity, after which second-order lags of the dependent variable, either differenced ($\Delta y_{i,t-j}$) or in levels ($y_{i,t-j}$) are used as instruments, where *j = 2……..T.* The difficulty with this approach is the loss of data due to the use of higher-order lags. Additionally, observations for which lagged observations are not available would have to be dropped, further aggravating data loss. Another approach is to transform the data using first-level differencing which removes the fixed effects. Lagged levels of potentially endogenous variables are then used as instruments (Holtz-Eakin, Newey & Rosen, 1988; Holtz-Eakin, 1988; Arellano and Bond, 1991). However this approach also has its shortcomings.

First differencing equation (14) in general terms gives

$$y_{i,t} - y_{i,t-1} = \delta(y_{i,t-1} - y_{i,t-2}) + \beta' (X_{i,t} - X_{i,t-1}) + (\nu_{i,t} - \nu_{i,t-1}) \quad (15)$$

which yields $$\Delta y_{i,t} = \delta \Delta y_{i,t-1} + \beta' \Delta X_{i,t} + \Delta \nu_{i,t} \quad (16)$$

Although the fixed effects are eliminated, the first differencing approach has a number of weaknesses. The $y_{i,t-1}$ term in $\Delta y_{i,t-1}$ is a function of $\nu_{i,t-1}$ which is also included in $\Delta \nu_{it}$. This implies that $\Delta y_{i,t-1}$ is still correlated with $\Delta \nu_{it}$. Differencing also makes successive error terms correlated even if they weren't correlated before the transformation. For instance $\Delta \nu_{it} = \nu_{it} - \nu_{i,t-1}$ and $\Delta \nu_{i,t-1} = \nu_{i,t-1} - \nu_{i,t-2}$. These two are correlated by virtue of the common term $\nu_{i,t-1}$. Thirdly, differencing magnifies the gaps in unbalanced panels. If an y_{it} observation is missing, then both Δy_{it} and $\Delta y_{i,t+1}$ will also be missing in the transformed data (Love and Zichinno,

2006). Blundell and Bond (1998) found that in dynamic panels, instrumental variables and the first-difference GMM estimator suffer from small sample bias due to weak instruments. To address this, Blundell and Bond (1998) use an extended system estimator that uses lagged differences of $y_{i,t}$ as instruments for equations in levels in addition to lagged levels of $y_{i,t}$ as instruments for equations in first differences. Although the system estimator is more efficient than the first-difference estimator, it results in estimators which are inefficient with standard errors severely biased downwards. Although this downward bias could be corrected with the Windmeijer (2005) robust estimator the problem still persists in the presence of cross-sectional dependence. This is because all these estimation techniques detailed above assume cross-sectional independence of the error term and would therefore result in estimators that are inefficient with biased standard errors under cross-sectional dependence (Coakley et al. 2002; Baltagi, 2008; Phillips and Sul, 2003).

The results of the initial diagnostics warrant the use of an estimation technique that preserves homoscedasticity, prevents serial correlation and also preserves the orthogonality between transformed variables and lagged regressors (Arellano and Bover, 1995), meaning E[$x_{it-S}\ \tilde{\varepsilon}_{i,t}$] = 0, for all s≥ 0 (Holtz-Eakin et al. 1988). Consequently, the model is estimated using the Arellano and Bover (1995) two-step system GMM with forward orthogonal deviations instead of differencing. For robustness an LSDV estimation is also done using Driscoll and Kraay (1998) robust standard errors to correct for the possibility of the existence of cross-sectional dependence of the error term. The Driscoll et al. (1998) standard errors are robust to general forms of cross-sectional and temporal dependence when *T* is moderately large and are suitable for both balanced and unbalanced panels.

To address the endogeneity, the data is first of all time demeaned to remove time-effects by expressing all variables in the model as deviations from year-specific means. This is also known to correct moderate levels of cross-sectional dependence (De Hoyos et al., 2006). The cross-sectional specific effects are then eliminated using forward orthogonal deviations thereby making 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). Let $\bar{y}_{i,t}$ denote the forward means of y_{it} in the vector $Y_{i,t}$. Also let

$\bar{\varepsilon}_{i,t}$ represent the forward mean of $\varepsilon_{i,t}$ in the vector $\epsilon_{i,t}$. The Helmert's transformations are then given by

$$\tilde{y}_{i,t} = \partial_{it}(y_{it} - \bar{y}_{i,t}) \quad (17)$$

and

$$\tilde{\varepsilon}_{i,t} = \partial_{it}(\varepsilon_{i,t} - \bar{\varepsilon}_{i,t}) \quad (18)$$

where $\partial_{it} = \sqrt{(T_i - t)/(T_i - t + 1)}$ and T_i the last year of data available for a given country series. Since there are no future values for the last year of data, it is not possible to construct forward means, thus we lose this observation (Love et al. 2006).

The transformed models in reduced form are finally given by

$$\tilde{Y}_{i,t} = \Gamma(L)\tilde{Y}_{i,t} + \tilde{\varepsilon}_{i,t} \quad (19)$$

where $\Gamma(L) = \Gamma_1 L + \Gamma_2 L^2 + \ldots + \Gamma_p L^p$, a matrix polynomial in the lag operator. (20)

Another advantage of this approach is that it is more resilient to missing data. It is computable for all observations except the last for each cross-section, hence minimising data loss (Roodman, 2006).

2.4 Empirical results

Table 2.8: Empirical results: OLS, LSDV and two-step system GMM

Dependent variable: REM

Variable	OLS	LSDV[7]	Two-step system GMM (ARBover, 1995)[8]
REM(-1)	0.80***	0.44**	0.42***
GDPC	-0.0003*	-0.002**	-0.003***
Ym	0.02*	0.24**	0.29***
Idif	0.0007*	0.01*	0.05***
M2	0.04	0.11**	0.13***
RER	-0.0001*	0.0002	-0.0002**
C	0.06*	2.21**	
Adjusted R^2	0.64	0.71	
ABond test for second-order serial correlation			Prob > z = 0.32
Hansen test for over-identification			Prob > $\chi^2 = 0.98$
Diff. in Hansen test for exogeneity of instrument subset.			Prob > $\chi^2 = 0.98$

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

[7] The Kiviet (1995) correction for the LSDV small sample bias was also applied but the results were not meaningful. This is because the LSDV bias is known to improve as *T* increases.

[8] The two-step system GMM estimation involved forward orthogonal deviations of the regressors instead of differencing. The results of the estimation satisfy all post-estimation diagnostics, being the Arellano & Bond (1991) test for second order serial correlation and the difference in Hansen test for exogeneity of instruments. In the absence of cross-sectional dependence of the error terms these results are adequately robust and well aligned to *a priori* expectations.

It can be observed that the results of the LSDV estimation which includes correction for the possibility of cross-sectional dependence are significantly no different from the forward orthogonal two-step system GMM results. The Kiviet (1995) LSDV small sample bias was also done but the results were not meaningful. This is because the LSDV bias is known to improve as *T* increases (Nickel, 1981). Furthermore the Kiviet (1995) correction is most suitable for small *T.*

Using the two-step system GMM results the coefficient of lagged remittances is positive and statistically significant at the 1 percent level. Although the coefficient has been corrected downwards as compared to the OLS estimation it still denotes strong persistence behaviour in remittance inflows to Sub-Saharan Africa. Home country income as expected is negatively signed and statistically significant at the 1 percent level however the magnitude of the coefficient remains low. This confirms earlier findings in the cross-correlation analysis of a negative but weak relationship between remittance inflows and home country income.

The coefficient of host country economic conditions is positive and statistically significant at the 1 percent level. This indicates that Sub-Saharan African migrants remit more when an improvement in the economic conditions of the host country improves their income levels. This corroborates earlier findings by Singh et al. (2010) that countries with more migrants in wealthy countries receive more remittance inflows than otherwise. The degree of market sophistication (M2) is positively signed and statistically significant at the 1 percent level. This aligns with *a priori* expectations as well as earlier trends in the cross-correlation analysis. Thus the degree of market sophistication is a key factor to be considered in efforts aimed at directing remittance inflows through formal channels into Sub-Saharan Africa and thereon for more productive uses.

The coefficient of the interest rate differential is positively signed and statistically significant at the 1percent level. This indicates that Sub-Saharan African migrants would take advantage of investment opportunities in their home countries under the right conditions.[9] However, this is conditioned on exchange rate expectations being well anchored. The coefficient of the real exchange rate is negatively signed and statistically significant at the 1 percent level. This implies

[9] Confidence issues and exchange rate expectations are additional determining factors.

that an expected depreciation of the real exchange rate which signals adverse economic conditions back home would result in a fall in remittance inflows whiles an expected appreciation of the real exchange rate which signals strong economic fundamentals would result in an increase in remittance inflows. The assumption that returns on investment are in home country currency units means that a depreciation of the exchange rate represents a loss of value to the returns seeking migrant. These results - especially the interest rate differential and the real exchange rate - are consistent with self interest motives for remittances and not altruistic motives.

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 whiles the Difference in Hansen test also fails to reject the null that the instrument subset are strictly exogenous. Hence the results of the two-step system GMM estimation with forward orthogonal deviations meet all post-estimation diagnostic requirements. All coefficient estimates compare favourably with the OLS and LSDV coefficient estimates. This shows that they are likely good estimates of the true parameters of the variables.

2.5 Conclusion, policy implications and future research

The empirical results confirm that host country economic conditions and self-interest motives are a stronger driver of remittance inflows to Sub-Saharan Africa than altruism and home country economic conditions. This modifies earlier findings by Singh et al. (2010).

Secondly, the degree of market sophistication is the key factor to be considered if remittance inflows into Sub-Saharan Africa through formal channels are to be maximised. This corroborates earlier findings by Singh et al. (2010) and Gupta et al. (2007) that countries with well-developed financial services industries stand a better chance of attracting more remittance inflows through formal channels and thereon the opportunity to channel them into more productive uses.

Furthermore, the positive and statistically significant coefficient of the interest rate differential improves earlier findings by Katseli and Glystos (1986) that home country interest rates had no relationship with remittance inflows. Hence Sub-Saharan African migrants would take advantage of investment opportunities under the right conditions. This is more consistent with self-interest remittance inflows than altruism. The self-interest motive is further strengthened by the negative and statistically significant coefficient of the real exchange rate. This is understandable due to the assumption that returns on investment are assumed to be in home country currency units hence an expected real exchange rate appreciation would be preferred to a depreciation by returns-seeking migrants. These results confirm that although some degree of altruism pertains in remittance inflows to Sub-Saharan Africa, self-interest or returns-seeking motives are a much stronger driver of remittance inflows to Sub-Saharan Africa than altruism.

With respect to policy recommendations, economic fundamentals (e.g. the real exchange rate) need to be strong to generate the right confidence levels if countries are to be able to harness remittance inflows from the diaspora for development finance. Coupled with an improved level of market sophistication, i.e. the products and services provided by financial service providers, the enabling environment would be created to direct remittance inflows through formal channels and thereon for more productive uses. This would further mitigate its negative impact on macroeconomic variables such as money supply growth, inflation and the exchange rate. It would also help alleviate its influence on money laundering, fraud, terrorism financing and illegal forex markets. Many countries in Latin America, South Asia, Eastern Europe and Mediterranean regions have been able to finance several development projects through diaspora targeted debt instruments. In light of dwindling portfolio investments, FDI and ODA saddled with unfavourable conditionalities, Sub-Saharan African countries could also harness remittance inflows as an alternative source of external finance for development if the right products and services are designed by financial service providers, economic fundamentals are strong, exchange rate expectations are well anchored and the right confidence levels are ensured.

It is clear from the results of the preceding chapter that exchange rate considerations play a key role in the ability of countries to harness remittance inflows as an alternative source of finance for development. Since returns on investment are assumed to be in home currency units,

returns-seeking migrants would prefer a strong exchange rate to a depreciated exchange rate to avoid loss of value. This is consistent with earlier findings by Higgins (2004). On the other hand, foreign inflows are also known to appreciate the real exchange rate of the recipient economy, adversely affects export competitiveness and consequently worsen the trade deficit - referred to as the Dutch-disease effect (Corden and Neary, 1982). There seems to be a tradeoff between maintaining a strong real exchange rate to attract returns-seeking remittances as an alternative source of finance for development on one hand and maintaining export competitiveness and a sustainable current account deficit on the other hand. What are the options for Sub-Saharan African countries? The next chapter addresses this question.

3. Remittances and the Dutch disease in Sub-Saharan Africa

3.1 Introduction

A stable real exchange rate has been found to be one of the key factors to be considered if Sub-Saharan African countries are to be able to harness remittance inflows as an alternative source of finance for development (Kemegue et al., 2011). This is based on the assumption that returns on investment are in home country currency units (Katseli and Glystos, 1986). On the contrary, the Dutch-disease theory of Corden and Neary (1982)[10] posits that increases in foreign inflows could cause the underlying real exchange rate of the recipient economy to appreciate, adversely affecting export competitiveness, and consequently the trade deficit. This would further result in the contraction of the tradable sector of the recipient economy leading to a decline in manufacturing and production of other tradable goods. These two theories raise an issue with the direction of causality between remittances and the real exchange rate. Which is dominant, the impact of a strong exchange rate in driving remittance inflows or the impact of remittance inflows in appreciating the real exchange rate of recipient countries? Or is there reverse causality between remittance inflows and a strong real exchange rate?

On the domestic front an increase in remittance inflows - all things being equal - increases the disposable income of recipient households leading to an increase in aggregate demand. This spending effect results in higher relative prices of non-tradable goods as prices of tradable goods (imports) are assumed to be exogenously given (Acosta et al., 2007). The higher prices of non-tradable goods lead to an expansion of the non-tradable sector. Assuming that resources are perfectly mobile, there could be a reallocation of resources (labour) from the tradable to the non-tradable sector. Besides this reallocation of resources, remittance receiving households are also known to sometimes reduce labour supply (Amuedo-Dorantes and Pozo, 2006). Assuming

[10] The phrase “Dutch disease” was first used to describe a situation in the Netherlands in which the development of natural gas on a large scale led to a sharp appreciation of the real exchange rate to the detriment and contraction of the manufacturing sector in the Netherlands. Since then it has been used to describe situations in which a natural resource boom, large foreign aid or capital inflows have caused a real exchange rate appreciation that adversely impacts on the manufacturing sector (Acosta et al., 2007).

resources are fully utilised this could increase the marginal cost of labour in the tradable sector, leading to a hike in production costs and a further contraction of the tradable sector (Acosta et al., 2007). These adverse effects of an increase in foreign inflows (in this case remittances) on the real exchange rate, loss of export competitiveness, the tradable sector and trade deficit are referred to as the Dutch-disease effect of remittance inflows (Corden and Neary, 1982). This is however based on the assumption that households spend remittances mainly on non-traded goods. However, if households spend remittances on traded goods then the Dutch-disease effect would be weakened or entirely absent (Izquierdo and Montiel, 2006).

Most Sub-Saharan African countries are characterised by low production capacities, hence trade is liberalised and the non-tradable sector is largely supplemented by massive imports, which are mostly of better quality and therefore largely preferred to locally produced goods. In the medium to long term, the increase in household disposable income would also increase demand for imports through income and substitution effects. This could lead to an increase in demand for foreign currency which has a depreciating effect on the domestic currency over time (Acosta et al., 2007). This depreciation of the domestic currency could over time stimulate export revenue and consequently appreciate the real exchange rate, all things being equal. Additionally, the increased demand for imports could also result in an increase in the price of tradables which could fuel domestic inflation. An increase in domestic prices also requires an appreciation of the real exchange rate to restore internal balance (Montiel, 1999). The extent to which this latter appreciation caused by increased export revenue and domestic inflation mitigates the initial depreciation of the domestic currency, would determine the total effect of remittance inflows on imports and exports and therefore the direction of the trade balance in the long run (Singer, 2008). If the latter appreciation effect alleviates the initial short-run depreciation effect, then there would be a net deterioration of the trade deficit in the long run, due to loss of export competitiveness. On the contrary, if the latter appreciation effect does not mitigate the initial depreciation effect, then the current account deficit would not worsen from the loss of export competitiveness perspective (Opoku-Afari et al., 2004; Nayyer, 1994).

Consequently, temporal dimensions are critical in analyzing the effect of foreign inflows on the underlying real exchange rate of the recipient economy and whether the Dutch-disease theory is supported or not. It is relevant to distinguish the short-run effects from the long-run effects to ascertain the total effect of remittance inflows on the underlying real exchange rate of the recipient economy (Edwards, 1989, Montiel, 1999). Besides the effect of temporal dimensions, extensive literature also exists on the role of other fundamental determinants of the real exchange which depreciate the real exchange rate, thereby mitigating the appreciating effect of foreign inflows. In some countries a specific policy positioning by policy makers as well as conditionalities to development assistance have also been found to mitigate the usual transmission mechanism of macroeconomic variables (Herzberg, 2006).

The objective of this chapter therefore is to examine the relationship between remittances and the real exchange rate using annual data from 1980 to 2008 for 34 Sub-Saharan African countries. Does remittance inflows into SSA have an appreciating effect on domestic exchange rates? If yes, does it adversely affect the trade balance, thereby worsening the trade deficit? If not, is it due to the role of other fundamental determinants of the real exchange rate or a policy positioning in pursuit of a specific monetary policy objective? We also seek to determine the direction of causality between remittance inflows and the real exchange rate or whether there is reverse causality. What policy implications emerge for countries looking to harness remittance inflows as an alternative source of finance for development?

The rest of this chapter is structured as follows; section 3.2 addresses the relevant literature, section 3.3 describes data and methodology, section 3.4 contains empirical results and section 3.5 entails the conclusion, policy recommendations and future research.

3.2 Relevant literature

Extensive literature exists on the determinants of the real exchange rate, ranging from monetary models, balance of payment models to portfolio balance models. However, most of these models have largely failed to accurately predict the real exchange rate, and also do not distinguish between short-run and long-run changes in the determinants of the real exchange rate (Kempa, 2005). Consequently, there have been relatively newer approaches, namely fundamental models, basically pioneered by Edwards (1989, 1994) and revised by Montiel (1999). The fundamental approach basically posits that the real exchange rate at any point in time is transitory and follows a path along which an economy maintains internal and external balance[11].

Edwards (1989, 1994) provides a framework which decomposes the fundamental determinants of the real exchange rate into monetary variables (nominal or temporary) and real variables (permanent and fundamental). He posits that in the short run both real and nominal variables affect the equilibrium real exchange rate, however in the long run only real fundamental variables affect the equilibrium real exchange rate. The Edward's model starts with portfolio decisions and divides the economy into four categories; the demand side, supply side, government sector and external sector. Portfolio of assets consists of the sum of domestic money and foreign money converted by the nominal market exchange rate. Thus the ratio of domestic money to foreign money is decreasing in the expected rate of depreciation of the nominal market exchange rate. The Edward's model assumes perfect foresight, which implies that the expected rate of depreciation equals the actual rate of depreciation. Supply is determined by prices of exportables relative to importables whiles demand is determined by the level of real assets and the relative price of importables. Government is assumed to finance its consumption mainly from nondistortionary taxes. The external sector is represented by the current account. The current account is identical to the balance of payments in the Edwards

[11] Contrary to this, the PPP approach posits that nominal exchange rates adjust rapidly to any price differentials between an economy and its trading partners, thus the equilibrium real exchange rate for an economy remains constant over time. However empirical evidence has proven that absolute PPP cannot hold (Edwards, 1989; Elbadawi & Soto, 1997) hence the equilibrium real exchange rate of an economy cannot be constant over time.

model because the model assumes that there is no capital mobility. Consistent with the path along which the economy achieves internal and external balance, a steady state is attained when portfolio equilibrium holds, non-tradables market clears, the current account is in equilibrium and there is fiscal balance. The real exchange rate consistent with these conditions is the long-run equilibrium real exchange rate. Changes in any of these conditions would change the long-run equilibrium exchange rate. Consequently, Edwards (1989, 1994) categorises the fundamental determinants of the real exchange rate into external variables such as terms of trade, international transfers, world real interest rates, and domestic fiscal policy variables such as the composition of government expenditure, capital and exchange controls, import tariffs, import quotas and export taxes. Non-policy variables such as technological progress also has an effect on the long-run equilibrium exchange rate (see Edwards 1989, 1994, for full details of the framework). Edwards' model was further developed by Montiel (1999).

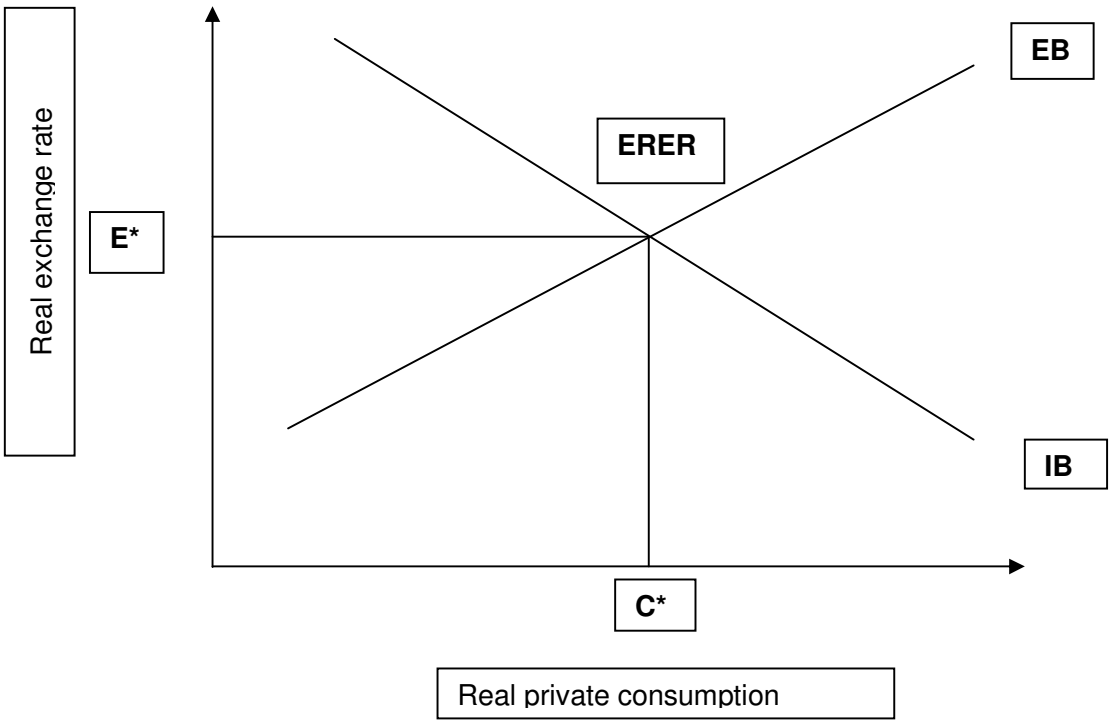
The Montiel (1999) model posits that the real exchange rate is an endogenous variable and is in equilibrium when it is simultaneously consistent with internal and external balance and conditioned on long-run fundamentals (sustainable values of exogenous and policy variables). Internal balance refers to the situation where the non-tradables[12] goods market clears in the current period and is expected to be in equilibrium in the future (Montiel, 1999). Thus assuming initial internal balance equilibrium, an increase in private spending creates excess demand for non-tradable goods at the initial exchange rate. An appreciation of the real exchange rate would then be required to restore equilibrium. Hence a downward sloping IB curve in Figure 3.1, leading to an increase in supply of non-tradable goods and an increase in demand for tradable goods (imports). The external balance, on the other hand, is defined as the current account balance that is consistent with long-run sustainable capital inflows (Montiel, 1999). This is given by domestic output of traded goods net of domestic consumption, plus net aid flows, less cost of foreign debt. From an initial external balance equilibrium position, an increase in private spending generates a current account deficit at the initial exchange rate. A real depreciation

[12] Non-tradable goods are good produced and consumed domestically which are not close substitutes to import or export goods and services. Tradable goods are goods that are traded internationally (exports and imports) and obey the law of one price or an appropriate relative pricing (Goldstein & Officers, 1979).

would therefore be required in this case to restore equilibrium. Hence an upward sloping EB curve in Figure 3.1. This leads to an increase in supply of tradable goods and an increase in demand for non-tradable goods.

The E^* denotes the long-run equilibrium real exchange rate consistent with internal and external balance. The Montiel (1999) model posits that factors that cause changes in the position of the internal and external balance curves would also cause changes in the long-run equilibrium real exchange rate. These factors include fiscal policy, international transfers, and terms of trade, Balassa-Samuelson effects (total factor productivity), international financial conditions and commercial policy (see Montiel (1999, 2003) for full details of the model).

Figure 3.1: The equilibrium real exchange rate (Montiel, 1999).



Thus on the basis of the Montiel (1999) framework, the fundamental determinants of the exchange rate to be used in this study are fiscal expenditure (government spending on tradable and non-tradable goods), terms of trade, international transfers (remittances), current account openness, international financial conditions (interest rate differential) and quasi money as a percentage of GDP (M2), as a proxy for monetary policy positioning. Total factor productivity, which captures Balassa-Samuelson effects, is not added due to lack of accurate data on capital stock for some of the Sub-Saharan African countries in the panel.

The direction of fiscal expenditure, whether on tradables or non-tradables, impacts the real exchange rate. Tax-financed expenditure on non-tradables creates excess demand in that sector, requiring an exchange rate appreciation to restore equilibrium. On the contrary, if fiscal expenditure is more geared towards traded goods then the trade balance moves towards a deficit. An exchange rate depreciation would then be required to restore external balance (Edwards, 1994; Montiel, 1999). The terms of trade, which is the relative price of exports to imports, reflects the influence of external market dynamics on the tradables sector. Its effect on the real exchange rate depends on the relative strength of the income and substitution effects emanating from changes in the prices of imports and exports. An improvement in the terms of trade leads to real wage increases in the tradable sector and a reallocation of resources towards the tradable sector. If the income effect dominates the substitution effect then it would lead to an appreciation of the real exchange rate. On the contrary if the substitution effect dominates the income effect then a change in terms of trade will lead to real exchange rate depreciation (Montiel, 1999).

International transfers, like remittances, impact the real exchange rate of the recipient economy in two ways. First of all, an increase in remittances - all things being equal - increases the recipient country's stock of foreign exchange reserves and consequently the supply of foreign exchange in the recipient economy. This appreciates both the nominal and real exchange rate, assuming that prices respond slowly. Secondly, remittances increase the disposable income of households most of which is consumed. This raises the prices of non-tradable goods requiring

an exchange rate appreciation to restore internal balance (Montiel, 1999). This is however based on the assumption that households spend remittances mainly on non-traded goods. However, if households spend remittances on traded goods, then the demand for imports would generate demand for foreign exchange over time, which would result in a depreciation of the real exchange rate (Izquierdo and Montiel, 2006).

Changes in a country's commercial or trade policy also affects the real exchange rate. Assuming import demand is price elastic, an import tariff or quota that reduces imports will create an increase in the price of imports, which would result in an increase in demand for foreign currency. This depreciates the real exchange rate. On the other hand, a subsidy to exports would result in a current account surplus which requires an appreciation of the real exchange rate to restore external balance (Montiel, 1999). An increase in the interest rate differential between the home country and the rest of the world attracts foreign inflows which increases a country's foreign reserves and appreciates the real exchange rate (Montiel, 1999). A decrease in the interest rate differential would result in capital outflows, thereby depreciating the real exchange rate.

Although most of the countries in the panel operate flexible exchange rate regimes exchange rate stability is core to the monetary policy outlook of Sub-Saharan African countries aimed at maintaining export competitiveness and a sustainable current account deficit. An expansionary monetary policy increases demand domestically, especially for non-tradable goods, thereby requiring a real exchange rate appreciation to restore internal balance. A contractionary policy aimed at mopping up excess liquidity would have the opposite effect. In Armenia where a flexible exchange rate regime prevails, strong remittance inflows over the last decade resulted in a real appreciation of the exchange rate, but the current account deficit did not worsen. This is because the monetary authorities embarked on sterilisation measures to smooth exchange rate volatility (Oomes, 2008). Such monetary policy positioning mitigates the natural transmission mechanism of macroeconomic variables in the recipient economy.

Conditionalities to capital inflows sometimes include a requirement to devalue or depreciate the nominal exchange rate of the recipient country. Changes to the nominal exchange rate also

impact the real exchange rate should prices respond slowly. A devaluation of the nominal exchange rate depreciates the real exchange rate, whiles a nominal appreciation of the nominal exchange rate appreciates the real exchange rate. This prevents inflows of any kind from having their natural transmission mechanism in the recipient economy (Nwachukwu, 2008). The degree of reversibility of the particular inflow in question has also been found to impact on the extent to which the real exchange rate would appreciate. Whiles some inflows are more reversible, or more associated with outflows, others are less reversible. The resultant impact on the real exchange rate would therefore vary. Remittance inflows in particular are less reversible than other foreign inflows (Bugamelli and Paterno, 2006). This gives merit to the analysis of specific foreign inflows in order to analyse more effectively their respective impact on key macroeconomic variables such as the exchange rate (Opoku-Afari et al., 2004).

The current levels of remittance inflows to developing countries, in excess of the traditional capital inflows qualifies it as major international transfers from abroad. Remittance inflows have also been found to be relatively more stable than other forms of foreign inflows, such as foreign direct investment, official development assistance and portfolio investments (Ratha, 2005). However, empirical evidence shows that the impact of foreign inflows on the real exchange rate varies from region to region. In a study on foreign aid and the real exchange rate in 12 francophone West African countries Quattara and Strobl (2004) found that foreign aid flows do not generate Dutch-disease effects. Similar results were found by Ogun (1995) for Nigeria and Nyoni (1998) for Tanzania. On the contrary, Elbadawi (1999) in a study of 62 developing countries, and White and Wignaraja (1992) for Sri Lanka found that aid flows appreciated the real exchange rate of the recipient countries in their study. Conflicting results have also been found in a study of foreign aid and the real exchange rate in Ghana. While Sackey (2001) found no appreciating effect on the real exchange rate Opoku-Afari et al. (2001) found the contrary and support for the Dutch-disease theory. Using annual data on six Central American countries from 1985 to 2004 Izquierdo and Montiel (2006) found the exchange rate to be relatively stable despite increased remittance inflows. In other cases such as the Euro-Mediterranean region, remittance inflows appreciated the exchange rate but did not result in the worsening of the current account balance although exports suffered to some extent (Oomes, 2008). These

disparities in findings have been attributed to a number of reasons such as the role of other fundamental determinants of the exchange rate or a specific policy positioning which may cause a depreciation of the real exchange rate, thereby mitigating the appreciating effect of foreign inflows such as remittances.

Most studies on the impact of foreign inflows on the real exchange rate in Sub-Saharan Africa have mainly focused on aid, foreign direct investments and portfolio investments, and scarcely on remittances. Secondly, most of them have looked at specific countries in Sub-Saharan Africa like Tanzania (Nyoni, 1998), Nigeria (Ogun, 1995), Ghana (Sackey, 2001; Opoku-Afari et al. 2004) and rarely at sub-regions within Sub-Saharan Africa such as francophone West Africa (Ouattara and Strobl, 2004) or Sub-Saharan Africa (Nwachukwu, 2008).

This paper therefore fills this gap in the foreign inflows literature by looking at remittance inflows to Sub-Saharan Africa and its effect on the real exchange rate using annual data on 34 Sub-Saharan African countries from 1980 to 2008 and dynamic panel estimation techniques namely, the feasible generalised least squares (FGLS) by Park (1967) and Kmenta (1971, 1986) and the two-step system GMM by Arellano and Bover (1995). Furthermore, Sub-Saharan Africa consists of a number of sub-regional divisions, all of which adhere to different policy frameworks aimed at achieving a stipulated macroeconomic convergence criteria, a single currency and a single market at a future date. These are Francophone West Africa (UEMOA), Anglophone West Africa (ECO), the Southern Africa Development Cooperation (SADC) and the East African Community (EAC). Very little literature exists on intra African studies on remittances and any disparities in its transmission mechanism within the different regions. Using seemingly unrelated regressions (SUR) by Zellner (1962), this paper further fills this gap in the African remittances literature by analysing the effect of remittance inflows on the real exchange rate in each of these regions separately, country-specific differences within each of these regions and implications for policy.

This paper again differs from most previous work by testing for cross-sectional dependence of the error term between the countries in the panel using the Pesaran (2004) CD test[13] for the full sample estimation and the Breusch and Pagan (1980) Lagrange Multiplier test for the regional specific estimations and controlling for it. This addresses one major critique of panel data estimations being the assumption of cross-sectional independence of the error term. The estimation techniques used in this paper, namely the Park and Kmenta FGLS (also corrects for groupwise heteroscedasticity), two-step system GMM with time demeaned and forward orthogonal deviations of Arellano and Bover (1995) and the SUR by Zellner (1962) are known to adequately correct for cross-sectional dependence of the error term in dynamic panel estimations and account for heterogeneity across the countries.

3.3 Data and methodology

Table 3.1 below details the data used and how data series are measured. Data on all variables for the Sub-Saharan African[14] countries in the panel are obtained from the World Development Indicators of the World Bank, complimented with data from the International Monetary Fund.

[13] The properties of other tests such as the Frees (1995) test and Friedman (1937) test for cross-sectional dependence are suited for static panel data estimations and not dynamic panel estimations.
[14] Benin, Burundi, Botswana, Burkina Faso, Cameroun, Cape Verde, Comoros, Cote D'Ivoire, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritius, Mauritania, Mozambique, Niger, Nigeria, Rwanda, Senegal, Seychelles, Sierra Leone, Swaziland, South Africa, Tanzania, Togo, Uganda, Zambia.

Table 3.1: Sources and definition of variables

	Variable	Source	Definition
RER	Real exchange rate	IMF, World Bank	The real exchange rate is defined directly, and measured as the product of the nominal exchange rate to the US dollar and the ratio of the wholesale price index of the US to domestic prices (CPI in 2005 = 100) for each country.
REM	Remittances as a percentage of GDP (International transfers)	World Bank	Worker's remittances and compensation of employees as a percentage of GDP in current prices (US$ Millions).
FP	Fiscal Policy	World Bank	Government final consumption as a percentage of GDP in SSA countries (a proxy for the composition of government expenditure).
OPEN	Current account openness	Penn World Table PWT 7.0	The ratio of the sum of exports and imports of goods and services to GDP in SSA countries.
Idif	International financial conditions	IMF, World Bank	Interest rate differential between SSA countries and the US.
M2	Monetary policy effects	IMF, World Bank	Quasi money as a percentage of GDP. (A proxy for short-term monetary policy positioning).
TOT	Terms of trade	World Bank	Ratio of exports prices to import prices of the SSA countries.

Table 3.2: A priori expectations

Variable	Sign	Inference
REM	Positive/ negative	Remittances improve the foreign reserve position of recipient countries which should appreciate (negative relationship) the domestic currency. If remittances are spent on tradables then it would have a depreciating effect (positive relationship) with the real exchange rate
FP	Positive/ negative	If fiscal expenditure is on traded goods then it would have a (positive relationship) depreciating effect on the real exchange. If it is geared towards non-traded goods then it would have a (negative) appreciating effect on the real exchange rate.
TOT	Positive/ negative	An export dominant terms of trade would appreciate the real exchange rate (negative relationship) whiles an import dominant terms of trade would depreciate the real exchange rate (positive relationship)
OPEN	Positive/ negative	An export dominant foreign sector would appreciate the real exchange rate (negative relationship), an import dominant foreign sector would depreciate the real exchange rate (positive relationship).
Idif	Negative	A positive interest rate differential should attract foreign inflows that should appreciate (negative relationship) the real exchange rate.
M2	Negative/ positive	Monetary policy interventions (sterilization) aimed at depreciating the real exchange rate would have a positive relationship with the real exchange rate and a negative relationship if it is aimed at appreciating the real exchange rate.

3.3.1 Descriptive statistics and initial diagnostics

Descriptive statistics of the variables used in this paper are done on regional basis and detailed in Table 3.3.

Table 3.3: Descriptive statistics per region (mean of variables over the period 1994-2008)

Variable	SADC	UEMOA	ECO	EAC
RER	1955.00	2618.79	1077.90	300.16
REM	8.99	4.38	3.80	3.67
FP	18.77	13.93	13.64	14.42
TOT	113.62	123.31	111.93	121.41
OPEN	88.39	69.81	61.03	41.78
Idif	5.94	-0.51	8.01	2.63
M2	34.09	23.07	18.58	19.26

It can be observed that the SADC region registers the highest mean remittance inflows (approximately 9 percent), almost twice the level of remittances to each of the other regions. This is consistent with the fact that as at end 2006, the highest amount of remittances within Sub-Saharan Africa (33 percent) was from South Africa (Migration Policy Institute, 2006). Consequently, its money supply is significantly above that of the other regions. The ECO region has the highest mean interest rate differential of 8.01 percent followed by the SADC region with 5.94 percent. This should attract high levels of foreign inflows that ideally should appreciate the real exchange rate in these two regions. The SADC region has a higher degree of economic integration with international trade and finance probably driven by South Africa's large export-oriented economy. It is followed by UEMOA attributable to its easy access to the EU market through France; ECO and EAC regions follow in that order. The ECO region registers the lowest level of fiscal expenditure driven by stronger fiscal policy rules which are part of its regional macroeconomic framework, whiles the SADC region registers the highest level of fiscal expenditure.

3.3.2 Cross-correlation analysis

Table 3.4 details the cross-correlations between the real exchange rate and other variables for the different regions.

Table 3.4: Cross correlation matrix of variables with RER per region

Variable	SADC	UEMOA	ECO	EAC
RER	1	1	1	1
RER(-1)	0.90***	0.95***	0.99***	0.95***
REM	-0.11***	0.25***	-0.35***	0.42***
FP	-0.21***	0.40***	-0.37***	-0.20**
TOT	0.50***	0.09	0.27***	0.49***
OPEN	-0.27***	0.14**	0.41***	-0.37***
Idif	0.11*	0.17***	0.22**	-0.08
M2	-0.22***	-0.21***	-0.20**	-0.57***

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

In all regions there is a high positive correlation between the real exchange rate in the current period and in the previous period, statistically significant at the 1 percent level. This denotes strong persistence behavior of the real exchange rate which indicates the need for a dynamic model specification for the empirical estimation in this paper. For the SADC and ECO regions, remittances are negatively correlated with the real exchange rate and statistically significant at 1 percent level. This indicates the possibility of remittances having an appreciating effect on the real exchange rate in these two regions. On the contrary, remittances are positively correlated with the real exchange rate in the UEMOA and EAC regions and statistically significant at a 1 percent level indicating the possibility of remittances of a depreciating effect on the real exchange rate in these two regions. Fiscal expenditure is negatively correlated with the real exchange rate and statistically significant at the 1 percent level for the SADC, ECO and EAC

regions. This implies that fiscal expenditure could be geared more towards non-tradable goods than tradable goods, hence its appreciating effect on the real exchange rate in these three regions. The opposite effect is observed for fiscal expenditure in the UEMOA region. Terms of trade is positively correlated and statistically significant at a 1 percent level for all the regions except UEMOA, indicating an import dominated terms of trade, hence a depreciating effect on the real exchange rate of these three regions. For UEMOA the terms of trade has a very low correlation coefficient with the real exchange rate and is statistically insignificant. Current account openness is negatively signed and statistically significant for SADC and EAC indicating an export dominated foreign sector for these two regions and consequently an appreciating effect on the real exchange rate. For the UEMOA and ECO regions openness is positively signed and statistically significant at a 1 percent level, indicating an import dominated foreign sector for these two regions and consequently a depreciating effect on the real exchange rate. The interest rate differential is statistically insignificant for the EAC region but positively signed and significant at a1 percent level for all other regions. This indicates that a positive interest rate differential does not necessarily attract foreign inflows to these regions. This has been attributed to conditionalities attached to capital inflows to Sub-Saharan African countries which sometimes require a devaluation or artificial depreciation of the domestic currency (Nwachukwu, 2008). For Sub-Saharan African countries, in particular, this could also be attributed to low investor confidence due to a history of political instability, corruption and poor institutional quality. Monetary policy is negatively correlated and statistically significant at a 1 percent level in all four regions. This indicates that monetary policy is positioned to strengthen the real exchange rate in all four regions.

However, since correlations do not imply causality we proceed to ascertain these *a priori* expectations with an empirical estimation of the data.

3.3.3 Pair-wise Granger causality tests

Granger causality tests are used to ascertain the direction and time trajectory of the relationship between the real exchange rate and its fundamental determinants as posited by the Montiel (1999) framework. Results of Granger causality tests are detailed in Table 3.5.

Table 3.5: Pair-wise Granger causality tests

Null Hypothesis:	Obs.	F-Statistic	Prob.
RER does not Granger Cause REM	578	2.31206	0.0070
REM does not Granger Cause RER		0.02538	1.0000
RER does not Granger Cause REM(-2)	850	0.01885	0.9813
REM(-2) does not Granger Cause RER		2.81689	0.0604
RER does not Granger Cause FP	578	2.02152	0.0206
FP does not Granger Cause RER		1.18127	0.2929
RER does not Granger Cause FP(-1)	884	4.84933	0.0080
FP(-1) does not Granger Cause RER		7.41764	0.0006
RER does not Granger Cause IDIF	578	8.66556	3.E-15
IDIF does not Granger Cause RER		5.04677	5.E-08
RER does not Granger Cause IDIF(-1)	884	1.83514	0.1602
IDIF(-1) does not Granger Cause RER		8.69393	0.0002
RER does not Granger Cause M2(-2)	850	0.04871	0.9525
M2(-2) does not Granger Cause RER		2.83391	0.0593
RER does not Granger Cause OPEN	578	6.36950	1.E-10
OPEN does not Granger Cause RER		0.82750	0.6221
RER does not Granger Cause TOT	578	1.44578	0.0109
TOT does not Granger Cause RER		2.93351	0.0006

Whiles the real exchange rate Granger-causes remittances contemporaneously, remittances Granger-cause the real exchange rate asynchronously with a two-period lag. This shows the direction and time trajectory of the causality between remittances and the real exchange rate. Similarly, whiles the real exchange rate Granger-cause fiscal expenditure contemporaneously, fiscal expenditure Granger-causes the real exchange rate asynchronously with a one-period lag (four quarters since this is annual data). This confirms that the direction of fiscal expenditure does impact the real exchange rate as posited in the Montiel (1999) framework of the fundamental determinants of the real exchange rate. Monetary policy positioning Granger-causes the real exchange rate asynchronously with a two-period lag. This is consistent with macroeconomic theory that demand management measures normally impact economies with a lag (Mohr and Fourie, 2008). There is contemporaneous reverse causality between the real exchange rate and terms of trade, openness and the interest rate differential. Thus the fundamental determinants of the real exchange rate Granger-cause the real exchange rate as posited by the Montiel (1999) model. This justifies their use as regressors in the empirical estimation in this paper.

3.3.4. Model specification and estimation technique

The strong persistence behavior of the real exchange rate warrants the need to specify a dynamic panel data model which includes one or more lags of the dependent variable. We specify a two-way error component model based on the heterogeneity between the 34 countries in the panel expressed in (1) as

$$y_{it} = \delta y_{i,t-1} + X_{it}^{'} \beta + \mu_i + \lambda_t + v_{it} \quad (1)$$

where Y_{it} = *NT x1* vector of dependent and endogenous variables. $X_{it}^{'}$ represents an *NT x k* vector of lagged endogenous regressors other than the lag of the dependent variable, β denotes

a *k x m* vector of slope coefficients, μ_i represent country-specific effects, λ_t time effects and v_{it} the idiosyncratic error term. Equation (1) is based on the assumption that there is no serial correlation present in the error term and the regressors are strictly exogenous $E(v_{it} \mid x_{i1}\ldots,x_{in}, \mu_i) = 0$. The Hausman test for endogeneity rejects the null of exogeneity, meaning the regressors and the fixed effect error terms are correlated. All the regressors in this model are assumed to be endogenous. This is because they are all determined by additional factors that are not specifically captured in this model and are likely to be reflected in the error term. Additionally, by construction the lag of the dependent variable $y_{i,t-1}$ is correlated with the fixed effects μ_i error term. The Lagrange Multiplier test for first-order serial correlation, given fixed effects, rejects the null of no first-order serial correlation. This violates an assumption necessary for consistency of OLS estimators resulting in biased and inconsistent estimators (Nickell, 1981). The modified Wald test rejects the null of groupwise homoscedasticity, implying a non-constant variance across cross-sections. However, it is known to have very low power in the context of fixed effects when *N > T* (Greene, 2003). It is therefore not reported but controlled for in this paper. Table 3.6 details the results of initial diagnostic tests performed on pooled OLS and fixed effects models.

Tests for cross-sectional dependence of the error terms using the Pesaran (2004) CD test rejects the null of cross-sectional independence however with a low average cross-sectional correlation coefficient of 0.36. Table 3.7 details the results of the tests for cross-sectional dependence.

Table 3.6: Initial diagnostic tests

Test	Test statistic	Critical value	Inference
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= 1.60	d_p < 1.9639	Positive first-order serial correlation, given fixed effects.
Hausman specification test			
$H_0 : E(\mu_{it}/X_{it}) = 0$ $H_0 : E(\mu_{it}/X_{it}) \neq 0$	m_3 = 13.60 Prob χ^2 = 0.03	$\chi^2_{(6)}$= 12.59	Regressors are endogenous.
Pesaran CD (2004) test for cross-sectional dependence			
H_0 : corr $(\mu_{i,t}, \mu_{j,t}) = 0$ for $i \neq j$ H_A : corr $(\mu_{i,t}, \mu_{j,t}) \neq 0$ for some $i \neq j$	LM = 8.98 (0.36)	Prob = 0.00	Cross-sections are inter-dependent

To determine the order of integration of the variables we take preference to unit root methods that assume individual unit root processes and accommodate cross-sectional dependence to some extent due to the validity of individual effects and cross-sectional dependence of the error terms.

These are the Im, Pesaran and Shin Test (2003), ADF- Fisher Chi-square test and PP-Fisher Chi-square (1932) tests (Maddala et al. 1999; Baltagi, 2008). All the variables are stationary except M2 which is *I(*1). The results of the unit root test can be found in Table 3.8.

Table 3.7: Tests for cross-sectional dependence[15]

Test	Test statistic	Prob. value	Distribution	Inference
Frees (1995, 2004) test	3.78	α = 0.10 : 0.09 α = 0.05 : 0.12 α = 0.01 : 0.17	Frees' Q distribution	Cross-sections are inter-dependent
Friedman (1937) test	96.76	Prob = 0.00	$\chi^2_{(T-1)}$	Cross-sections are inter-dependent

Note: For all tests: *H_0: corr ($\mu_{i,t}, \mu_{j,t}$) = 0 for i ≠ j ; H_A: corr ($\mu_{i,t}, \mu_{j,t}$) ≠ 0 for some i ≠ j*

Table 3.8: Order of integration of variables

Variable	I(*d*) Levels	I(*d*) Difference	Obs.
RER	I(0)		986
REM	I(0)		986
FP	I(0)		986
TOT	I(0)		986
OPEN	I(0)		986
Idif	I(0)		986
M2	I(1)	I(0)	986

These initial diagnostic results warrant the use of an estimation technique that preserves homoscedasticity, prevents serial correlation, corrects for cross-sectional dependence and also preserves the orthogonality between transformed variables and lagged regressors (Arellano et al. 1995). Two estimations techniques fully meet these criteria, namely the feasible generalised

[15] It is recognised in this study that the properties of the Frees (1995) and Friedman (1937) tests for cross sectional dependence are suited for static panel data estimations and not dynamic panel estimations. Only the Pesaran (2004) test under FE/RE is suited for dynamic panel estimations (De Hoyos & Sarafidis, 2006).

least squares (FGLS) by Park (1967) and Kmenta (1971, 1986) and the two-step system GMM by Arellano and Bover (1995)

The Parks and Kmenta FGLS estimation technique is perfectly suited to data with individual effects, groupwise heteroscedasticity, serial correlation, cross-sectional dependence and endogeneity (Kmenta, 1986; Hicks, 1994) as depicted by the initial diagnostics of the dataset in this study. The FGLS estimation technique is suitable whether the individual effects are fixed over time and cross-sections or are normally distributed random variables. It is however criticised as producing upward biased standard errors. Hence the panel-corrected standard error (PCSE) technique of Becks and Katz (1995) is sometimes used as an alternative. The Becks and Katz (1995) PSCE technique produces OLS estimates with standard errors that correct the upward biased standard errors of the FGLS estimation. However the PCSE estimation technique is best suited to small and finite samples (Greene, 2003). OLS estimates are also known to be biased and inconsistent in dynamic models with one or more lags of the dependent variable as a regressor due to serial correlation (Nickel 1981). Hence the FGLS is still superior to the PCSE estimation technique in dynamic models characterised by individual effects, serial correlation, endogeneity of the regressors and groupwise or other heteroscedasticity. The FGLS estimation is however known to lose some efficiency when the regressors are endogenous and the error process has a large number of parameters (Kmenta, 1986). Hence for robustness we also employ the two-step system GMM estimation technique of Arellano and Bover (1995).

In the two-step system GMM the endogeneity problem is addressed by time demeaning the data to remove time effects. This is also known to correct moderate levels of cross-sectional dependence as in this study (De Hoyos and Sarafidis, 2006; Fuertes and Smith, 2008). The cross-sectional specific effects are then eliminated using forward orthogonal deviations, thereby making 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). Time demeaning and

Helmert transforming the data preserves homoscedasticity, prevents serial correlation, controls for cross-sectional dependence and also preserves the orthogonality between transformed variables and lagged regressors (Arellano and Bover, 1995). Another advantage of this approach is that it is more resilient to missing data. It is computable for all observations except the last for each cross-section, hence minimising data loss (Roodman, 2006).

Furthermore, to investigate any disparities in the transmission mechanism of remittances within the different sub-regions in Sub-Saharan Africa, different estimations are performed for each of the regions represented in the dataset. These are Francophone West Africa (UEMOA), Anglophone West Africa (ECO), East African Community (EAC) and the Southern Africa Development Cooperation (SADC). Based on the results of the initial diagnostics, the seemingly unrelated regressions (SUR) estimation technique by Zellner (1962) is used to estimate each of the regional models. To maintain the dynamic framework of the panel estimation and also 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 when $T > N$ (Baltagi, 2008). It also enables country-specific analysis in each region and helps to identify which specific countries drive the regional spatial dynamics and implications for policy formulation and implementation.

3.4 Empirical results

3.4.1 Full sample results

The full sample estimation show similar results for the FGLS and the two-step system GMM estimations. Table 3.9 details results of the full sample estimation.

As expected, the real exchange rate shows strong persistence behaviour significant at the 1 percent level. The coefficient of remittance inflows is negatively signed and statistically

significant at the 1 percent level. This means that remittances on average have an appreciating effect on the real exchange rate of recipient Sub-Saharan African countries in the panel. Tax financed fiscal expenditure is positively signed and statistically significant at the 1 percent level. This denotes that government expenditure is more geared towards traded goods requiring an exchange rate depreciation to restore external balance. The coefficient of terms of trade is negatively signed and statistically significant at the 1 percent level, indicating an appreciating effect on the real exchange rate. This denotes that the income effect dominates the substitution effect of an improvement in the terms of trade, requiring an appreciation of the real exchange rate to restore external balance. Current account openness is also negatively signed and statistically significant at the 1 percent level. This indicates an export dominated foreign sector on average hence an appreciating effect on the real exchange rate. Contrary to *a priori* expectations, the interest rate differential is positively signed and statistically significant at the 1 percent level, which denotes a depreciating effect on the real exchange rate. This is consistent with the finding of Nwachukwu (2008) that foreign inflows sometimes include the conditionality to devalue or artificially depreciate the nominal exchange rate mitigating its appreciating effect on the real exchange rate of the recipient economy. Monetary policy positioning is positively signed and statistically significant at the 1 percent level. This denotes that monetary policy is positioned to keep the real exchange rate depreciated. This gives an indication of the mitigating effect of monetary policy positioning on the appreciation of the real exchange rate due to remittance inflows. This positioning is usually policy determined as countries strive to achieve regional macroeconomic convergence criteria or maintain a real exchange rate that ensures export competitiveness and a sustainable current account deficit.

The two-step system GMM estimation 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 whiles the difference in Hansen test also fails to reject the null that the instrument subset is strictly exogenous.

Table 3.9: Full sample empirical results: OLS, FGLS and two-step system GMM

Dependent variable RER[16]

Variable	OLS	FGLS	Two-step system GMM
RER(-1)	0.90***	0.79***	0.79***
REM	0.28**	-3.05***	-3.20***
FP	-1.84***	10.43***	10.72***
TOT	-0.08**	-0.72***	-0.99***
OPEN	-0.11**	-0.64***	-0.93***
Idif	0.08	0.81***	0.71***
M2	-0.52***	1.21***	2.88***
Adjusted R^2	0.98		
ABond test for second-order serial correlation			Prob > z = 0.29
Hansen test for over-identification			Prob >χ^2 = 1.00
Diff. in Hansen test for exogeneity of instrument set			Prob > χ^2 = 1.00

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

Beside these sample-wide results, the regional estimations show significant country-level differences.

[16] The FGLS estimation specified that the errors of the panels are correlated. The two-step system GMM estimation involved forward orthogonal deviations instead of differencing (Arellano and Bover, 1995).

3.4.2 SADC results

It can be observed that the real exchange rate exhibits strong persistence across all the countries in the SADC panel and is significant at the 1 percent level. This justifies the use of a dynamic panel estimation framework in this paper. In Swaziland, remittances and interest rate differential have an appreciating effect on the real exchange rate as indicated by their negatively signed and statistically significant coefficients. This is mitigated by monetary policy positioning and an import-dominant terms of trade which have a depreciating effect on the real exchange rate as indicated by their positively signed and statistically significant coefficients. In Madagascar, Mauritius and Seychelles, remittances have a depreciating effect supported by an import dominated terms of trade and foreign sectors. This indicates a heavy dependence on imports in these three countries and the greater probability of remittances being spent more on traded goods than on non-traded goods, hence its depreciating effect on the real exchange rate. Consequently for Madagascar, monetary policy and the direction of fiscal expenditure are both geared towards ensuring an appreciation of the real exchange rate as indicated by their negative and statistically significant coefficients.

Table 3.10: Seemingly unrelated regressions (SADC). Dependent variable: RER

	BOTS	LES	MDG	MLW	MUS	MOZ	SEY	SWZ	ZAR	ZAM
RER(-1)	0.34***	0.69***	0.75***	0.55***	0.77***	0.32***	0.71***	0.55***	0.23***	0.31***
REM	-0.05	-0.001	0.95*	0.18	0.42**	1.20**	0.03**	-0.17***	0.52	-0.25
M2	0.02**	0.002	-0.49*	-0.45*	0.02**	2.07**	0.0002	0.06***	0.03**	0.37***
FP	0.01	0.03***	-0.71***	0.07	-0.07	-1.09	0.02***	-0.02	-0.0001	0.64
TOT	0.01	0.001	0.10***	0.04**	0.05***	0.93	-0.001	0.02***	-0.01**	0.39***
OPEN	0.01***	0.001	0.25***	0.33***	0.02**	1.41	0.004***	-0.002	0.007	0.62**
Idif	-0.02**	-0.04*	0.31***	-0.06	-0.16***	-0.95	-0.01	-0.02*	-0.02***	0.16***

Breusch-Pagan test of independence: $\chi^2_{(45)}$ = 79.66 (Prob = 0.0011)

Correlation matrix of residuals (real exchange rate)

Botswana	1									
Lesotho	0.07	1								
Madagascar	0.21	0.01	1							
Malawi	-0.09	-0.37	-0.01	1						
Mauritius	0.26	-0.11	0.47	0.12	1					
Mozambique	-0.04	0.24	0.07	-0.39	-0.07	1				
Seychelles	0.19	-0.17	0.17	0.11	0.22	-0.32	1			
Swaziland	0.02	0.20	0.25	-0.04	0.22	0.53	-0.09	1		
South Africa	0.46	0.01	-0.03	0.16	0.29	0.09	0.22	0.55	1	
Zambia	-0.35	-0.10	-0.06	0.14	0.02	-0.41	0.33	-0.48	-0.39	1

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

For the rest of the countries in the panel, remittances inflows are not statistically significant to changes in the real exchange rate. Other fundamental determinants of the real exchange rate drive changes in the real exchange rate. In Botswana, the negatively signed and statistically significant interest rate differential underlies a specific positioning to attract foreign direct investment to Botswana. This has an appreciating effect on the real exchange rate. This is mitigated by an import-dominated foreign sector and monetary policy positioning to ensure a depreciated exchange rate. Despite Lesotho's high remittances to GDP ratio (probably due to its relatively small GDP), remittance inflows are not significant to changes in the real exchange rate. The interest rate differential is the factor exerting an appreciating effect on the real exchange rate mitigated by the direction of fiscal expenditure. Malawi's foreign sector is heavily import driven indicated by the positive and statistically significant coefficients of openness and terms of trade. Consequently, monetary policy is positioned to ensure an appreciation of the real exchange rate as indicated by the negative and statistically significant coefficient of M2. South Africa's strong export driven economy and its attractiveness to capital inflows is depicted by the negatively signed and statistically significant coefficient of terms of trade and interest rate differential. Monetary policy is therefore positioned to ensure a depreciated real exchange rate as indicated by the positively signed and statistically significant coefficient of M2.

The Breusch-Pagan (1980) test for cross-sectional dependence rejects the null of cross-sectional independence, confirming the existence of spatial dynamics between the countries in the SADC region. The regional spatial dynamics are mainly driven by a strong positive correlation between the real exchange rates of South Africa, Botswana, Mozambique and Swaziland and a strong negative correlation with the real exchange rate of Zambia. Hence a shock to the real exchange rate of South Africa will move the real exchange rate of Swaziland. Mozambique and Botswana in the same direction, and that of Zambia in the opposite direction.

3.4.3 Francophone West Africa results (UEMOA)

Table 3.11: Seemingly unrelated regressions (UEMOA). Dependent variable: RER

	BEN	BFO	CIV	MAL	NIG	SEN	GNB	TOG
RER(-1)	0.32***	0.99***	0.35**	0.30**	0.68***	0.53***	0.48***	0.99***
REM	2.40**	-3.34*	-0.93	5.15**	12.78***	5.72**	-1.85	0.50
M2	0.67	3.46**	-1.89	3.54***	-0.31	0.89	- 2.42**	1.87**
FP	3.90***	-2.39**	4.00**	-1.97**	1.61	0.81	1.48***	-3.72*
TOT	0.68***	-0.15	0.30**	0.32**	0.06*	0.19**	-0.93***	-0.02
OPEN	0.19	0.12	2.07***	0.63***	0.56*	0.32**	2.10	-0.21
Idif)	-1.69*	0.18	-4.12*	-2.76**	0.38	-2.99***	-0.94	-1.36

Breusch-Pagan test of independence: $\chi^2_{(45)}$ = 45.26 (Prob = 0.02)

Correlation matrix of residuals (real exchange rate)

Benin	1						
Burkina Faso	-0.06	1					
Cote D'Ivoire	0.14	-0.24	1				
Mali	0.32	-0.10	0.49	1			
Niger	0.38	-0.15	0.30	0.21	1		
Senegal	0.36	0.17	0.14	0.38	0.06	1	
Guinea-Bissau	-0.24	0.05	-0.09	-0.18	-0.26	0.30	1
Togo	0.31	0.24	-0.33	-0.05	0.06	-0.02	-0.30	1

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

Remittance inflows have a depreciating effect on the real exchange rate in Benin, Mali, Niger and Senegal indicated by the positive and statistically significant coefficient of remittances. These four countries are also characterised by an import-dominated foreign sector and terms of trade as denoted by the positive and statistically significant coefficients of openness and terms of trade. This signifies the likelihood of remittances being spent more on traded goods than on non-traded goods, hence its depreciating effect on the real exchange rate in these countries. Interest rate differential is the appreciating factor on the real exchange rate in these four countries. Remittances appreciate the real exchange rate in Burkina Faso. The direction of fiscal expenditure also appreciates the real exchange rate, indicating that tax-financed fiscal expenditure is more geared towards non-traded goods than traded goods. This appreciating effect on the real exchange rate is mitigated by the monetary policy positioning aimed at ensuring a depreciated real exchange rate as depicted by the positive and statistically significant coefficient of M2. For Cote D'Ivoire, Guinea-Bissau and Togo remittance inflows are not significant to changes in the real exchange rate.

The interest rate differential is the appreciating factor on the real exchange rate in Cote D'Ivoire, mitigated by government final consumption of goods and services which are more geared towards traded goods and an import dominated foreign sector. In Guinea-Bissau an export dominated terms of trade and monetary policy positioning appreciate the real exchange rate, mitigated by the direction of government consumption of final goods and services which is geared towards traded goods and therefore has a depreciating effect on the real exchange rate. In Togo, government final consumption of goods and services is geared towards non-traded goods appreciating the real exchange rate. This is mitigated by monetary policy positioning.

The existence of spatial dynamics between the countries in the UEMOA region is indicated by the results of the Breusch-Pagan (1980) test which rejects the null of cross-sectional independence. This is mainly driven by a strong and positive correlation between the real exchange rates of Cote D'Ivoire, Mali, Benin, Senegal, Niger and Togo. Hence a shock to the real exchange rate of any of these countries will move the real exchange rates of the other countries in the same direction barring any monetary policy intervention by the Francophone

West African central bank. This is attributable to the fact that UEMOA countries use the same currency and there is a common Francophone West African central bank responsible for monetary policy in all the member countries. Hence, despite differences in the policy direction in mitigating the effect of remittances on the real exchange rate, the ultimate policy objective is the same.

3.4.4 Anglophone West African Results (ECO)

The estimation results of the ECO region are detailed in Table 3.12. Remittances to Sierra Leone have an appreciating effect on the real exchange rate. The interest rate differential also has an appreciating effect on the real exchange rate, confirming the huge level of foreign inflows to Sierra Leone as part of the country's restructuring efforts after a prolonged civil war. This is mitigated by monetary policy positioning and an import-dominated foreign sector and terms of trade.

For Ghana and Gambia, remittances have a depreciating effect on the real exchange rate. This is understandable from the import-driven terms of trade, indicating the possibility of remittances being spent more on traded goods than on non-traded goods, or remittances being sent in kind. Although not statistically significant, the interest rate differential and openness are negatively signed for both Ghana and Gambia indicating the possibility of an appreciating effect on the real exchange rate. The direction of government final consumption of goods and services for Gambia is also negatively signed but statistically insignificant. Consequently monetary policy is positioned towards maintaining a depreciated real exchange rate in Gambia. For Ghana on the contrary, the direction of government final consumption of goods and services is more geared towards traded goods and hence has a depreciating effect on the real exchange rate. Consequently, monetary policy is geared towards maintaining an appreciated real exchange rate which is a strong monetary policy objective in Ghana. This is underlined by the recent redenomination of Ghana's currency to strengthen it against the major foreign currencies.

Table 3.12: Seemingly Unrelated Regressions (ECO). Dependent variable: RER

	GAM	GHA	GUI	NGA	SLE
RER(-1)	0.45***	0.80***	0.86***	-0.11	0.72***
REM	0.04**	0.85**	0.09	-1.29	-3.72***
M2	0.05**	-0.41*	1.90	0.25	2.27**
FP	-0.01	0.82***	-0.53	0.39	0.04
TOT	0.02***	0.44*	0.60*	0.03	1.17***
OPEN	-0.01	-1.03	1.18	0.86***	2.14***
Idif	-0.01	-1.23	2.29*	0.80***	-0.91***

Breusch-Pagan test of independence: $\chi^2_{(45)}$ = 19.33 (Prob = 0.036)

Correlation matrix of residuals (real exchange rate)

Gambia	1				
Ghana	0.18	1			
Guinea	0.11	-0.04	1		
Nigeria	0.01	-0.05	0.23	1	
Sierra Leone	0.50	-0.18	0.50	0.29	1

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

For Guinea and Nigeria remittances are not significant to changes in the real exchange rate. Both countries have an import-dominated terms of trade and foreign sector respectively that exert a depreciating effect on the real exchange rate. The interest rate differential also has a depreciating effect on the real exchange rate in both countries.

The null of cross-sectional independence of the error term is rejected in the Breusch-Pagan test for cross-sectional dependence, confirming the existence of spatial dynamics between the countries in the ECO region. This is attributable to the second monetary zone policy framework in Anglophone West Africa which drives macroeconomic policy towards an agreed convergence criteria. There is also a strong positive correlation between the real exchange rates of Sierra Leone, Gambia and Guinea.

3.4.5 East African Community Results (EAC)

The estimation results of the EAC region are detailed in Table 3.13. Remittances to Uganda and the interest rate differential have a depreciating effect on the real exchange rate attributable to the import-driven foreign sector and terms of trade, which indicates that remittances are more likely to be spent on tradable goods than on non-tradable goods. For the rest of the countries in the EAC region, remittances are not statistically significant to changes in the real exchange rate.

In Kenya, fiscal expenditure is geared towards traded goods coupled with an import dominated terms of trade, both having a depreciating effect on the real exchange rate as indicated by their positive and statistically significant coefficients. Monetary policy is therefore positioned to strengthen the exchange rate as denoted by its negative and statistically significant coefficient. For Rwanda the direction of fiscal expenditure depreciates the real exchange rate indicating that it is more geared towards traded goods than non-traded goods, whiles Burundi's import-dominated terms of trade is what depreciates the real exchange rate.

Table 3.13: Seemingly unrelated regressions (EAC). Dependent variable: RER

	KEN	UGA	RWA	BUR	TAN
RER(-1)	0.69***	-0.24	0.48***	0.58	0.19
REM	0.46	1.72***	-0.81	1.13	-1.01
M2	-0.88***	2.87	-0.94	-0.07	3.60
FP	1.29***	0.97	6.73***	1.02	4.57
TOT	0.19***	0.75**	0.25	0.49***	0.32
OPEN	-0.004	6.65***	0.28	0.72	2.55
Idif	-0.27	-4.05**	-2.06	-0.69	-1.40

Breusch-Pagan test of independence: $\chi^2_{(45)}$ = 70.96 (Prob = 0.081)

Correlation matrix of residuals (real exchange rate)

Kenya	1				
Uganda	-0.03	1			
Rwanda	0.14	0.22	1		
Burundi	0.04	0.30	0.52	1	
Tanzania	-0.17	-0.02	0.30	0.03	1

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

The existence of spatial dynamics between the countries in the EAC region (as indicated by the results of the Breusch-Pagan (1980) test for cross-sectional dependence) is mainly driven by a strong positive correlation between the real exchange rates of Uganda, Rwanda and Burundi. Consequently a shock to the real exchange rate of Uganda will move the real exchange rates of Rwanda and Burundi in the same direction. Besides being members of the same regional

protocol it is also attributable to the dominant role of Uganda in the region being a major source of socio-political influence in the region and foreign direct investment in post-war reconstruction in Rwanda and Burundi.

3.5 Conclusion and future research

Empirical results from the full sample estimation shows that when cross-sectional dependence and individual effects are controlled for, remittance inflows on average should appreciate the underlying exchange rate of the recipient economy. This is consistent with the Dutch-disease theory of Corden and Neary (1982). However, this appreciating effect of remittance inflows on the real exchange rate is mitigated by monetary policy positioning and over dependence on imports. The import-dominated terms of trade and foreign sectors of the countries in the panel imply that tax financed fiscal expenditure is more geared towards tradables than non-tradables, hence its depreciating effect on the real exchange rate which mitigates the appreciating effect of foreign inflows such as remittances. Monetary policy positioning aimed at maintaining a competitive exchange rate and a sustainable current account deficit also keeps the real exchange rate depreciated despite known steady increases in the rate of inflation in countries in the panel preventing remittance inflows from exerting its natural transmission mechanism on the real exchange rate. This implies then that the nominal exchange rate is either being held or managed in most of the countries in the panel. This aligns with the findings of Oomes (2008) on Armenia, and Nwachukwu (2008) on Sub-Saharan Africa which sight policy interventions as the mitigating factor on the appreciating effect of foreign aid on the real exchange rate.

However, the addition from this paper is that in the case of remittances other fundamental determinants of the exchange rate, specifically the direction of fiscal expenditure and over dependence on imports, are additional factors that mitigate the appreciating effect of remittance inflows on the real exchange rate. Over dependence on imports due to low levels of domestic output in Sub-Saharan African countries is indicated by the depreciating effect (positive and statistically significant coefficient) of openness and terms of trade for most of the countries in the

panel. This also implies that remittances are probably spent more on tradable goods than on non-tradable goods or probably sent in kind, further worsening the current account deficit. Thus the Dutch-disease effect of remittance inflows through an appreciation of the real exchange rate is mitigated by monetary policy positioning, the direction of fiscal expenditure and an import dominated terms of trade and foreign sectors of the countries in the panel. The worsening of the current account deficit is more driven by overdependence on imports due to low domestic production capacity than the loss of export competitiveness as a result of an appreciation of the real exchange rate due to remittance inflows.

Furthermore, the greater probability of remittances being spent on tradables and fiscal expenditure geared towards tradables rather than non-tradables, generates increased demand for imports which over time could result in a depreciation of the real exchange rate due to demand for foreign exchange. This could stimulate export revenue over time which has an appreciating effect on the real exchange rate. Additionally, increased demand for imports would have a feedback effect on domestic inflation, which would result in an appreciation of the real exchange rate. The extent to which this latter appreciation caused by increased export revenue and domestic inflation mitigates the initial depreciation of the domestic currency, would determine the total effect of remittance inflows on imports and exports and therefore the direction of the trade balance in the long run (Singer, 2008). If the latter appreciation effect alleviates the initial short-run depreciation effect, then there would be a net deterioration of the trade deficit in the long run due to loss of export competitiveness. On the contrary, if the latter appreciation effect does not mitigate the initial depreciation effect, then the current account deficit would not worsen from the loss of export competitiveness perspective.

The effect of a specific policy positioning is further highlighted by the results of regional-specific estimations. The need to comply with stipulated macroeconomic convergence criteria in regional economic protocols strongly inhibits the natural transmission mechanism of macroeconomic variables. Similar trends exist between the different sub-regional groups within Sub-Saharan Africa. Consistent with its dual economic impact remittances depreciate the real exchange rate in some countries and appreciate the real exchange rate in other countries. Countries in which

remittances depreciate the real exchange rate are associated with import-dominated foreign sectors and terms of trade. This raises the likelihood of remittances being spent more on tradables than non-tradables. Fiscal expenditure in these countries is also geared more towards traded goods than non-traded goods. Consequently, monetary policy is positioned to strengthen the real exchange rate. In countries where remittances have an appreciating effect on the real exchange rate, monetary policy and the direction of fiscal expenditure are positioned to mitigate this appreciating effect. An import dominated terms of trade further strengthens this depreciating effect on the real exchange rate, mitigating the appreciating effect of remittance inflows. In spite of a common macroeconomic policy convergence framework, spatial dynamics are mainly driven by specific countries in each region. A shock to the real exchange rate of Uganda will impact the real exchange rates of Rwanda and Burundi in the same direction. Similarly in the UEMOA region, a shock to the real exchange rate of any of the countries will impact the real exchange rates of the other countries in the region in the same direction, in the absence of any intervention by monetary authorities. In the SADC region, the real exchange rate of Botswana, South Africa, Swaziland and Mozambique are positively correlated whiles for the ECO region the real exchange rates of Gambia, Sierra Leone and Guinea also tend to move in the same direction. Hence the regional-specific analysis adds tremendous value to the full sample estimation by clearly identifying the impact of these regional protocols on the effect of remittances on the real exchange rate, which countries drive the regional spatial dependences and the direction of spill-over effects in regional exchange rate dynamics. This paper also establishes the direction of causality and trajectory between remittances and the real exchange rate. Whiles the real exchange rate Granger-causes remittances contemporaneously, remittances Granger-cause the real exchange rate asynchronously with a two-period lag.

In terms of policy relevance, the findings of this study highlights the fact that although monetary policy positioning in most of the Sub-Saharan African countries in the panel is focused on preventing the loss of export competitiveness and its adverse effect on the current account deficit as a result of foreign inflows (in this case remittances), the Dutch-disease effect of remittance inflows could equally be caused by over dependence on imports. In light of this, Sub-Saharan African countries are confronted with a difficult decision with respect to which real

exchange rate is optimal to attract diasporan remittances for development finance, maintain export competitiveness and at the same time a sustainable current account deficit.

Consequently Sub-Saharan African countries would be better placed by alleviating over management of the nominal exchange rate and allowing the natural macroeconomic transmission of remittance inflows. This would enable better clarity on which policy positioning is optimal for each country.

Furthermore, knowing which specific countries drive regional spatial dependences and the direction of spill-over effects makes policy makers aware of which country's macroeconomics trends impact their economies directly, either in the same or opposite direction. This enables more focused and optimal monitoring of regional macroeconomic trends and the ability to forecast ahead and strategise for unwanted developments.

It must be mentioned though that there are strong migration and remittance dynamics within Sub-Saharan Africa that need to be researched. It is estimated that about 20 percent of SSA migrants are within SSA who also remit regularly (Barajas et al. 2010). Thus in terms of future research, it would be useful for specific remittance corridors within Sub-Saharan Africa to be studied in relation to their respective dominant migration destination. It also addresses one limitation of this study that the U.S.A. isn't the main destination migration for all the countries in this study. One example of such a well defined sub-region within Sub-Saharan Africa is the SADC region whose citizens mainly migrate to South Africa, the economic powerhouse of the region. The next chapter therefore examines remittance inflows to ten SADC countries using South Africa as the host country

4. Remittances inflows to Sub-Saharan Africa. The case of SADC

4.1 Introduction

Remittance inflows into sub-Saharan Africa are not only from developed countries. It is estimated that about 20 percent of sub-Saharan African migrants are within the region and also remit regularly (Barajas et al. 2010). It needs to be mentioned though that migration patterns within sub-Saharan Africa are equally driven by political factors as by 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 labour that work, consume, save and invest in both host and home countries[17] as well as send money home to support the basic needs of their families.

The SADC region was chosen to fill the gap in intra-African remittances literature for a number of reasons. First, the largest proportion of remittances within sub-Saharan Africa is from South Africa. As at end 2006, 33 percent of remittance inflows within sub-Saharan Africa were from South Africa, 18 percent from Cote D'Ivoire, 11 percent from Uganda, 7 percent from Angola, 4 percent from Botswana and 27 percent from other sources in the region (Migration Policy Institute, 2006).

Second, the SADC region has an economic treaty aimed at achieving regional integration. Inherent in the SADC Treaty is the Finance and Investment Protocol which sets the legal basis for regional cooperation and harmonisation in the areas of finance, investment and macroeconomic policy. It entails a well structured macroeconomic policy framework that has targets for achieving a monetary integration, a customs union and a common market among

[17] Home country is the migrant's country of origin and the host country is his country of sojourn.

other policy objectives. This creates a high degree of interdependencies between the countries and an indication of strong spatial dynamics in the region.

Table 4.1: Cross-correlation analysis of real GDP per capita of the SADC countries and South Africa[18].

	ZAR	BOT	LES	MDG	MLW	MUS	MOZ	SEY	SWZ	TAN	ZAM
ZAR	1										
BOT	0.84***	1									
LES	0.99***	0.88***	1								
MDG	0.50**	0.3	0.51**	1							
MLW	0.27	0.03	0.29	0.57**	1						
MUS	0.89***	0.99***	0.93***	0.38	0.15	1					
MOZ	0.93***	0.97***	0.95***	0.39	0.12	0.98***	1				
SEY	0.70**	0.77***	0.75***	0.53**	0.43	0.81***	0.79***	1			
SWZ	0.89***	0.98***	0.93***	0.35	0.04	0.99***	0.97***	0.74***	1		
TAN	0.98***	0.93***	0.98***	0.42	0.14	0.96***	0.93***	0.72***	0.96***	1	
ZAM	0.97***	0.73***	0.94***	0.52**	0.2	0.78***	0.85***	0.57**	0.80***	0.92***	1

Cross-correlation analysis of the real GDP per capita of South Africa and the countries in the panel shows a strong positive correlation significant at the one percent level except for Malawi. Although correlation does not mean causality, it is a significant indication that their economies are highly integrated and move in the same direction.

Additionally, the financial sectors of the countries in the region are relatively under-developed with strong capital controls, which constraints the use of formal channels for remittances. Furthermore, all the countries in the panel are in close proximity to South Africa, creating a high incidence of temporary migration within the region. These characteristics of the SADC region makes it well aligned with the factors affecting remittance inflows as stipulated in the literature and a perfect case study for intra-African inflows.

[18] Migration data to confirm migration flows from these countries to South Africa was not available during this study.

4.2 Relevant Literature

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 and Rapoport, 2006). In this regard temporary migrants have been known to be more oriented towards self-interest motives whiles permanent migrants are more geared towards altruistic remittances (Glystos, 1997). 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 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 FDI, ODA or 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 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, 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 lead to misleading inference. Consequently panel data estimations using instrumental variable and generalised method of moments approaches would provide very little efficiency gain over OLS estimators (Coakley et al. 2002; Baltagi, 2008; Phillips and Sul, 2003). We also adapt a micro-foundations approach to our model derivation using optimization theory following Bougha-Hagbe (2004), Funkhouser (1995) and Lucas and Star (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 as in Huang et al. (2006), we measure host country economic conditions using a composite variable derived by principal component analysis. This composite variable consists of the real GDP per capita, end of period inflation rate, M2 and the prime rate of in 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 whiles 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 corrected for, formal remittances 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 direction of policy 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 chapter is organised as follows; section 4.2 addresses

the theoretical framework, section 4.3 data and methodology, section 4.4 empirical results and section 4.5 concludes with recommendations for policy and future research.

4.3 Data and methodology

Table 4.1 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.

Table 4.2: 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 (SA)	World Bank, South African Reserve Bank	A composite variable was created using principal component analysis. It comprises of the real GDP per capita, end of period inflation rate, M2 and the prime rate for South Africa[19]
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.

[19] 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.

4.3.1 Descriptive statistics and stylised facts

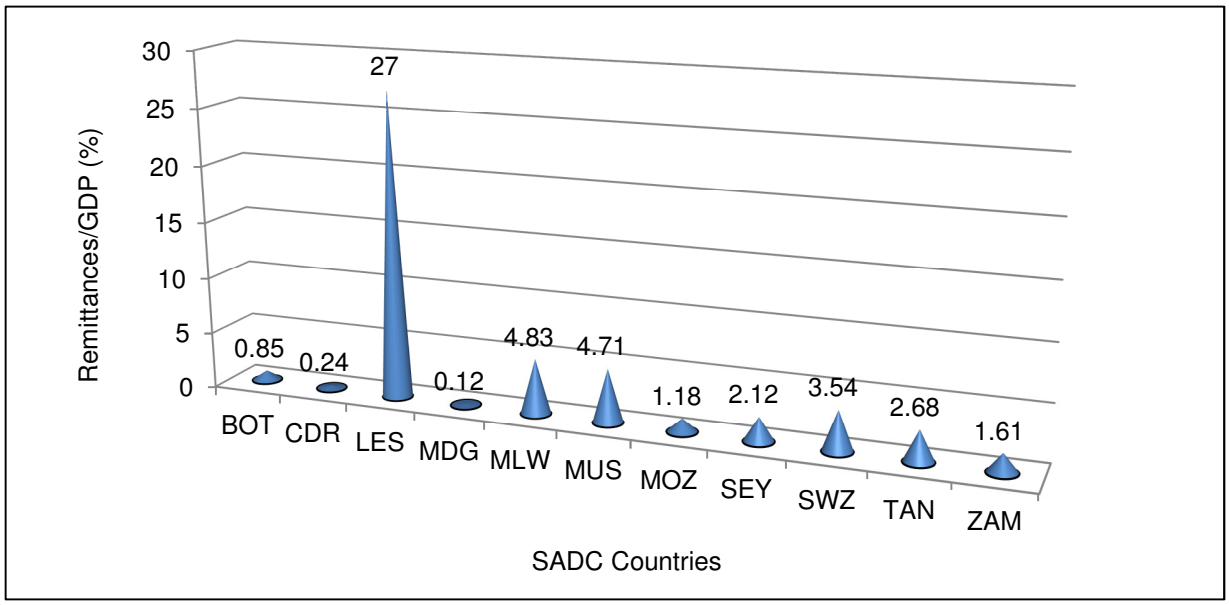
Descriptive statistics of the variables used in this paper are detailed on Table 4.2. For the 10 countries in the panel remittances to GDP ratio averaged 6.2 percent from 1994 to 2008. There are however wide disparities between individual countries with remittances to Lesotho averaging 27 percent of GDP. Malawi and Mauritius follow with an average of 5 percent whiles remittances to the rest of the countries range between 1 to 4 percent of GDP over the period. M2 as a percentage of GDP averaged 34 percent, which indicates a more sophisticated financial sector in this region as compared to Sub-Saharan Africa as a whole (25.3 percent). Real GDP per capita for South Africa averaged almost twice as much as the rest of the SADC countries combined. This explains why most migrants in the sub-region migrate to South Africa in search better living and work conditions.

Table 4.3: 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

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 4.1 depicts remittances as a percentage of GDP in the 10 SADC countries in the panel.

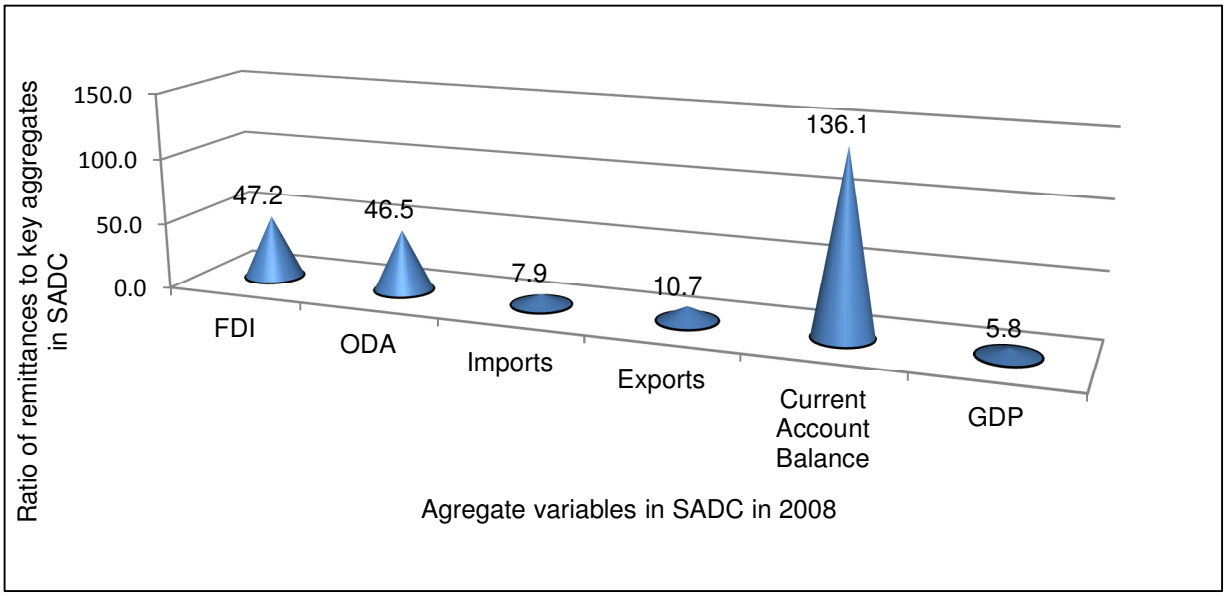
Figure 4.1: Remittances as a ratio to GDP in SADC countries in the panel in 2008



Data Source: World Development Indicators, World Bank

As a ratio to other foreign inflows and key aggregates in the SADC region as at end 2008, remittances were approximately 46 percent of ODA and 47 percent of FDI to the region (see Figure 4.2). As at end 2008, remittance inflows to SADC were 11 percent and 8 percent of regional exports and imports of goods and services as a percentage of GDP respectively and exceeded the regional current account surplus by 36 percent. This shows the potential of remittance inflows in supplementing financing of the external gap in recipient countries and regions.

Figure 4.2: Ratio of remittances to regional aggregates in SADC countries in 2008



Data Source: World Development Indicators, World Bank.

4.3.2 Cross-correlation analysis

Table 4.3 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 percent 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 percent level. This indicates the existence of some degree of altruistic motives in remittances sent home by migrants from SADC countries in the panel.

Table 4.4: Cross-correlations of variables (contemporaneous)

Variables	REM	REM(-1)	Idif	M2	GDPC	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.

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 percent 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). Thus it seems from the cross-correlation analysis that SADC migrants remit less when an improvement in host country economic conditions improve their income levels, since the economic conditions back home is also likely to have improved to some extent.

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. Consequently migrants would only respond to an increase in home country interest rates if it is accompanied by a strong exchange rate (Higgins et al., 2004). This is because returns on investment are assumed to be denominated in home country currency units (Katseli and Glystos, 1986). 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 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.

Table 4.4 uses the sign and magnitude of the correlation coefficients as a proxy to determine the main driver of remittance inflows to each country.

Table 4.5: Country-specific cross-correlations of remittances and other variables

	BOT	LES	MDG	MLW	MUS	MOZ	SEY	SWZ	TAN	ZAM
GDPC	-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	0.30	-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.

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 these 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 the 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.

4.3.3 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 remittances 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. Consequently the error term takes a one-way error component form and the model is specified as

$$y_{it} = \delta y_{i,t-j} + X_{it}^{'} \beta + \mu_i + v_{it} \quad (13)$$

where Y_{it} = *NT x1* vector of dependent and endogenous variables. X_{it}' represents an *NT x k* vector of lagged endogenous regressors other than the lag of the dependent variable, β denotes a *k x 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 H_0: cross-sections are independent. To test for the order of integration of these variables we use the Im, Pesaran and Shin (2003) test, ADF-Fisher Chi-square test and PP- Fisher Chi-square (1932) test due to the validity of individual effects and the cross-sectional dependence of the error terms. These unit root tests assume individual unit root processes and accommodate cross-sectional dependence to some extent (Maddala 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 4.5 for the order of integration of the variables and Table 4.6 for initial diagnostic tests performed on pooled OLS and fixed effects models.

Table 4.6: Order of integration of 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
RER	I(1)	I(0)	150
Idif	I(0)		150

Table 4.7: Initial diagnostic tests

Test	Test Statistic	Critical Value	Inference
Joint validity of cross-sectional effects $H_0: \mu_1 = \mu_2 \ldots . \mu_{N-1} = 0$ H_A : *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 $H_0: \lambda_1 = \cdots \lambda_{T-1} = 0$ H_A: *Not all equal to 0*	F = 1.23	$F_{(0.05, 13, 132)}$ = 1.79	Time effects are not valid. Error term takes a one-way error component form.
Serial correlation (one-way model) (Durbin Watson test for first-order serial correlation $H_0: \rho = 0$; $H_A = \lvert\rho\rvert < 1$	d_p = 1.517	d_p < 1.8164	First-order serial correlation present.
Heteroscedasticity $H_0: \sigma_i^2 = \sigma^2$ H_A : *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 in the error term.
Breusch-Pagan LM test for cross-sectional dependence H_0 : *corr* $(\mu_{i,t}, \mu_{j,t}) = 0$ *for* $i \neq j$ H_A : *corr* $(\mu_{i,t}, \mu_{j,t}) \neq 0$ *for some* $i \neq j$	LM = 78.43	Prob = 0.0015	Cross-sections are inter-dependent

The model as specified in equation (13) above raises additional issues. First of all, it is based on the assumption of strict exogeneity of the regressors $E(v_{it} \mid x_{i1}\ldots,x_{in}, \mu_i) = 0$. The Hausman 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.

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 correction[20] 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 model is also estimated using the two-step system GMM technique by Arellano and Bover (1995). Cross-sectional specific effects are eliminated using forward orthogonal deviations instead of the usual first differencing instrumental variable approaches. This is because the differencing instrumental variable 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

[20] The bias correction is initialised through a Blundell and Bond (1998) estimator.

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. This could result in estimators that are inefficient with biased standard errors since the error terms of the cross sections in this study have been found to be dependent (Baltagi, 2008; Phillips and Sul, 2003). 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 when $T > N$ (Baltagi, 2005). It also allows for detailed country-specific analysis in comparison to sample wide results.

4.4 Empirical results

The empirical results are detailed in Tables 4.7 (sample wide results) and 4.8 (country-specific results). From the two-step system GMM results in Table 4.7 the coefficient of lagged remittances is positively signed and significant at the 1 percent 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. 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 percent level. This is consistent with the cross-correlation analysis and *a priori* expectations and 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 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.

Table 4.8: Empirical results: OLS, LSDV and two-step system GMM

Dependent variable: REM[21]

Variable	OLS	LSDV1	LSDV2	Two-step system GMM
REM(-1)	0.76***	0.95***	0.78***	0.84**
GDPC	-0.0007**	-0.0004***	-0.0009	0.0001
Ym	-0.00007	0.0002	-0.0002***	-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	0.00007	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.

[21] LSDV1 employed the Kiviet (1995) LSDV small sample bias. 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).

The coefficient of interest rate differential is positive and significant at 1% level depicting the potential for SADC migrants to take advantage of investment opportunities back home. This is consistent with the dynamics of the theoretical framework, but contradicts initial findings of the cross-correlation analysis and Katseli and Glystos (1986). As expected the degree of market sophistication (M2) is positively signed and statistically significant at the 1 percent level. This aligns with *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 (fixed effects with SUR cross-sections) 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 whiles 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 4.8 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.

Table 4.9: Seemingly unrelated regressions (Dependent variable: Remittances)

	BOTS	LES	MDG	MLW	MUS	MOZ	SEY	SWZ	TAN	ZAM
REM	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	0.0007***	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.

Besides the results of the total sample, country-level differences exist. It can be observed from Table 4.8 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 percent 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 (Singh et al. 2010). 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 percent and 5 percent levels respectively. The coefficient of the real exchange rate for Seychelles is also negatively signed and statistically significant at the 1 percent 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 stable. Remittances to Seychelles therefore exhibit strong self-interest patterns. Although home country income is not significant to remittance inflows from South Africa to Madagascar and Swaziland, the positive and statistically significant coefficient of the real exchange rate implies that remittances to these three countries increase

when the exchange rate depreciates[22]. A depreciating exchange rate is consistent with adverse economic conditions. This therefore signals some degree of altruism. The coefficient of the real exchange rate is negatively signed and statistically significant for Botswana, Lesotho, Malawi, Mauritius, Seychelles and Tanzania which is consistent with self-interest motives, whiles it is positively signed and significant for Madagascar, Swaziland and Zambia, consistent with altruistic motives. It is however not significant for Mozambique. The post-estimation Breusch Pagan (1980) test for cross-sectional dependence fails to reject the null of cross-sectional independence of the error term, despite strong spatial dynamics between a few of the countries such as Botswana and Swaziland, Mauritius and Tanzania, and Seychelles and Zambia. All the coefficients are jointly significant showing the efficiency gain of using the SUR over alternative estimation techniques.

4.5 Conclusion, policy implications and future research

The empirical results show that when cross-sectional dependence 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 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.

[22] 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.

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 Singh et al. (2010) and 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. Despite this similarity in both country-specific analysis and the sample wide results, further analysis of country-specific results from the SUR of Zellner (1982) 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 whiles 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 on one hand, and 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 differences 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 direct remittances through formal channels and thereon for more productive uses. This also shows the relevance of country-specific analysis in addressing lack of specificity in large sample studies.

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 intra-African remittances and also enhance effective corridor-specific policy interventions.

It must be mentioned though that there are strong migration and remittance dynamics within Sub-Saharan Africa that need to be researched. It is estimated that about 20 percent of SSA migrants are within SSA who also remit regularly (Barajas et al. 2010). Thus in terms of future research, it would be useful for specific remittance corridors within Sub-Saharan Africa to be studied in relation to their respective dominant host countries. This would further facilitate targeted policy interventions aimed at enhancing the flow of remittances through formal channels, maximising their positive externalities whiles minimising the associated negative externalities.

5. Conclusion of study and policy recommendations

5.1 Conclusion of the study

This study set out to investigate what drives or constrain remittances through formal channels to Sub-Saharan Africa. The aim was to address a key global policy challenge of informal inflows and establish what market, institutional or policy positioning is required to mitigate the negative externalities associated therewith. Secondly, in response to the varying impact of remittances on macroeconomic variables in different regions this study proceeded to ascertain the impact of remittances on the real exchange rate of 35 Sub-Saharan African countries and the implications for export competitiveness and the current account balance. To address the criticism that such large sample studies lack country specificity, detailed country specific analysis was also done. The findings of the country specific analysis highlighted very relevant differences in what each country would require to address the negative externalities associated with remittance inflows as well as harness remittances as an alternative source of finance for development. Furthermore, despite the existence of significant migration and remittance patterns within Sub-Saharan Africa, very little work had previously been done on intra-African remittance inflows and its effect on the various sub-regions within Sub-Saharan Africa. Consistent with the objectives and relevance of this study, its findings add to emerging African remittances literature in several ways.

Firstly, it counters earlier findings by Singh et al. (2010) that remittances to Sub-Saharan Africa are mainly driven by altruistic motives. It shows that when cross-sectional dependence and individual effects are controlled for, Sub-Saharan African migrants are more driven by self-interest motives than by altruistic motives. Additionally, the migrant's economic condition in the host country is a stronger driver of remittances sent home than home country economic conditions. The migrant's altruistic duty to his family is probably more of a social responsibility and not in response to business cycle trends in Sub-Saharan Africa in particular. The quality of financial service delivery is paramount to the ability to redirect remittance inflows through formal channels. This corroborates earlier findings by Gupta et al. (2007) and Singh et al. (2010) that countries with well developed financial sectors are better placed to attract remittances through

formal channels and thereon for more productive uses. The existence of investment opportunities in the home country that the migrant could take advantage of, coupled with exchange rate expectations are also strong drivers of remittances to Sub-Saharan Africa. This is further based on the assumption that returns on investment are in home country currency units. Consequently, barring any confidence issues, migrants would take advantage of investment opportunities back home if it is supported by strong economic fundamentals such as a strong exchange rate. This is more consistent with self-interest motives than altruistic motives for remittances. It also aligns with earlier findings by Higgins et al. (2004) who found that exchange rate expectations are very important to remittance inflows. These findings further improve earlier findings by Katseli and Glystos (1986) who posited that a higher home country interest rate (meaning investment opportunities back home) has no impact on remittance inflows.

Additionally, the lack of specificity in large sample estimations is also thoroughly addressed through country-specific analysis throughout this study, leading to the conclusion that different factors drive remittance inflows to different countries within SSA. For instance, policy makers in Lesotho, Malawi and Seychelles would have to focus on ensuring a stable exchange rate whiles financial service providers would have to design products and services that facilitate the acquisition of physical assets and investment into financial assets. This is due to strong self-interest patterns in remittance inflows to these three countries. 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. Consequently, the direction of remittance related policy would differ between countries.

The findings of this study also establishes that although remittances appreciate the real exchange rate of the recipient Sub-Saharan African countries as a whole, its effect is mitigated by other fundamental determinants of the real exchange rate specifically monetary policy positioning, the direction of fiscal expenditure and overdependence on imports which have a depreciating effect on the real exchange rate. Thus the Dutch-disease effect of remittance

inflows through the loss of export competitiveness is not experienced. This is consistent with previous findings on aid and the Dutch-disease effect by Oomes (2008) on Armenia and Nwachukwu (2008) on Sub-Saharan Africa, both of which cite policy interventions as the mitigating factors on the appreciating effect of foreign aid on the real exchange rate.

Furthermore overdependence on imports would lead to an increase in demand for imports which would result in demand for foreign exchange and consequently a depreciation of real exchange rate. This could stimulate export revenue over time - all things being equal - which could appreciate the real exchange rate. Excess demand for imports could also fuel domestic inflationary pressures which also has an appreciating effect on the real exchange rate. If this latter appreciation effect mitigates the initial depreciation then there could still be a net deterioration of the current account deficit from the loss of export competitiveness perspective. However, if the latter appreciation effect does not mitigate the initial depreciation effect, then the current account deficit would not worsen from the loss of export competitiveness perspective.

The findings of this study further reveal that the depreciation biased monetary policy positioning could be the reason why Sub-Saharan African countries have hitherto failed to harness remittance inflows as an alternative source of finance for development. This is because profit-seeking migrants would prefer a strong exchange rate to avoid loss of value since returns on investments are assumed to be in home country currency units (Katseli and Glystos, 1986; Higgins et al., 2004).

The lack of existing literature on intra-African remittance inflows is thoroughly addressed by this study through empirical analysis of the various sub-regions in Sub-Saharan Africa, namely SADC, UEMOA, ECO and the EAC. Regional-specific estimations highlight the dual economic impact of remittance inflows. Whiles remittances appreciate the real exchange rate in some countries, it depreciates it in others. In countries where remittances depreciate the real exchange rate, there is an import-dominated foreign sector and terms of trade, meaning remittances are more likely spent on traded goods than on non-traded goods. Fiscal expenditure in these countries is also geared more towards traded goods than non-traded goods.

Consequently, monetary policy is positioned to strengthen the real exchange rate. On the contrary, where remittances have an appreciating effect on the real exchange rate, monetary policy and the direction of fiscal expenditure are positioned to mitigate this appreciating effect. If the terms of trade are also import dominant, it further depreciates the real exchange rate, further mitigating the appreciating effect of remittance inflows.

This study also settles the issue of causality between the real exchange rate and remittance inflows. Whiles the real exchange rate Granger-causes remittances contemporaneously, remittances Granger-cause the real exchange rate asynchronously with a two-period lag.

Finally this study establishes that in panel data estimations on Sub-Saharan African countries the existence of cross-sectional dependence of the error term would have to be tested and controlled for. This is empirically relevant to the accuracy of findings and addresses one major critique of panel data estimations. The issue of cross-sectional dependence also gives policy makers deeper insight into the implications of regional macroeconomic dynamics for their respective countries. It helps to identify which country's macroeconomic trends affect their economies either directly or inversely. This gives very relevant direction to regional macroeconomic analysis, policy formulation and implementation.

5.2 Policy recommendations

The findings of this study give tremendous insight into what is required by policy makers to redirect remittance inflows through formal channels and thereon for more productive uses. Policy makers in Sub-Saharan African countries would have to ensure that their financial services industries provide products and services that are compatible to the needs and wants of migrants and their families. These products and services must align with the prevailing motive for remittances to their respective countries, whether altruism or self interest. Where self interest motives are the main driving force of remittance inflows, economic fundamentals would have to

be strong to generate the right levels of confidence that would attract remittance inflows as an alternative source of finance for development.

However Sub-Saharan African countries have to address a complex tradeoff between attracting remittances for development finance on one hand, and maintaining export competitiveness and a sustainable current account balance on the other hand. The current depreciation biased monetary policy positioning aimed at mitigating the appreciating effect of remittance inflows hinders the ability of countries to attract diaspora remittances for development finance. Sub-Saharan African countries seeking to harness remittances for development finance would therefore have to determine which policy choice would generate the highest net benefit. As depicted in the findings of this study the policy direction would differ between countries.

Since most Sub-Saharan African countries are price takers, export revenue is subject to international price fluctuations and other factors beyond the control of developing countries. Thus if the net benefit of attracting remittances for development finance exceeds the adverse impact of a loss of export competitiveness then policy makers would have to refrain from the depreciation biased monetary policy positioning in order to attract remittance inflows for development. On the contrary if the impact of a loss of export competitiveness exceeds the benefits of attracting remittances for development finance then financing development through remittances would not be optimal. Except in addition to other financing needs of the country, it is also channeled into financing technological improvements in the production of tradables that would improve a country's comparative advantage on international markets thereby mitigating the associated loss of export competitiveness due to remittance inflows.

Consistent with the objectives of this study, the findings of this study establishes what market, institutional and policy positioning is required to attract remittances through formal channels and thereon for more productive uses. Its effect on the real exchange rate of recipient Sub-Saharan African countries, the role of other fundamental determinants of the real exchange rate and the implications of the current policy stance is also clarified by this study. Which policy direction

would be optimal under what circumstances is further ascertained by the findings of this study giving policy makers a clear direction into which policy choices would minimise the negative externalities associated with remittance inflows. Which countries drive regional spatial dynamics and the direction in which it impacts on a country's macroeconomy is further clarified by the findings of this study. The findings of this study therefore fully addresses its stipulated objectives thereby making significant additions to the remittances literature on Sub-Saharan Africa as a whole as well as filling the gap in the literature on intra-African remittance inflows.

List of References

Acosta, A.P., Lartey, E.K.K. & Mandelman, S.F. 2007. Remittances and the Dutch Disease. Federal Reserve Bank of Atlanta Working Paper 2007-08.

Addison, E.K.Y. 2004. The Macroeconomic Impact of Remittances in Ghana. Ghana. Bank of Ghana.

Agarwal, Reena and Andrew W. Horowitz (2002), Are International Remittances Altruism or Insurance? Evidence from Guyana Using Multiple-Migrant Households. World Development 30(11):2033-44.

Amuedo-Dorantes, C. & Pozo, S. 2004. Workers' Remittances and the Real Exchange Rate: A Paradox of Gifts. Journal of World Development 32(8):407-17.

Anderson, T.W and Hsiao, C. 1981. Estimation of dynamic models with error components. Journal of the American Statistical Association 76:598-606

Arellano, M. & Bond, S. 1991. Some tests of specification for panel data: monte carlo evidence and an application of employment equations. Review of Economic Studies 58:277-297.

Arellano, M. and Bover, O. 1995. Another look at the Instrumental Variable Estimation of Error Component Model. Journal of Econometrics 68:29-52.

Ball, C.P., Cruz-Zuniga, M., Lopez, C. & Reyes, J. 2009. Remittances, Inflation and Exchange Rate Regimes in Small Open Economies. Economic Working Paper Series 2008/03. University of Cincinnati.

Baltagi, B.H. 2008. Econometric Analysis of Panel Data. 4th ed. John Wiley and Sons Ltd. United Kingdom.

Banerjee, A., Marcellino, M & Osbat, C. 2004. Some cautions on the use of panel methods for integrated series of macroeconomic data. Econometrics Journal 7:322-340.

Barajas, A., Chami, R. Fullenkamp, C, & Garg, A. 2010. The Global Financial Crisis and Workers' Remittances to Africa: What's the Damage? IMF Working Paper WP/10/24. Washington. International Monetary Fund.

Becks, N & Katz, J.N. 1995. What to do and not to do with Time-Series Cross-Section Data. American Political Journal Review. 89:634-647.

Bester, H. 2006. Striking the Balance: AML/CFT Regulation and Access to Remittances Services. The Second International Conference on Migration and Remittances. London. United Kingdom.

Bouhga-Hagbe, J. 2004. A Theory of Worker's Remittances with an application to Morrocco. IMF Working Paper WP/04/194. Washington. International Monetary Fund.

Breusch, T.S. and Pagan, A.R. 1980. The Lagrange Multiplier Tests and its Applications to Model Specification in Econometrics. Review of Economic Studies XLVII 239-253.

Breusch, TS. and Pagan, A.R. 1979. A Simple Test for Heteroscedasticity and Random Coefficient Variation. Econometrica 47:987-1007.

Blundell, R. and Bond, S. 1998. Initial Conditions and Moment Restrictions in Dynamic Panel Data Models. Journal of Econometrics 87:115-43.

Bokkerind, M. 2006. Regulation and Supervision of Remittance Service Providers: Overview of International Standards. The Second International Conference on Migration and Remittances. London. United Kingdom

Bugamelli, M. & Paterno, F. 2006. Do Workers' Remittances Reduce the Possibility of Current Account Reversals. Center for Economic Performance Discussion Paper dp071.

Carrasco, E. and J. Ro, 2007. Remittances and development. The University of IOWA Centre for International Finance Development E-Book, June 2007.

Chami, R., Fullenkamp, C. & Jahjah, S. 2003. Are Immigrant Remittance Flows a Source of Capital for Development? IMF Working Paper 03/189. Washington: International Monetary Fund.

Coakley, J., Fuertes, A. & Smith, R. 2002. A Principle Components Approach to Cross-Sectional Dependence in Panels. Unpublished Manuscript.

Corden, W.M. & Neary, J.P. 1982. Booming Sector and De-Industrialisation in a Small Open Economy. Economic Journal. 92:825-48.

Coulibaly, D. 2009. Macrodeterminants of Migrant remittances: New Evidence from a Panel VAR. Paris: Centre d'Economie de la Sorbonne.

De Hoyos, R.E. & Sarafidis, V. 2006. Testing for cross-sectional dependence in panel -data models. The Stata Journal 6(4):482-496.

De la Briere, B., De Janvry, A., Lambert, S. & Sadouleth, E. 2002. The Roles of Destination, Gender, and Household Composition in Explaining Remittances: An Analysis for the Dominican Sierra, Journal of Development Economics 68:309-28.

Dickey, D.A. & Wayne, A.F. 1979. Distribution of Estimators for Autoregressive Time Series with a Unit Roots. Journal of the American Statistical Association 74(366):427-431.

Docquier, F. & Rapoport, H. The Economies of Migrants: Remittances. Discussion Paper 1351, Institute for the Study of Labor (IZA), Bonn, Germany.

Driscoll, John C. & Kraay, A. C. 1998, Consistent Covariance Matrix Estimation with Spatially Dependent Panel Data. Review of Economics and Statistics 80:549-60.

Durrand, J., Parrado, A. & Massey, D. 1996. Migradollars and Development: A Reconsideration of the Mexican Case. International Migration Review 30(2):423-44.

Edwards, S., 1989. Real exchange rates, devaluation and adjustment: exchange rate policy in developing countries. Cambridge: The MIT. Cambridge University Press.

Edwards S., 1994. Real and monetary determinants of real exchange rate behavior: theory and evidence from developing countries. In: Williamson, J. (ed). Estimating equilibrium exchange rates. Washington: Institute for International Economics.

Elbadawi, I.A. 1999. External Aid: Help or Hindrance to Export Orientation in Africa. Journal of African Economies 8(4):578–616.

Elbadawi, I.A. & Rocha, R. 1992. Determinants of Expatriate Workers' Remittances in North Africa and Europe. Working Papers 1038, 1-56. The World Bank. Washington D.C.

Elbadawi. I & Soto, R. (1997) Real exchange rate and macroeconomic adjustment in Sub-Saharan Africa and other developing countries. Journal of African Economies 6(3):74-120.

Elsakka, M.I.T. and McNabb, R. 1999. The Macroeconomic Determinants of Emigrant Remittances. Journal of World Development 27(8):1493-1502. Elsevier:

Fisher, R.A. 1932. Statistical Methods for Research Workers. Oliver and Boyd. Edingurgh. 4th Edition.

Frees, E.W. 1995. Assessing Cross-Sectional Correlation in Panel Data. Journal of Econometrics 69:393-414.

Friedman, M. 1937. The Use of Ranks to Avoid the Assumption of Normality Implicit in the Analysis of Variance. Journal of the American Statistical Association 32, 675-701.

Green, W.H. 2003. Econometric Analysis. 5th Edition. Upper Saddle River: Prentice Hall. New Jersey. United States of America.

Gutierrez, L. 2003. On the power of panel cointegration tests: a monte carlo comparison. Economic Letters 80:105-111.

Funkhouser, E. 1995. Remittances from International Migration: A comparison of El Salvador and Nicaragua. The Review of Economics and Statistics 77:137-46.

Gallina, A. 2006. The Impact of International Migration on the Economic Development of Countries in the Mediterranean Basin. United Nations Expert Group Meeting on International Migration and Development in the Arab Region. UN/POP/EGM/2006/04. United Nations. New York.

Glystos, N. 1997. Remitting Behaviour of temporary and permanent migrants: The Case of Greeks in Germany and Australia. Labour 11:409-35.

Guiliano, P. & Ruiz-Arranz M. 2005. Remittances, Financial Development and Growth. IMF Working Paper 05/234. Washington: International Monetary Fund.

Gupta, S., Patillo, C. & Wagh, S. 2007. Impact of Remittances on Poverty and Financial Development in Sub-Saharan Africa. IMF Working Paper 07/38. Washington: International Monetary Fund.

Gutierrez, L. 2003. On the power of panel cointegration tests: a monte carlo comparison. Economic Letters 80:105-111.

Hansen, H. & Tarp, F. 2000. Aid Effectiveness Disputed. Journal of International Development 12(3):375-398.

Hansen, L. P. 1982. Large Sample Properties of Generalised Method of Moments Estimators. Econometrica 50:1029-1054.

Herzberg, V. 2006. Access to Finance in the Mediterranean Partner Countries-Can Remittances Deliver? Proceedings of the 2nd International Conference on Migration and Remittances, London, United Kingdom.

Holtz-Eakin, D. 1988. Testing for Individual Effects in Autoregressive models. Journal of Econometrics 39(3):297-307

Holtz-Eakin, D., Newey, W. and Rosen, H.S. 1988. Estimating Vector-autoregressions in Panel Data. Econometrica. 56(6):1371-95.

Hicks, A. 1994. Introduction to Pooling, in Janoski, T and Hicks, A. The Comparative Political Economy of the Welfare State. Cambridge University Press. Cambridge

Higgins, M., Hysenbegasi, A & Pozo, S. 2004. Exchange Rate uncertainty and workers' remittances. Applied Financial Economics. 14:403-11.

Huang, P. & Vargas-Silva, C. 2006. Macroeconomic Determinants of Workers' Remittances: Host versus Home country's Economic Conditions. Journal of International Trade Economic Development 15(1), 81-99.

Human Development Indicators. 2009. United Nations.

International Monetary Fund. 2005. *World Economic Outlook 2005 - Globalisation and External Balances.* Washington: International Monetary Fund.

Izquiero, A. & Montiel P.J. 2006. Remittances and Equilibrium Real Exchange Rates in Six Central American Countries. Unpublished Paper.

Im, K., Pesaran, H., & Shin, V. 2003. Testing for Unit Roots in Heterogeneous Panels. Journal of Econometrics 115:53-74.

International Monetary Fund. 2005. World Economic Outlook 2005 - Globalisation and External Balances. Washington: International Monetary Fund.

International Monetary Fund. 2006. Balance of Payment Statistics Yearbook. Washington. International Monetary Fund.

Kapur, D. 2005. Remittances: The New Development Mantra? In Maimbo S. & Ratha, D. Eds. Remittances: Development Impact and Future Prospects. Washington D.C. World Bank.

Katseli, L. & Glystos, N. 1986. Theoretical and Empirical Determinants of International Labour Mobility: A Greek German Perspective. Centre for Economic Policy Research Working Paper 148.

Kemegue, F., Owusu-Sekyere, E. & VanEyden, R. 2011. What remittance inflows to Sub-Saharan Africa. A dynamic panel approach. Unpublished paper.

Kempa, B. 2005. An oversimplified inquiry into the sources of exchange rate variability. Economic Modelling. 22:439-458.

Ketley, R. 2006. Evolving Opportunities and Constraints in Remittances. A view from SADC. Proceedings of the 2nd International Conference on Migration and Remittances, 13-14 November, London, United Kingdom.

Kiviet, J. F.1995. On Bias, Inconsistency, and Efficiency of Various Estimators in Dynamic Panel Data Models, Journal of Econometrics, 68:53-78.

Kmenta, J. 1986. Elements of Econometrics. New York. Mcmillan. London. Collier McMillan. 2nd Edition.

Love, I. 2001. Estimating Panel Data Autoregressions. Package of Programs for Stata. New York. Columbia University. Mimeo.

Love, I., and Zicchino, L. 2006. Financial Development and Dynamic Investment Behaviour: Evidence from Panel VAR. The Quarterly Review of Economics and Finance 46:190-210.

Lucas, R and Stark, O. 1985. Motivations to Remit: Evidence from Botswana. The Journal of Political Economy 93:901-18

Lueth, E. & Ruiz-Arranz, M. 2006. A Gravity Model of Workers' Remittances. IMF Working Paper 06/290. Washington: International Monetary Fund.

Maddala, G.S. & Wu, S. 1999. A Comparative Study of Unit Root Test with Panel Data. Oxford Bulletin of Economics and Statistics 61, 631-52.

Migration Policy Institute. 2006. Remittance Profile, Sub-Saharan Africa. [Online] Available from:

Mohapatra, S., Ratha, D. & Silwal, A. 2009. Migration and Remittance Trends in 2009. Migration and Development Brief 11. World Bank. Washington D.C.

Mohr, P. & Fourie, L. 2008. Economics for South African students. Van Schaik Publishers. Pretoria. South Africa.

Montiel, P. J., 1999. Determinants of the long-run equilibrium real exchange rate: an analytical model. New York: Oxford University Press.

Montiel, P. J., 2003. Macroeconomics in emerging markets. Cambridge: Cambridge University Press.

Nayyer, D. 1994. Migration, Remittances and Capital Inflows: the Indian Experience. Delhi: Oxford University Press.

Nickell, S. 1981. Biases in Dynamic Models with Fixed Effects. Econometrica 49(6), 1417-26

Nwachukwu, J. 2008. Foreign Capital Inflows, Economic Policies and the Real Exchange Rate in Sub Saharan Africa: Is there an interaction Effect? Brooks World Poverty Institute Working Paper 25.

Nyoni, T. 1998. Foreign Aid and Economic Performance in Tanzania, World Development 26(7):1235-1240.

Ogun, O. 1995. Real Exchange Rate Movements and Export Growth in Nigeria from 1960 to 1990. Research Paper 82. Nairobi Kenya. African Economic Research Consortium.

Oomes N. 2008. Coping with Strong Remittances: The Case of Armenia. International Monetary Fund. Washington D.C.

Opoku-Afari, M., Morrissey, O. and Lloyd. T. 2004. Real Exchange Rate Response To Capital Inflows: A Dynamic Analysis For Ghana. CREDIT Research Paper No. 04/12. University of Nottingham.

Orrozco, M. 2004. Remittances to Latin American and the Caribbean: Issues and Perspectives on Development. Organisation of American States. Washington D.C.

Park, R.W. 1967. Efficient Estimation of a System of Regression Equations when Disturbances are both Serially and Contemporaneously Correlated. Journal of the American Statistical Association. 62:500-509.

Pinger. P.R. 2007. Come Back or Stay? Spend Here or There? Temporary versus Permanent Migration and Remittance Patterns in the Republic of Moldova. Working Paper 438. Germany. Kiel Institute for the World Economy.

Ouattara, B. and Strobl, E. 2004. Foreign Aid Inflows and the Real Exchange Rate in the CFA Franc Zone. CREDIT: Research Paper No. 04/07. University of Nottingham.

Pearce, D. 2006. Key Developments in Remittance Inflows since 2003. Proceedings of the 2nd International Conference on Migration and Remittances, 13-14 November, London, United Kingdom.

Pesaran, M.H. 2004. General Diagnostic Tests for Cross Section Dependence in Panels. Cambridge Working Paper 0435. University of Cambridge. Faculty of Economics. Cambridge

Philips, P. and Sul, D. 2003. Dynamic Panel Estimation and Homogeneity Testing under Cross Section Dependence. Economics Journal 6:217-59.

Quartey, P. and Blankson, T. 2004. Do Migrant Remittances Minimise the Impact of Macro-Volatility on the Poor in Ghana?

Ratha, D. 2003. Worker's Remittances: An Important and Stable Source of External Development Finance. Global Development Finance: Striving for Stability in Development Finance 157-175. Washington D.C. World Bank.

Ratha, D. 2006. Remittances and Migration. Proceedings of the 2nd International Conference on Migration and Remittances, 13-14 November, London, United Kingdom.

Roodman, D. 2006. How to do xtabond2: An Introduction to “Difference” and “System” GMM in Stata. Working Paper 103. Center for Global Development. Washington.

Sackey, H.A. 2001. External Aid Inflows and The Real Exchange Rate in Ghana. African Economic Research Consortium Research Paper 110.

Sargan, J. 1958. The Estimation of Economic Relationships using Instrumental Variables. Econometrica 26(3):393-415.

Singer, A. 2008. Migrant Remittances and Exchange Rate Regimes in the Developing World. Massachusetts Institute of Technology. Cambridge. Massachusetts. USA.

Singh R.J., Haacker, M. & Lee, K. 2009. Determinants and Macroeconomic Impact of Remittances in Sub-Saharan Africa. International Monetary Fund Working Paper 09/216. Washington D.C. International Monetary Fund.

Solimano, A. 2003. Workers Remittances to the Andrean Region: Mechanisms, Costs and Development Impact. Paper prepared for the Multilateral Investment Fund-IDB’s Conference on Remittances and Development, May 2003, Quito-Ecuador.

White, H, and Wignaraja, G, 1992. Exchange Rates, Trade Liberalisation and Aid. The Sri Lankan Experience. World Development 20(10):1471-80.

Windmeijer, F. 2005. A finite sample correction for the variance of linear efficient two-step GMM estimators. Journal of Econometrics 126: 25-51.

Woodruff, C. & Zenteno, R. 2001. Remittances and Microenterprises in Mexico. UCSD Graduate School of International Relations and Pacific Studies Working Paper. University of California. San Diego.

World Bank. 2006. Global Economic Prospects: Economic Implications of Remittances and Migration. Washington: World Bank.

World Bank. 2008. Migration and Remittances. Washington. World Bank.

World Bank. 2009. World Development Indicators. World Bank. World Bank. 2010. Migration and Remittances. Washington. World Bank.

Zellner, A. 1962. An efficient method of estimating seemingly unrelated regressions and tests for aggregation bias. Journal of the American Statistical Association, 57:348-368.

APPENDIX 1: Theoretical framework for Chapter 2

The representative migrant therefore solves the problem

$$\text{Max } U_t = \sum_{t=1}^{T} \beta^t \left(\gamma_t LnA_t + \theta_t LnC_t^m + \phi_t LnC_t^h\right) \quad (1)$$

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

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

From first order conditions

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

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

$$\frac{\partial L}{\partial C_t^h} = [\frac{\phi_t}{C_t^h} - \lambda_{3,t}P_t^h] = 0 \quad (9)$$

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

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

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

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

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

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

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

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

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 (16) into (17) $R_t^m = Y_t^m + F_{t-1}^m(1 + i_t^m) - F_t^m - \frac{\theta_t}{e_t \phi_t} P_t^h C_t^h$ (18)

From equation (18) $\frac{\partial R_t^m}{\partial C_t^h} = -\frac{\theta_t}{e_t \phi_t} P_t^h$ (19)

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

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

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

Again from equation (20)

$$\frac{\partial r_t^m}{\partial Y_t^m} = \frac{\phi_t}{\theta_t} \quad (23)$$

From equation (11)

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

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

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

From equation (24) $\frac{\partial R_t^m}{\partial i_t^h} = \frac{1}{e_t}[-F_{t-1}^h]$ (27)