THE IMPACT OF REMITTANCES ON POVERTY IN AFRICA:

A CROSS-COUNTRY EMPIRICAL ANALYSIS

By

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In the

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Abstract

Very limited empirical studies exist on the impact of remittances on poverty in Africa. To fill this gap in the literature, this study analyses the impact of remittances on poverty in a panel of 32 African countries. The study expands upon earlier work by including two additional foreign currency inflows, exports and Official Development Assistance (ODA). Accounting for possible heteroscedasticity and endogeneity, the results consistently show that remittances significantly reduce poverty. Exports and ODA are found to have a statistically insignificant effect on poverty. The absence of a significant relationship between exports, ODA and poverty suggest that the growth gains from exports and ODA fail to trickle down to the poor. These results highlight the significance of remittances as a source of finance for development.

Keywords: Remittances, Poverty, Africa, Panel Data Models.

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Dedication

I dedicate this thesis to my Mom and Dad, Manku Maduwane and Mxolisi Mahlalela.

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List of Abbreviations

2SLS	Two-Stage Least Squares
AEO	African Economic Outlook
BOPS	Balance of Payments Statistics
DAC	Development Assistance Committee
DWH	Durbin-Wu-Hausman
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GLS	Generalised Method of Moments
GNI	Gross National Income
GMM-IV	Generalised Method of Moments- Instrumental Variables
IMF	International Monetary Fund
IV	Instrumental Variables
LAC	Latin-American Caribbean
MFI	Micro finance Institutions
MNO	Mobile Network Operators
MTO	Money Transfer Operators
NELM	New Economics of Labour Migration
ODA	Official Development Assistance
ODI	Overseas Development Institute
OECD	Organisation for Economic Corporation and Development
OLS	Ordinary Least Squares
PPP	Purchasing Power Parity
RSP	Remittance Service Providers
UNCTAD	United Nations Conference on Trade and Development
WDI	World Development Indicators

List of Variables

P_0	Poverty headcount ratio
P_1	Poverty gap ratio
g	Gini coefficient
y	Income (per capita GDP)
r	Remittances
x	Exports
a	ODA
D_1	Lower-middle-income group dummy variable
D_2	Upper-middle-income group dummy variable
t	Trade openness
e	Educational attainment

Chapter One

Introduction

While neither migration nor cross-border remittances are a recent occurrence, the latter have become a topic of increasing interest in development economics over recent years. Cross-border remittances are the sum of two components in the balance of payments, personal transfers and compensation of employees. Personal transfers consist of current transfers between resident and non-resident households. While compensation of employees refers to the income of short-term seasonal workers employed in economies where they are non-residents, and the income of residents employed by non-resident entities (World Bank, 2015b). The upward trend of cross-border remittances to developing countries has led to a resurgence of focus on remittances. Studies analysing the impact of cross-border remittances have predominantly focused on developing regions in East Asia and the Pacific, Europe and Central Asia, Latin America and the Caribbean, the Middle East and South Asia. Very limited empirical studies, however, exist on the developmental impact of cross-border remittances to Africa; most empirical studies examine the impact of remittances at the household and community level. This study seeks to fill the gap in the literature by analysing the impact of cross-border remittances on poverty in Africa.

Remittances to Africa have increased substantially over the years, rising from US$11.45 billion in 2000 to US$50.11 billion in 2010 (World Bank, 2015a). They are an important source of foreign finance, accounting for over 15% of Gross Domestic Product (GDP) in countries such as Lesotho, Liberia, Gambia and Comoros. They are the largest source of external financial flows to Africa, exceeding both Foreign Direct Investment (FDI) and aid flows since 2010.

There are two distinguishing features of remittances. First, they are more stable relative to other foreign financial flows (Gupta, Pattillo & Wagh, 2009:105). Second, they tend to behave counter-cyclically. Quarterly and Blankson (2004) found that remittances to Ghana move counter-cyclically with respect to the economic cycle and are beneficial in smoothing household income and consumption over time. The counter-cyclical nature of remittances enables them to absorb external shocks that could negatively affect the economies of recipient countries.

Given the stable and counter-cyclical nature of remittances, it has become increasingly important to analyse their effects on development. Evidence from around the globe suggests that remittance-receiving households generally have higher levels of income and lower incidences of extreme poverty compared to households that do not receive remittances (Kamuleta, 2014:18). Ratha (2013) argues that remittances can play a pivotal role in contributing towards poverty reduction, as they tend to increase the incomes of recipient households.

A number of studies have analysed the relationship between remittances and poverty. Using a sample of 1000 households from three villages across rural Egypt, Adams (1991) found that the number of poor households decreases by 9.8% when international remittances are included in household income. Similarly, Yang and Martinez (2006) analysed the impact of remittances on poverty using household surveys in the Philippines and found remittances to have a negative relationship with poverty.

Despite the growing importance of remittances as a source of finance for development, the high cost of sending remittances to and within Africa limit their impact on development outcomes in Africa. In 2013, the average cost of sending remittances to and within Africa was 11.5%; this compared with a global average of 8.9% (World Bank, 2013). A report by the Overseas

Development Institute (ODI) estimated a mid-range annual loss of $1.8 billion as a result of Africa's high remittance costs (Watkins & Quattri, 2014:20). At current levels of per-pupil spending, $1.8 billion would be sufficient to put roughly 14 million African children into school (Watkins & Quattri, 2014:21). Moreover, the savings that would result from reducing the high remittance costs would be enough to provide clean water to 21 million people or improved sanitation to 8 million people (Watkins & Quattri, 2014:21). These estimates illustrate the magnitude of the opportunity cost associated with Africa's high remittance costs.

The G7 and the G20 have taken a number of steps to reduce the cost of sending remittances. In 2008, the G7 adopted a quantitative goal towards halving the global cost of sending remittances from 10% to 5% over five years (Watkins & Quattri, 2014:17). Although this commitment has been reaffirmed and taken up in a number of countries, the commitment has had no discernible effect on Africa's high remittance costs.

A number of factors contribute to maintain Africa's high remittance cost structure. Exclusivity agreements involving major Money Transfer Operators (MTOs) and commercial banks are one of the drivers of Africa's high remittance costs as they restrict competition. These agreements allow MTOs to carry out transactions through designated commercial banks (Ratha, Mohapatra, & Scheja, 2011), and have the effect of increasing the cost of market entry, reducing competition, and creating highly segmented markets characterised by limited competition.

Reducing remittance costs in Africa and increasing competitiveness in the market for remittances will maximise the flow of remittances directly to the hands of recipients. Moreover, formalising remittance transaction services will help reduce the cost of sending remittances and will leverage remittances for development purposes (Kamuleta, 2014: 50).

1.1 Statement of the Problem

There is a growing body of literature evaluating the developmental effects of remittances to Africa. Existing studies have predominantly focused on the impact of remittances on poverty for specific villages or countries in Africa, for example, Adams (1991) utilized household survey data from three villages in rural Egypt and Adams and Cuecuecha (2013) utilised a dataset consisting of Ghanaian households to investigate the effects of remittances on poverty. Very limited empirical studies, however, exist on the impact of remittances on poverty in Africa at the aggregate level. This study seeks to fill the gap in the literature by evaluating the relationship between remittances and poverty in a broad panel of African countries.

In evaluating the relationship between remittances and poverty, we build on the basic growth-poverty model suggested by Ravillion and Chen (1997). Aside from remittances, other foreign currency inflows may have an impact on poverty; therefore we expand upon previous work by incorporating exports and Official Development Assistance (ODA). By including two additional foreign currency inflows i.e. exports and ODA, we test for the significance of remittances on poverty relative to other foreign currency flows.

We first use a standard Ordinary Least Squares (OLS) model to estimate the poverty-elasticity of remittances. Next we consider the possible violations of the Gauss-Markov assumptions and use appropriate estimation techniques to tackle these issues.

1.2 Contribution of the study

The study contributes to the literature in a number of ways. First, by looking specifically at Africa, it provides a richer analysis of the impact of remittances on poverty in the continent than that provided by studies with global coverage. Second, it develops the most commonly used data set on remittances, poverty and inequality by expanding the data coverage of African countries. Lastly, by incorporating exports and ODA, the study seeks to determine the importance of remittances on poverty relative to other foreign currency inflows.

1.3 Limitations of the study

The availability of poverty and remittances data was the main limitation of the study. Poverty data are based on household surveys that take place once every few years. Moreover, a number of African countries generally do not record or publish data on remittances. For those reasons, the analysis could only include countries that have at least two observations.

1.4 Organisation of the study

The study is organised as follows: Chapter two Section one provides a detailed summary of the recent trends in remittances to Africa, while Section two provides a summary of the definition and measures of poverty. Chapter three reviews the literature on remittances. Chapter four outlines the research methodology and data. Chapter five discusses the empirical results and, Chapter six presents the key research findings and recommendations.

Chapter Two

Section One

Remittances to Africa

2.1.1 Recent trends in remittances to Africa

Remittances to developing countries have grown rapidly over recent years, rising from roughly US$292 billion in 2010 to US$436 billion in 2014 (World Bank, 2015b). Africa has been part of the global surge in remittance flows. Remittances to the continent have increased substantially, rising from US$11.6 billion in 2000 to US$50.1 billion in 2010. The 331.9% growth in remittances to Africa over the period 2000-10 (from US$11.6 billion to US$50.1 billion) illustrates how growth in remittances has accelerated. Remittances continue to be the largest source of external financial flows to Africa, exceeding both FDI and aid flows since 2010. Figure 1 illustrates financial inflows to Africa (in billions of US dollars) over the period 1983 to 2013 (World Bank, 2015a).

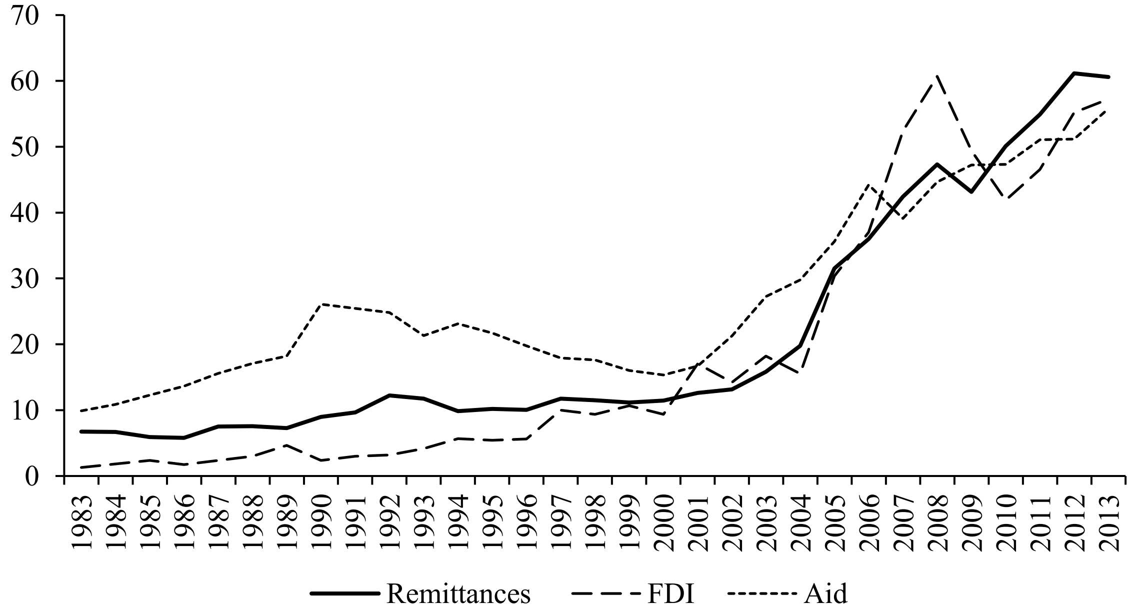

Figure 1. Financial inflows to Africa, 1983-2013 (billions of US dollars)

Source: World Bank (2015a)

Remittances are an important source of finance for African countries. Lesotho, Gambia, Liberia, Comoros and Senegal, for example, receive about 20% of GDP in the form of remittances (see Table 1). Although remittances account for a comparatively smaller share of GDP in larger countries, they still make up a larger share of GDP compared to other sources of external financial flows. In 2013, for example, remittances to Egypt were 6.6% of GDP, while ODA and FDI flows were 2% and 1.5% of GDP respectively.

Table 1. Remittance flows to African countries (% of GDP), 2013

Country	% of GDP
Lesotho	20.9
Gambia	20
Liberia	19.7
Comoros	19.4
Senegal	10.9
Cabo Verde	9.6
Togo	9.2
Sao Tome and Principe	8.7
Mali	8.2
Guinea-Bissau	6.7
Egypt	6.6
Morocco	6.4
Tunisia	4.9
Nigeria	4.0
Madagascar	4.0

Source: World Bank (2015b)

Remittances tend to be more stable relative to other external financial flows. Over the period 1983-2012, remittances to Africa were not only less volatile than ODA but they were also less volatile than FDI, which is often perceived as the most stable external financial flow (see Figure 2 below) (Gupta, Patillo and Wagh, 2009:105). Remittances also tend to behave counter-cyclically. They tend to increase in response to external shocks in recipient countries and decrease when conditions are more favourable.

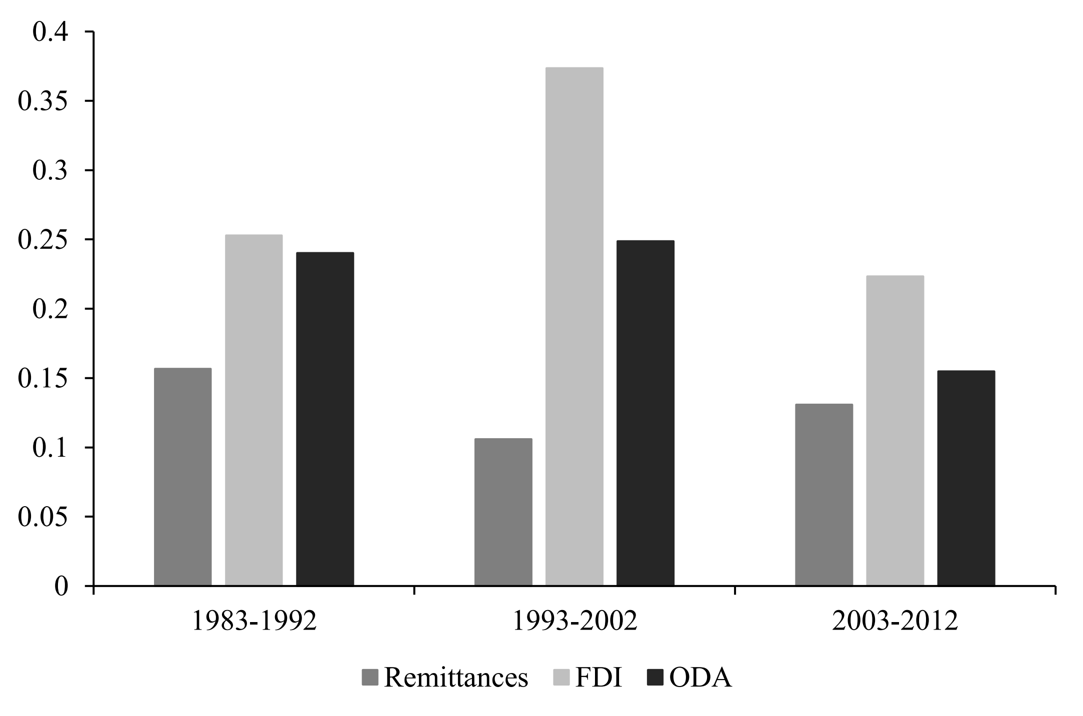

Figure 2. Volatility of external flows to Africa[1]

Source: Author's calculations. Data is from World Bank (2015a).

2.1.2 Market for remittances in Africa

Remittance service providers (RSPs) in Africa offer services to clients and charge fees either directly or through agents working for RPSs. Recipients receive remittances through MTOs, commercial banks, non-bank financial institutions such as micro-finance institutions, or post offices. The functions of the key service providers are summarised briefly below.

[1] Volatility is measured as the coefficient of variation of the financial flow to GDP.

2.1.2.1 Money Transfer Operators (MTOs)

Money Transfer Operators provide electronic money transfer services and cash-to-cash transfers. They work through networks of agents as well as in partnerships with commercial banks in recipient countries. Remittance markets in Africa are dominated by a duopoly of MoneyGram and Western Union, the two largest MTOs. MoneyGram and Western Union together account for over half of the total market share in 22 countries in Africa (Watkins & Quattri, 2014:17).

2.1.2.2 Commercial banks

Commercial banks are the only RSPs authorised to carry out transfer services in most African countries and typically pair up with large MTOs, such as MoneyGram and Western Union. Commercial banks account for over half of the in-bound remittance payments in 29 countries across Africa (Watkins & Quattri, 2015:18).

2.1.2.3 Non-bank financial institutions

Non-bank financial institutions include micro-finance institutions (MFIs) and credit unions. Under the regulations operating in most African countries, only a few are authorised to pay remittances directly (Watkins & Quattri, 2015:18). Generally, these institutions only function as payment agents for MTOs.

2.1.2.4 Post Offices

In comparison to commercial banks, post offices in Africa have higher levels of coverage, particularly in rural areas. This provides them with the opportunity to tap into the market for remittances.

2.1.2.5 Innovative RSPs

The use of new communication and information technology is becoming increasingly common in the market for remittances (Organisation for Economic Corporation and Development [OECD], 2010). A number of innovative transfer technologies have been developed to expand access to electronic transfer services. The most significant of these are mobile banking transfer services accessible through partnerships between mobile phone companies and commercial banks (Kamuleta, 2014:30). Vodafone-Safaricom, for example, launched mobile banking services in Kenya, M-PESA, to facilitate mobile transactions. With over 7 million customers, M-PESA has generated over US$ 88.5 million worth of daily transactions (UNCTAD, 2013). M-PESA is a cheap, fast and convenient way of making transactions and allows customers to transfer money to any mobile network at any time (Kamuleta, 2014:31).

The example of M-PESA indicates that there is a growing market for innovative transaction technologies that facilitate the geographical reach of RSPs, particularly in rural areas with limited coverage (Mohapatra & Ratha, 2011). New transaction technologies, such as M-PESA, have increased the accessibility and affordability of remittances, thus increasing inclusion in financial services, particularly for recipients who lack access to formal financial services (OECD, 2010).

2.1.3 Remittance channels in Africa

Migrants use formal and informal channels for remitting money.

2.1.3.1 Formal channels

The main formal RSPs are MTOs, commercial banks, post offices, mobile network operators (MNOs), as well as other non-bank financial institutions such as MFIs. Formal channels are of particular importance as they can facilitate formal financial inclusion by expanding access to other financial services and products in both the sending and recipient country (Gupta, Patillo & Wagh, 2009; Agunias & Newland, 2012). Generally, commercial banks, MTOs and post offices are assumed to provide the highest levels of reliability, security and a larger geographical reach through their local branches.

2.1.3.2 Informal channels

Sending or receiving remittances through informal channels is the most common method available for people living in areas with limited access to formal financial services. Informal channels involve the use of relatives, friends or couriers to send remittances. Hawala is one of the most prevalent money transfer systems used in the informal remittance market. The basic hawala mechanism works as follows: "the remitter pays, often with a small fee, the first transfer person (in the sending country), who informs the second transfer person (in the recipient country), and the second transfer person releases funds to the recipient" (Kamuleta, 2014:34).

There are contrasting views regarding the use of informal remittance channels. A number of authors find that their fragmented nature provides advantages as they make services accessible to people living in areas with limited access to formal financial services (Hariharan, 2012; Rodima-Taylor et al., 2013). While others have taken on a less positive view, perceiving them as a means for criminal activity (Looney, 2003). According to Maimbo and Passas (2005), sending remittances through informal channels increases the likelihood of capital flight, tax evasion and smuggling.

2.1.3.3 User Preferences

A migrant's choice of remittance channel and RSP may be influenced by a number of factors such as cost, accessibility, speed and service. Table 2 summarises the advantages and disadvantages of each.

Table 2.Advantages and Disadvantages of Remittance Channels and RSPs

Remittance Channel	RSP	Advantages	Disadvantages	Accessibility	Cost
Formal	MTOs	Very accessible in urban areas; fast; and reliable	Less accessible in rural areas; and high cost per transaction, particularly for small transactions	High	High
	Commercial banks	Very accessible in most sending countries; reliable; and often the cheapest option for large transactions	Less accessible in receiving countries, particularly in locations with weak financial sectors; sender and receiver must maintain accounts in order to make transactions; high cost per transaction; and service can be slow	Medium/ Low	High
	Post offices	Very accessible in both sending and receiving countries; and often cheaper than other formal RSPs	Can be unreliable; slow; and possible delays at receiving end because of lack of liquidity and poor service quality in many developing countries	High	Low
Informal	Hawala	Operate in locations with limited access to formal financial services; costs are generally lower than formal RSPs; fast; reliable; and door-to-door delivery	In some cases, costs may be higher than formal services	High	Medium/ Low
	Self/ Relatives/ Friends	Operate in locations with limited or no access to formal financial services; no direct costs; and reliable	Slow; and the risk of loss of funds	High	Low

Source: Adapted from Sander and Maimbo (2003).

Informal channels are generally used wherever the formal financial sector is weak and unreliable, with high transaction costs (Sander & Maimbo, 2003:27). The use of formal channels increases in economies with strong and reliable financial sectors.

The inefficiencies of weak and unreliable commercial banks in Africa has left a gap in the market for remittances and has paved the way for formal MTOs. In comparison to banks, MTOs cover a broader network of locations.

Although post offices also offer broader coverage, particularly in rural areas, they are generally not used as RSPs because of their poor service and inefficiency. Even in countries where post offices operate effectively, not all are authorised to handle transfers because of the costs and risks involved (Sanders & Maimbo, 2003; Cross, 2003).

Altogether, a number of factors can influence a migrant's choice of remittance channel. External factors such as exchange rate fluctuations and foreign exchange controls in a migrant's home country can also influence a migrant's choice of remittance channel; as well as other factors such as accessibility and cost. Accessibility is an important factor to consider. Although bigger cities provide fairly good access to financial services, rural areas typically do not receive as much coverage. Many remitters, however, need to make transfers to locations with weak financial infrastructure in which commercial banks have little or no coverage. In such cases, recipients can only receive remittances through informal channels (Watkins & Quattri, 2014).

2.1.4 The cost of remittances to Africa

The World Bank's Send Money Africa Remittance Cost database has made it possible to compare the cost of sending remittances from selected countries, worldwide, to a number of African countries. In 2013, the average cost of sending money to and within Africa was 11.5%; while the average global cost was 8.9% (World Bank, 2013). With an average cost of 11.5%, sending US$200 to and within Africa was 2.6% higher than the global average. The most expensive sending markets in Africa were Ghana, Tanzania and South Africa, which measured 26%, 20.2% and 19.3% respectively.

A number of factors contribute to maintain Africa's high remittance cost structure, these include: "limited competition, regulatory practices that limit market entry, and a lack of financial inclusion" (Watkins & Quattri, 2014:25).

Exclusivity agreements between big MTOs and banks are one of the drivers of Africa's high remittance costs as they restrict competition (Watkins & Quattri, 2014:24). Exclusivity agreements with commercial banks allow MTOs to carry out transactions through designated commercial banks (Ratha, Mohapatra, & Scheja, 2011). A 2007 survey carried out in Nigeria found that 84% of commercial banks in the country have exclusivity agreements with either MoneyGram or Western Union (Watkins & Quattri, 2014:17). This virtual duopoly operated by MoneyGram and Western Union is stifling competition in the market for remittances in Africa.

The G7 and the G20 have taken a number of steps to reduce high remittance costs in developing countries. In 2008, the G7 adopted a quantitative goal towards halving the global cost of remittances, from 10% to 5% over five years (Watkins & Quattri, 2014:17). Although this commitment has been reaffirmed and taken up in a number of countries, the commitment has had no discernible effect on reducing remittance costs in African countries.

Reducing remittance costs in Africa and increasing transparency and competitiveness in the market for remittances will maximise the flow of remittances directly to the hands of recipients. Moreover, formalising remittance transaction services will help reduce the cost of sending remittances and will leverage remittances for development purposes (Kamuleta, 2014:50).

Section Two

Defining and Measuring Poverty

2.2.1 Defining Poverty

The study uses poverty to analyse the developmental impact of remittances in Africa. As a multidimensional phenomenon, poverty can be defined and measured in different ways. The United Nations High Commission for Refugees (UNHCR) defines poverty as a human condition characterised by the sustained deprivation of resources, choices, capabilities, security and power necessary for adequate standard of living (UNHCR, 2004). Thus, poverty can be described as the state of being without the necessities of daily living, often associated with hardship, need and lack of resources across a wide range of circumstances. Economic deprivation is a standard feature of most definitions of poverty.

Development agencies often employ quantitative measures of poverty, such as those setting a threshold of one or two dollars a day. Poverty can also be measured by specific indicators relating to certain economic and social factors, such as infant mortality and literacy rates. Although quantitative poverty measures may fail to account for several aspects of poverty, they provide a number of benefits including (Chamber, 2002:22):

- the comparison of time series to identify trends;
- the cross-sectional comparison of different households, communities, countries and regions;
- the estimation of distributions within populations and regions; as well as
- the credibility of numbers in influencing policy-makers.

As far as the poverty issue is discussed, it is always closely associated with the poverty line. The poverty line is the minimum threshold level of income, or consumption, below which one cannot afford to purchase all the resources one requires to live. Practically, different countries often use different poverty lines. However, in general, it is more common to use one poverty line in order to compare economic welfare levels across countries and regions. When comparing poverty across countries, the purchasing power parity (PPP) exchange rate is used. PPP exchange rates are used to ensure that poverty levels do not change with normal exchange rates (Makoka & Kaplan, 2005:6).

2.2.2 Poverty Measures

There are several methods that can be used to measure poverty[2], this study makes use of the poverty headcount and the poverty gap indices.

2.2.2.1 Poverty Headcount, P_0

The Poverty Headcount Index, denoted as P_0, measures the share of the population whose consumption, or income, is below the poverty line. This poverty measure quantifies the share of the population that cannot afford to buy a basket of goods.

Mathematically, the poverty headcount ratio P_0 is defined as:

$$P_0 = \frac{1}{N}\sum_{i=1}^{N} I(y_i < z) = \frac{1}{N}\sum_{i=1}^{q} 1 = \frac{N_p}{N} \quad (1)$$

where:
N = total population
I(.) = an indicator function taking a value of 1 (below the poverty line) if the bracketed expression is true, and 0 otherwise.
y_i = welfare indicator, e.g. consumption per capita

[2] These methods include the Poverty Headcount Index, the Poverty Gap Index, the Squared Poverty Gap Index and the Human Poverty Index.

z = poverty line

N_p = number of poor individuals in the population

The Poverty Headcount measure has the advantage of being easy to construct and understand. It also has the advantage of being an adequate measure of assessing the overall progress in reducing poverty. However, it does suffer from a number of limitations (Makoka & Kaplan, 2005:19). First, it does not account for differences in well-being between different households living below the poverty line. And second, it does not take the depth of poverty into account. For this reason, the Poverty Gap Index is also employed.

2.2.2.2 Poverty Gap, P_1

The Poverty Gap Index, P_1, measures the degree to which the mean income of the poor differs from the established poverty line. It is also called the Depth of Poverty Index.

Mathematically the Poverty Gap Index is defined as:

$$P_1 = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{z-y_i}{z}\right)I(z-y_i) = \frac{1}{N}\sum_{i=1}^{q}\left(\frac{z-y_i}{z}\right) \quad (2)$$

where the variables are defined as in equation 1.

The advantage of the poverty gap measure is that it reflects the average shortfall of poor individuals, thereby giving a better understanding of the depth of poverty (Makoka & Kaplan, 2005:19). Another advantage of this measure is that it gives an indication of how much would have to be transferred to the poor to bring their expenditure up to the poverty line. It is therefore easy to derive, from the index, the minimum cost of eliminating poverty with transfers i.e. the cost of eliminating poverty by targeting the poor directly. However, the limitations of the poverty gap index are that it does not capture differences in the severity of poverty among the poor and it ignores inequality among the poor themselves (Makoka & Kaplan, 2005:20).

Chapter Three

Literature Review

This chapter summarises the literature on remittances. Section one focuses on the motives and determinants of remittances. Section two focuses on the impact of remittances at the household and national level. Finally, section three looks at the relationship between remittances, inequality and poverty.

3.1 Motives and determinants of remittances

3.1.1 Micro level

The literature concerning the motives for remitting has been influenced to a large extent by Lucas and Stark's (1985) paper, *Motivations to remit: Evidence from Botswana*. In their paper, household data from Botswana is used to analyse remittances from household members working in other parts of the country (Lucas & Stark, 1985). They postulate key motives for remitting money as: pure altruism; pure self-interest; and other intermediate motives (Carling, 2008:584).

Migrants are considered to be altruistic if their utility is derived from their family's utility, which is assumed to depend on their family's consumption (Carling, 2008:584). If remittances are motivated by altruism, one can expect remittances to increase in response to adverse conditions back home.

Migrant remittances can also be motivated by self-interest. Migrants can send remittances with the aspiration to inherit, acquire assets back home or in preparation for their return home (Carling, 2008:584).

A number of authors find that remittances are motivated by a combination of altruistic and self-interest motives, Lucas and Stark (1985), for example, suggest “tempered altruism” or “enlightened self-interest” to refer to a combination of altruistic and self-interest motives.

Lucas and Stark’s analytical framework was a significant component in the development of the New Economics of Labour Migration (NELM). The NELM differs from the traditional neoclassical approach to labour migration, which posits that decisions about migration are made on an individual basis. The primary principles of the NELM are that decisions regarding remittances are related to decisions about migration and that these decisions must be understood at the household level (Carling, 2008:584). Migrant workers enter into contractual insurance agreements with household members back home and send remittances when households experience shocks. At the same time, households support migrants by, for example, paying the costs of migration or supporting the migrant during periods of unemployment (Carling, 2008:584). This co-insurance agreement between migrants and households reduces household risks for family members back home.

In summary, migrants have a number of motives for sending remittances. The motives for remitting depend on the circumstances of both migrant senders and remittance recipients and should be viewed as complementary (Kamuleta, 2014:17).

3.1.2 Macro level

Studies have identified a number of macroeconomic factors that determine remittance flows, including: economic conditions in a migrant’s home and host country; the stock of migrant workers in the host country, economic policies and institutions in the home country, transaction costs, general risks in the home country, and opportunities for investment.

- *Economic conditions in a migrant's home and host country*

Economic conditions in a migrant's home country can determine the volume of remittances sent home. For example, adverse shocks to output, wages and employment in the home country can reduce household income and increase the need for remittances. Assuming migrants are motivated by altruism, this can encourage them to send more remittances home. Economic conditions in a migrant's host country can also be a determinant of remittance flows. Favourable economic conditions in a migrant's host country increase a migrant's employment and earnings prospects, enabling migrants to send more money home. Using data from Latin American countries and the United State, Vargas-Silva and Huang (2006) investigated whether remittances are more responsive to changes in the macroeconomic conditions of the home country versus changes in the macroeconomic conditions of the host country. They found that remittances are mostly driven by changes in the macroeconomic conditions of the host country.

It is, however, possible that neither home nor host country macroeconomic conditions drive remittances. Remittances can be determined by demographic factors independent of changes in the macroeconomic conditions of the home and host countries.

- *Stock of migrant workers in the host country*

The stock of migrant workers in the host country is another significant determinant of remittances. Freund and Spatafora (2008:356) find that an increase in the stock of migrant workers leads to a proportionate increase in remittance flows.

- *Economic policies and institutions in a migrant's home country*

Economic policies and institutions in a migrant's home country can affect the inflow of remittances. The presence of exchange rate restrictions, for instance, can discourage migrants from sending remittances through formal channels (El-Sakka & McNabb, 1999). Likewise, macroeconomic instability, such as real exchange rate overvaluation, can also discourage migrants from sending remittances through formal channels. Alternatively, financial sector development can encourage the flow of remittances through formal channels.

- *Transaction costs*

Transaction costs affect the way in which remittances are sent (Freund & Spatafora, 2005:357). In general, remittances can be sent through formal and informal channels. Formal channels include money transfer services provided by MTOs, banks and post offices; while informal channels include transfers sent by unofficial courier companies, relatives or friends. Globally, studies show that the cost of remitting money through informal channels is cheaper (Freund & Spatafora, 2005:357). Remittances sent through informal channels, however, are not recorded in the balance of payments. This understates the total volume of recorded remittances. By affecting the way in which migrants remit money, transaction costs are a significant determinant of the total volume of officially recorded remittances.

- *Risks in the home country*

Risks in the home country, such as political instability, can discourage migrants from remitting, at least for investment purposes. A study by Wahba (1991) found that political instability and poor financial intermediation has a negative impact on the inflow of remittances.

- *Opportunities for investment*

Greater potential returns on assets in the host country can encourage migrants to invest their savings in the host country rather than remit money home; this is assuming the investment motive for remittances surpasses the altruistic motive.

Though a number of potential determinants of remittances have been identified, the stock of migrant workers in a host country appears to be the most significant determinant of remittances at the macro level (El-Sakka & Mcnabb, 1999; Chami, Fullenkamp & Jahjah, 2005; and Freund & Spatafora, 2005).

3.2 Impact of remittances

3.2.1 Household level

This section reviews the literature on the impact of remittances at the household level.

- *Health*

Remittances can improve health outcomes of recipient households by enabling households to spend more on healthcare services. Frank and Hummer (2002) reported a positive relationship between remittances and health outcomes for remittance-receiving households in Mexico. They found that children born in households that receive remittances are less likely to be exposed to health risks at birth. Similarly, Hildebrant and McKenzie (2005) found that migration from Mexico to the United States has a positive impact on child health outcomes; lowering rates of infant mortality and increasing birth weights (Hildebrandt & McKenzie, 2005). In a cross-country study analysing the relationship between remittances and health outcomes in 56 developing countries, Drabo and Ebeke (2010) found that an increase in remittances is associated with better access to private healthcare treatment.

Although the empirical evidence on the impact of remittances on health outcomes in Africa is somewhat limited, household surveys conducted by the Africa Migration Project[3] indicate that remittance-receiving households in Africa, particularly households receiving remittances from outside the continent, spend on average 5-12% of total remittances on healthcare (Ratha et al., 2011:68). A similar share of remittances received domestically and within Africa is spent on

[3] The Africa Migration Project is a joint project undertaken by the World Bank and the African Development Bank in order to understand migration and remittances in Africa, with the objective of making informed policy recommendations for policymakers (World Bank, 2015c).

healthcare, although the average share is lower given the smaller volume of remittances flowing from within the continent. Birdsall and Chuhan (1986) found that remittance-receiving households in rural Mali increased demand for health services, particularly demand for private healthcare services. While using panel data for KwaZulu Natal, Nagarajan (2009) found that remittance-receiving households spend a larger share of their household budget on food and health expenditures.

- *Education*

Remittances reduce liquidity constraints faced by recipient households, enabling them to increase expenditure on education (Mara et al. 2012). A study by Adams and Cuecuecha (2010), for instance, found that in Guatemala households receiving international and internal remittances spend 58.1% and 45.2%, respectively, more on education than households that do not receive remittances. Hanson and Woodruff (2003) found that, in Mexico, children living in remittance-receiving households attained higher levels of schooling. While Cox-Edwards and Ureta (2003) found that in El Salvador, remittances reduce the likelihood of children leaving school (Cox-Edwards & Ureta, 2003).

Regarding Africa, household surveys by the Africa Migration Project indicate that expenditure on education is the second-highest use of international remittances in Nigeria and Uganda, the third highest in Burkina Faso and the fourth highest in Kenya (Ratha et al., 2011:66). With respect to domestic and intraregional remittances, remittance-receiving households in Kenya and Uganda, for example, typically spend 15% of domestic or intraregional remittances on education, while in Nigeria households typically spend 20% of domestic or intraregional remittances on education (Ratha et al., 2011:66).These figures indicate that a significant portion of remittances received in African countries are spent on education.

A study by Elbadawi and Roushdy (2010) found that in Egypt children living in remittance-receiving households are more likely to complete tertiary education than children living in households that do not receive remittances. Further, they found that teenaged girls living in households that receive remittances do less household work and are more likely to be in school than girls living in households that do not receive remittances. Adams, Cuecuecha and Page (2008) found that remittance-receiving households in Ghana invested more in education than households that do not receive remittances. And using data from six countries in Sub-Saharan Africa, Ratha (2013) found a strong positive relationship between remittances and the average number of household members with a secondary education.

- *Investment in physical capital and entrepreneurship*

Remittances can contribute to financial asset formation; improve investment opportunities; and promote entrepreneurship (Orozco et al., 2005). A study by Adams (1998) found that in rural Pakistan remittances increase the propensity to invest in agricultural land. While Woodruff and Zenteno (2001) found that a large portion of investments in microenterprises are financed by remittances.

With respect to Africa, household surveys by the Africa Migration Project indicate that a significant share of remittances to Africa are spent on investments in property, farming, agricultural equipment, and investments in small businesses (Ratha et al., 2011:65). As a share of total remittances, investments in these items represent 57% in Nigeria, 55.3% in Kenya, 36.4% in Burkina Faso, 20.2% in Uganda, and 15.5% in Senegal (Ratha et al., 2011:65).

Some might argue that remittances do not contribute to investments in long-term financial or physical assets as they function primarily as a form of social insurance for recipient households and are not necessarily intended for long-term investment purposes.

- *Insurance against external shocks*

Migration enables remittance-receiving households to diversify their income sources, and by so doing reduces household vulnerability to external shocks. In the Aceh region of Indonesia, remittance-receiving households recovered quicker than households that did not receive remittances after a tsunami hit the region in 2004 (Wu, 2006). In El Salvador, an increase in remittances, following an earthquake in 2001, helped smooth household consumption (Halliday, 2006). While, in Haiti, remittances from relatives and friends in the US played a significant role in decreasing the damage caused by an earthquake in 2010 (Ratha, 2010).

Remittances to Africa also function as a form of social insurance against external shocks (Block & Webb, 2001). In Botswana, Lucas and Stark (1985) found that remittance-receiving households, which rely on crops for their sustenance, receive more remittances during unfavourable environmental conditions. While Mohapatra, Joseph & Ratha (2009) found that remittance-receiving households in Ethiopia are less likely to sell their productive assets to cope with food shortages when faced with external shocks.

3.2.2 National level

- *Stability and counter-cyclicality of remittances*

Remittances tend to be more stable relative to other financial flows. In Sub-Saharan Africa, where private capital flows have fluctuated considerably over the years, remittances have consistently been less volatile (Gupta, Pattillo & Wagh, 2009).

To the extent that they represent a stable and large source of foreign currency, remittances have been shown to "help sudden current account reversals during periods of economic instability, improve a country's credit rating, and facilitate the inflow of new investments" (Amuedo-

Dorantes & Pozo, 2004). Moreover, they are likely to stem investor uncertainty when foreign reserves are declining or when external debt is rising (Gupta, Pattillo & Wagh, 2009).

Insofar as they are motivated by the altruism of migrant workers, remittances also tend to behave counter-cyclically. They tend to increase in response to external shocks in recipient countries and decline when conditions are more favourable. The countercyclical nature of remittances is of particular importance in African countries, where variations in climatic conditions such as rainfall, floods and droughts have a marked bearing on economic growth. Quarterly and Blankson (2004) found that remittances to Ghana move counter cyclically with respect to the economic cycle and are beneficial in smoothing household consumption and welfare over time (Quartey & Blankson, 2004). Hence remittances behave differently to other private capital flows, which tend to be pro-cyclical.

- *Fiscal Policy*

Given that remittances enter recipient countries through household transfers, they can have an indirect impact on fiscal policy. One way in which they can impact fiscal policy is by expanding the tax base. Although remittances are not taxed directly they can indirectly increase government revenue from consumption-based taxation (Chami, Cosimano and Gapen, 2006). The impact on taxation, however, is dependent on the tax structure in place in recipient countries. Chami, Csimano and Gapen (2006) examined how remittances respond to the setting of optimal fiscal and monetary policy in recipient countries. They found that remittances increase income and consumption, expand the tax base and, by so doing, allow governments to incur additional expenditure and carry more debt. Chami, Hakura and Montiel (2012), however, argue that by enabling governments to carry more debt, without clearly showing the full cost of government actions, remittances could damage the quality of government institutions in receiving countries. Similarly, Chami and Fullenkamp (2013) found that, by increasing government expenditure, remittances could enable governments to appropriate more resources and allocate them to those in power rather than invest in national development. Therefore, a moral hazard could arise because of the risk of government corruption.

- *Economic growth*

A number of studies have analysed the growth impact of remittances, however, results have not been conclusive. Remittances can have a positive impact on growth if an increase in remittances results in an increase in investment (Singh et al., 2010). This result can be large insofar as remittances improve credit constraints faced by households living in areas with underdeveloped financial systems (Woodruff & Zenteno, 2004). In the case where remittances are mostly consumed rather than invested, any effects on growth through higher investment are likely to be subdued (Woodruff & Zenteno, 2004:7).

Some might argue that remittances can potentially reduce growth. First, by increasing household consumption of non-tradable goods, remittances can increase the prices of domestically produced goods and appreciate the real exchange rate, the macroeconomic mechanism known as ‘Dutch Disease’ (Singh et al., 2010:8). This effect can be harmful to long-term growth, as an appreciation of the real exchange rate reduces the competitiveness of a country’s tradable sectors and can cause an increase in the current account deficit (Kireyev, 2006). Using a panel of 13 Latin American and Caribbean (LAC) countries, Amuedo-Dorantes and Pozo (2004) found that a doubling of remittances results in an appreciation of the real exchange rate (Amuedo-Dorantes & Pozo, 2004). However, there is limited evidence of this effect occurring in African countries (Bourdet & Falck, 2006). Second, by increasing household income and easing budget constraints, remittances can potentially reduce labour supply or labour market participation of recipients (Lucas 1987; Azam & Gubert, 2006; Bussolo & Medvedev, 2007; Chami et al., 2008). This can potentially lead to a decrease in output growth. But there is little evidence that this phenomenon will have a significant impact on output in Africa, particularly in countries with high levels of unemployment (Kamuleta, 2014).

Thus, the complexity of the growth process and issues concerning cross-country growth regressions make it challenging to determine the impact of remittances on growth. On average, empirical studies that include remittances in cross-country growth regressions provide mixed results (Barajas et al., 2009; Catrinescu et al., 2009; Singh, Haacker & Lee, 2009). The absence of a significant relationship between remittances and growth in regressions indicates either that their impact on growth can only be realised over the long-run or that official remittances data are of a poor quality.

3.3 Remittances, Inequality and Poverty

3.3.1 Remittances and inequality

Remittances are an important source of finance for many developing countries. Their impact on income inequality, however, is uncertain. While a number of studies suggest that remittances increase income inequality (Oberai & Singh, 1980; Stahl, 1982; Barham & Boucher, 1998; and Taylor et al., 2005), others suggest that they reduce it (Ahlburg, 1996). Barham and Boucher (1998) found that remittances increase income inequality in Nicaragua. Similarly, Oberai and Singh (1980) found that, in India, remittances increase inequality in rural areas. On the other hand, Ahlburg (1996) found that remittances reduce income inequality in Tonga.

Jones (1998) argues that the impact of remittances on income inequality is dependent on the migrant's "stage" of migration in the host country and defines three stages of migration: the "innovative stage", the "early adopter stage", and the "later adopter stage". The "innovative stage" is said to occur when only people from upper segments of the income distribution migrate; in this stage remittances tend to increase inequality. The "early adopter stage" refers to the stage of the migration process where people from the lower segments of the income distribution begin to migrate as well; in this stage remittances tend to decrease inequality. The "later adopter stage" is said to occur when, owing to the increase in remittances, the income of remittance-receiving households is substantially greater than the income of households which do not receive remittances; in this stage remittances tend to increase inequality.

Ultimately, the impact of remittances on inequality depends on where those who migrate or remit are situated in the distribution of income (Gonzalez-Konig & Wodon, 2005:2). If migration is more prevalent among individuals from poorer segments of the population, remittances are likely to be inequality decreasing as typically poorer families will receive the additional income. Alternatively, if migration is more prevalent among individuals from richer segments of the population, remittances are likely to increase income inequality as comparatively richer households will benefit from them.

3.3.2 Remittances and poverty

A number of studies have analysed the impact of remittances on poverty. Overall, the literature provides evidence to support the hypothesis that remittances reduce poverty as, unlike other private financial flows, they are directly received by the poor (Ratha et al., 2011:60). Remittances directly impact poverty by augmenting the income and consumption of poor remittance-receiving households. They also indirectly affect poverty and welfare in recipient countries through their multiplier- and macroeconomic effects. This section reviews the empirical literature on the impact of remittances on poverty.

3.3.2.1 Household level

At the household level, Stahl (1982) and Adams (1991) pioneered efforts to collect data that can be used to analyse the welfare effects of remittances (Stahl, 1982). Using a sample of 1000 households from three villages across rural Egypt, Adams (1991) found that the number of poor households decreases by 9.8% when international remittances are included in household income. Lokshin, Bontch-Osmolovskim, and Glinskaya (2007) studied the impact of migration and remittances on poverty in Nepal over the period 1995-2004. They found that an increase in the stock of migrants and remittances leads to a decrease in poverty. Using household survey data, Brown and Jimenez (2008) found migration and remittances to reduce poverty in Fiji and Tonga. Recently, Bertoli and Marchetta (2014) found evidence of the poverty reducing impact of remittances in Ecuador.

Evidence for African countries also points to the poverty-reducing impact of remittances. Using household survey data from 1994-1995, Lachaud (1999) found remittances to reduce rural poverty in Burkina Faso by 7.2% and urban poverty by 3.2%. While Adams and Cuecuecha (2013) found that, in Ghana, remittances reduce the likelihood of a household living in poverty by half.

Although these findings provide useful insights into the direction of the relationship between remittances and poverty, a number of them are of limited use owing to their small sample size. For example, Adams (1991) conducted his analysis using a sample of 1000 households from three villages across rural Egypt.

3.3.2.2 Cross-country

Cross-country empirical evidence on the impact of remittances on poverty is somewhat limited. Empirical studies have generally focused on the impact of remittances on poverty for particular village- and country settings. Pioneering works by Adams and Page (2005), however, led to the building of a database on remittances, poverty and inequality, enabling researchers to examine the remittances-poverty nexus in developing countries. Jongwanich (2007) and Gupta, Pattillo and Wagh (2009) have used this database on remittances, poverty and inequality to estimate the impact of remittances on poverty for countries in the Asian-Pacific and Sub-Saharan African regions. Similarly, Anyanwu and Erhijakpor (2010) analysed the relationship between remittances and poverty for a panel of 34 African countries. Each of the above mentioned papers is reviewed below, and a summary of the papers is presented in Table 3.

Table 3. Cross-country empirical evidence of poverty and remittances relationship

Study	Model Specification	Method	Period	Estimator	Instruments	Poverty Elasticity of Remittances
Adams and Page (2005)	$log(Pov_{it}) = \alpha_i + \beta_1 \log(y_{it}) + \beta_2 \log(g_{it}) + \beta_3 log(rem_{it}) + \beta_4 region_{ij} + \varepsilon_{it}$	Unbalanced Panel, 71 countries	1980-1998	OLS, IV	Distance, Education, Government stability	-0.35
Jongwanich (2007)	$log(Pov_{it}) = \alpha_i + \beta_1 \log(y_{it}) + \beta_2 \log(g_{it}) + \beta_3 log(rem_{it}) + \beta_4 X_{it} + \varepsilon_{it}$	Panel, Asia-Pacific countries	1993-2003	Fixed effects		-0.28
Gupta, Pattillo and Wagh (2009)	$log(Pov_{it}) = \alpha_i + \beta_1 \log(y_{it}) + \beta_2 \log(g_{it}) + \beta_3 log(rem_{it}) + \beta_4 region_{ij} + \varepsilon_{it}$ $log(rem_{it}) = \alpha_i + \beta_1 \log(Pov_{it}) + \beta_2 \log(trade_{it}) + \beta_3 log(educ_{it}) + \beta_4 (distance_{it}) + \beta_5 (dual_{it}) + \beta_6 (rem_{it-1}) + \varepsilon_{it}$	Unbalanced Panel,76 developing countries	1981-2003	OLS, 3SLS	Poverty, Trade openness, Education, Distance, Dual exchange rate dummy	-0.15
Anyanwu and Erhijakpor (2010)	$log(P_{it}) = \alpha_i + \beta_1 \log(y_{it}) + \beta_2 \log(g_{it}) + \beta_3 log(r_{it}) + \beta_4 X_{it} + \varepsilon_{it}$	Unbalanced Panel, 33 African countries	1990-2005	OLS, GMM-IV	First and second lags of remittances	-0.29

Source: Compiled by author.

- *Adams and Page (2005)*

Adams and Page (2005) estimated the impact of migration and remittances on poverty for 71 developing countries over the period 1980 to 1998. Three measures of poverty were used: the poverty headcount, the poverty gap and the squared poverty gap ratios, which measure the depth, intensity and severity of poverty respectively. The poverty model was specified as:

$$log(Pov_{it}) = \alpha_i + \beta_1 \log(y_{it}) + \beta_2 \log(g_{it}) + \beta_3 log(rem_{it}) + \beta_4 region_{ij} + \varepsilon_{it} \tag{3}$$

where P is a measure of poverty in country *i* at time *t*; α_i captures fixed effects; β_1 is the growth elasticity of poverty with respect to income, y; β_2 is the elasticity of poverty with respect to income inequality, g; β_3 is the elasticity of poverty with respect to remittances, r; β_4 is a dummy variable capturing regional effects; and ε is an error term capturing errors in the poverty measure used.

The poverty elasticity of migration and remittances were estimated separately and both migration and remittances were found to reduce poverty.

The study used instrumental variables (IV) to deal with the possibility of reverse causality between migration, remittances and poverty. Three instruments were used for migration and remittances: the distance from the remittance-sending to the recipient countries; the level of educational attainment in the recipient countries; and government stability. Using the IV approach, equation (3) was estimated in two stages. The first stage involved regressing migration and remittances against the chosen instruments and including income, the Gini coefficient, and regional dummies as exogenous variables. The second stage involved taking the instrumented migration and remittance variables and including them in the poverty regression to estimate their poverty elasticity. Instrumenting for migration and remittances and controlling for income, inequality and regional effects, migration and remittances were still found to reduce poverty.

- *Jongwanich (2007)*

Jongwanich (2007) estimated the impact of remittances on poverty for developing Asian-Pacific countries. The estimated poverty equation was of the form:

$$log(P_{it}) = \alpha_i + \beta_1 \log(y_{it}) + \beta_2 \log(g_{it}) + \beta_3 log(r_{it}) + \beta_4 X_{it} + \varepsilon_{it} \quad (4)$$

The study included additional control variables (within the vector X_{it}): human capital, inflation and openness. It was found that a 10% increase in remittances leads to a 2.8% decrease in poverty.

Jongwanich's (2007) results, however, must be accepted with a degree of caution as the study did not account for the possible reverse causality between remittances and poverty.

- *Gupta, Pattillo and Wagh (2009)*

Gupta, Pattillo and Wagh (2009) used an updated database on remittances, poverty and inequality to estimate the poverty elasticity of remittances. The database consisted of 76 developing countries, with a focus on countries from the Sub-Saharan African region. The direct poverty elasticity of remittances was first estimated using equation (5) below. Subsequently, the Three Stage Least Square (3SLS) estimator, which allows for poverty and remittances to be determined simultaneously as a system of equations, was used. The system of equations was made of a poverty model and a model capturing the determinants of remittances:

$$log(Pov_{it}) = \alpha_i + \beta_1 \log(y_{it}) + \beta_2 \log(g_{it}) + \beta_3 log(rem_{it}) + \beta_4 region_{ij} + \varepsilon_{it} \quad (5)$$

$$log(rem_{it}) = \alpha_i + \beta_1 \log(Pov_{it}) + \beta_2 \log(trade_{it}) + \beta_3 log(educ_{it}) + \beta_4(distance_{it}) + \beta_5(dual_{it}) + \beta_6(rem_{it-1}) + \varepsilon_{it} \quad (6)$$

where remittances (equation 6) are modelled as a function of poverty (Pov_{it}), trade openness $(trade_{it})$, educational attainment $(educ_{it})$, distance (in miles) from the host country to the recipient country $(distance_{it})$, a dual exchange rate dummy $(dual_{it})$, and lagged remittances (rem_{it-1}).

Two of the variables included in the remittance equation (6) were also included as instruments in the Adams and Page (2005) study.

Controlling for the possible reverse causality between remittances and poverty, the study found that, on average, a 10% increase in the share of remittances in GDP leads to a 1.5% decrease in the poverty headcount ratio.

- *Anyanwu and Erhijakpor (2010)*

Anyanwu and Erhijakpor (2010) estimated the impact of remittances on poverty using a dataset of 33 African countries over the period 1990-2005. To control for the possible endogeneity between remittances and poverty, they used the two-stage Generalised Method of Moments Instrumental Variables (GMM-IV) estimator to instrument for remittances. The first stage of the GMM-IV estimator involved regressing the remittance variable (r_{it}) against its first and second lags and including income, the Gini index, the illiteracy rate, trade openness and inflation as exogenous variables. The second stage involved taking the instrumented remittances variable and including it in the poverty model to estimate the poverty elasticity of remittances. They found that a 10% increase in remittances (as a share of GDP) leads to a 2.9% decrease in the poverty headcount.

Anyanwu and Erhijakpor (2010) results, however, must also be accepted with a degree of caution as they had a small sample size of only 51 observations.

One of the common limitations of previous cross-country studies is that a number of them fail to account for the possible endogeneity between remittances and poverty. Endogenous variables are correlated with the disturbance term; this violates the Gauss-Markov assumption that the regressors and the error term are uncorrelated. Failing to account for endogeneity when endogeneity is present can bias the estimation results. An additional limitation of previous cross-country studies is that they do not account for unobservable country specific factors, meaning there could be latent heterogeneity present in the errors. Although heterogeneity will generally not interfere with consistent parameter estimation, failing to account for it will yield inconsistent estimates of the standard errors of the estimated parameters and can invalidate statistical inferences. This study accounts for the possible endogeneity and heteroscedasticity in the model by employing the Two-Stage Least Squares (2SLS) and Generalised Least Squares (GLS) estimation techniques.

Chapter Four

Methodology and Data

This chapter discusses the modelling methodology and the data used in the study.

4.1 Model formation and functional form

The main objective of the study is to assess the impact of remittances on poverty. Therefore we begin with a basic poverty model and then incorporate remittances in order to determine their effect on poverty. In evaluating the relationship between remittances and poverty, we build on the basic growth-poverty model suggested by Ravillion and Chen (1997). Ravallion and Chen (1997) were one of the first to develop a growth-poverty model using cross-country aggregate data.[4] Following the empirical works of Adams and Page (2003) and Gupta, Pattillo and Wagh (2009), the basic growth-poverty model is expanded to include income inequality and the variable of interest, remittances. The baseline specification for the model is given by:

$$log(P_{it}) = \alpha_i + \beta_1 \log(y_{it}) + \beta_2 \log(g_{it}) + \beta_3 log(r_{it}) + \varepsilon_{it} \tag{7}$$

where P represents a measure of poverty in country i at time t, α_i captures fixed effects; β_1 is the growth elasticity of poverty with respect to income, y; β_2 is the elasticity of poverty with respect to income inequality, g; and β_3 is the elasticity of poverty with respect to remittances, r; ε is an error term capturing errors in the poverty measure used.

Equation (7) is estimated to identify the impact of remittances on poverty. Aside from remittances, other foreign currency inflows may have an impact on poverty, and the study expands upon previous work by incorporating exports and ODA.

[4] Ravallion and Chen (1997) used data from 42 developing countries to estimate how absolute poverty levels have changed over time.

One of the ways in which exports may have an impact on poverty is through their impact on employment and wages (Winters et al. 2004). In line with traditional trade theory, exports are particularly beneficial for the poor in developing countries. The Hechscher-Ohlin model indicates that countries with an abundance of unskilled labour will have a comparative advantage in products that are labour intensive (Thelle, et al., 2015). Under the assumption that most of the poor in developing countries are unskilled, increased demand for unskilled labour will in turn increase employment prospects and wages. Therefore, in theory, the opportunity for direct poverty reduction from exports should be significant.

ODA is specifically targeted to the poorest countries to facilitate economic development. So ODA can potentially lead to faster growth which translates into poverty reduction and improved social outcomes (Dollar & Pritchett, 1998; Burnside & Dollar, 1998; Collier & Dollar, 2000).

By incorporating exports and ODA in the model, the study seeks to determine the significance of remittances on poverty relative to other foreign currency flows. This would help in informing policy of African countries' sources of financing for development.

Along with the additional foreign currency flows, the model includes income group dummy variables to control for unobserved heterogeneity across countries. Countries that share similar characteristics often face similar challenges (Sy & Rakotondrazaka, 2015:4). Therefore, using the World Bank's income group classification, countries are classified into low-income, lower-middle- and upper-middle-income groups, based on their gross national income (GNI) per capita. GNI per capita is a useful income group measure as it reflects the average income levels of a country's citizens. Furthermore it is related to other indicators that measure the economic and social well-being of a country and its people.

Integrating the additional variables, the adapted model is specified as:

$$log(P_{it}) = \alpha_i + \beta_1 \log(y_{it}) + \beta_2 \log(g_{it}) + \beta_3 log(r_{it}) + \beta_4 log(x_{it}) + \beta_5 log(a_{it}) + \beta_6 D_1 + \beta_7 D_2 + \gamma t + \varepsilon_{it} \quad (8)$$

where P, α_i , β_1 , β_2 , γ and ε are as previously defined; β_4 and β_5 are the coefficients for exports and ODA respectively; and β_6 and β_7 are the coefficients for the lower- and upper-middle-income group dummy variables.[5] The model is expressed as a log-linear model. The appeal in using a log-linear model is that it enables the slope coefficients to be interpreted as elasticities (Gujarati,1995:180).

In order to control for income differences between countries, per capita GDP is used as a control variable. The model assumes that poverty is reduced as per capita income rises (Gupta, Pattillo & Wagh, 2009), therefore β_1 is expected to be negative ($\beta_1 < 0$).

In theory, higher poverty levels are associated with higher levels of income inequality (Gupta, Pattillo & Wagh, 2009), thus β_2 is expected to be positive ($\beta_2 > 0$).

Controlling for income and its distribution, the study estimates the sign and magnitude of the coefficient for remittances (β_3), exports (β_4) and ODA (β_5). A priori, we expect that a negative coefficient for remittances would indicate that remittances have a positive impact on poverty reduction. Given that low-income countries generally have higher poverty rates (Sumner, 2012:7), the coefficients of the lower- and upper-middle-income group dummy variables, β_6 and β_7, are expected to be negative ($\beta_6 , \beta_7 < 0$).

[5] Low-income countries are taken as the reference group.

4.2 Data sources

The dataset consists of 32 countries with a total of 130 observations.[6] Secondary data is employed over the period 1983 to 2013. The poverty and income inequality data are from the World Bank's PovcalNet database which releases estimates of global poverty from 1981 to 2012. The common international poverty line, currently set at $1.90 in 2011 Purchasing Power Parity (PPP) exchange rates, is used. The use of PPP exchange rates ensures that $1.90 is valued roughly the same in all countries. Data for all the other variables are from the World Bank's World Development Indicators, supplemented with data from the International Monetary Fund's (IMF) Balance of Payments Statistics. Given that the poverty estimates are based on household surveys that take place every few years, the analysis includes countries that have at least two nationally-representative household surveys.

4.3 Variable descriptions

Poverty is modelled as a function of income, income inequality, remittances, exports and ODA, and income group dummy variables are included to control for unobserved heterogeneity across countries.

[6] See Appendix A, Table A-1 for raw data.

Table 4. Summary of variables used in the study

Variable	Description	Source
Poverty headcount ratio (P_0)	Percentage of population living in households with income below the poverty line	PovcalNet database
Poverty gap ratio (P_1)	Distance by which the average income of the poor deviates from the poverty line (expressed as a percentage of the poverty line)	PovcalNet database
Gini coefficient (g)	Measures changes in the distribution of income	PovcalNet database
per capita GDP (y)	Income measure (in constant 2005 US dollars)	World Development Indicators (WDI)
Remittances (r)	Sum of personal transfers and compensation of employees (expressed as a percentage of GDP)	World Development Indicators (WDI) and Balance of Payments Statistics (BOPS)
Exports (x)	Value of goods and services provided to the rest of the world	World Development Indicators (WDI)
ODA (a)	Grants and loans made on concessional terms	World Development Indicators (WDI)
Income group dummy variables (D)	Countries classified into low-income, lower-middle-, and upper-middle-income groups based on per capita GNI	World Bank GNI per capita Operational Guidelines & Analytical Classifications database
Trade openness (t)	Sum of imports and exports (expressed as a percentage of GDP)	World Development Indicators (WDI)
Educational attainment (e)	Average schooling years among the over 25 population	Barro-Lee Educational Attainment database

Source: Compiled by author.

- *Poverty measures*

Two poverty measures are used: the poverty headcount and the poverty gap ratios. The poverty headcount ratio measures the percentage of the population living in households with income or expenditures below the poverty line. The advantage of using the poverty headcount ratio is that it can be easily constructed and understood. However, it fails to account for the intensity of poverty. Furthermore, it fails to give an indication of how poor the poor are and therefore does not change if households living below the poverty line become poorer (Haughton & Khandker, 2009:69). Accordingly, the poverty gap ratio, which takes into account the depth of poverty, is used as an alternative poverty measure. The poverty gap ratio measures the distance by which the average income of the poor deviates from the poverty line, expressed as a percentage of the poverty line. The gap ratio may be thought of as the minimum cost of eliminating poverty, as it indicates how much would have to be transferred to the poor to bring their incomes up to the poverty line (Haughton & Khandker, 2009:69).

- *per capita GDP*

Per capita GDP is used as the income measure. Income, as measured by per capita GDP, is from the national accounts and is in constant 2005 US dollars (World Bank, 2015b).

- *Income inequality*

Changes in the distribution of income are measured using the Gini coefficient. The Gini coefficient provides a convenient summary measure of the degree of income inequality in a given country. A Gini coefficient of 0 signifies equal income for all persons; while a coefficient of 100 means that all income is concentrated in one person (World Bank, 2015d).

- *Remittances*

Remittances are the sum of two components in the balance of payments, personal transfers and compensation of employees. Personal transfers consist of current transfers between resident and non-resident households, and compensation of employees refers to the income of short-term seasonal workers employed in economies where they are non-residents and the income of residents employed by non-resident entities (World Bank, 2015b). It is important to note that unofficial remittance flows account for a significant portion of total remittances. Aggarwal, Dermiguc-Kunt and Peria (2006) estimate that about 50-250% of total remittances are accounted for by unofficial remittance flows. Therefore recorded remittances are likely to be understated.

- *Exports*

Exports refer to the value of goods and services provided to the rest of the world (World Bank, 2015b).

- *ODA*

ODA is all financing that flows from developed country governments and multilateral agencies to the developing world (Dollar & Pritchett, 1998:6). ODA is primarily the official government-to-government transfer of financial and technical resources for the programs of social and economic development (Raheem & Ogebe, 2014). It consists of grants and loans made on concessional terms and given by; multilateral institutions, countries in the Development Assistance Committee (DAC) of the Organisation of Economic Corporation and Development (OECD), and by non-DAC countries to countries and territories in the DAC list of ODA recipients (World Bank, 2015b).

- *Income group dummy variables*

The model includes income group dummy variables to control for unobserved heterogeneity across countries. Countries that share similar characteristics often face similar challenges (Sy & Rakotondrazaka, 2015:4). Therefore, using the World Bank's income group classification, countries are classified into low-income, lower-middle-, and upper-middle-income groups based on their per capita Gross National Income (GNI). Using 2014 GNI values, low-income countries are those with a per capita GNI of $1,045 or less; lower-middle-income countries are those with a per capita GNI of over $1,045 but less than $4,125; and upper-middle-income income economies are those with a per capita GNI of over $4,125 but less than $12,736 (World Bank, 2015e).

4.4 Descriptive statistics

Table 5 presents the descriptive statistics of the regression variables. On average, 43.4% of households live below the $1.90 international poverty line. The poverty gap ratio indicates that the average income gap between households living below the poverty line and the actual poverty line is 18.3%. These ratios, however, differ significantly across countries and across time (see Table A-1 in Appendix A). For example, in 2010 the headcount ratio for Madagascar is 81.8%, while the headcount ratio for Tunisia is only 2%.

Table 5. Descriptive statistics for regression variables

	Observations	Mean	Std.	Min	Max
Poverty headcount	142	43.42	24.50	1.68	92.31
Poverty gap	142	18.30	13.86	0.31	62.96
per capita GDP	984	1131.59	1309.22	113.71	6930.85
Gini index	142	44.40	8.73	28.9	74.33
Remittances (% of GDP)	900	4.76	11.35	0.003	106.46
Exports (% of GDP)	979	27.87	14.82	2.52	100.95
ODA (% of GDP)	973	10.86	10.78	0.0004	94.44

Source: Author’s calculations.

Table 6 presents the pairwise bivariate correlations of the regression variables. The pairwise correlations show a negative relationship between remittances and both poverty measures at the 10% level of significance, suggesting that poverty decreases as remittances increase. Exports are negatively correlated with poverty, while ODA is positively correlated with poverty. In order to examine this further, the OLS and 2SLS estimation results are considered next.

Table 6. Bivariate correlations of regression variables

	Poverty headcount	Poverty gap	Per capita GDP	Gini index	Remittances (% of GDP)	Exports (% of GDP)	ODA (% of GDP)
Poverty headcount	1.00						
Poverty gap	0.99***	1.00					
Per capita GDP	-0.58***	-0.55***	1.00				
Gini index	0.29***	0.35***	0.41***	1.00			
Remittances (% of GDP)	-0.16*	-0.15*	0.04	-0.07	1.00		
Exports (% of GDP)	-0.33***	-0.29***	0.64***	0.28***	0.16***	1.00	
ODA (% of GDP)	0.50***	0.48***	-0.67***	-0.17**	0.14***	-0.38***	1.00

Source: Author's calculations.

Chapter Five

Empirical Results

We first use a standard OLS model for the poverty headcount and the poverty gap. Next we consider the possible violations of the Gauss-Markov assumptions of homoscedasticity and exoogeneity. We use appropriate estimation techniques to tackle these issues.

5.1 Ordinary Least Squares estimation

Table 7.Ordinary Least Squares Estimation

	Poverty headcount	**Poverty gap**
Per capita GDP (constant US$ 2005)	-0.65*** (0.133)	-0.96*** (0.167)
Gini coefficient	3.10*** (0.293)	4.52*** (0.368)
Remittances (% of GDP)	-0.09*** (0.034)	-0.10** (0.043)
Exports (% of GDP)	0.08 (0.137)	0.20 (0.171)
ODA (% of GDP)	0.02 (0.058)	0.01 (0.073)
Lower-middle-income	-0.47*** (0.187)	-0.49** (0.234)
Upper-middle-income	-0.58*** (0.346)	-0.64 (0.433)
Time	0.01* (0.007)	0.01 (0.008)
Constant	-4.26*** (1.103)	-9.07*** (1.38)
Observations	130	130
Adjusted R^2	0.69	0.72
F-statistic	37.40***	42.40***

Note: ***, **, and * indicate significance at 1%, 5% and 10% level. Standard errors are reported in parentheses.
Source: Author’s calculations.

Table 7 above illustrates the results when equation (8) is estimated using Ordinary Least Squares (OLS). As stated previously, equation (8) models poverty as a function of income, income inequality and remittances, exports and ODA. All variables are in logs.

5.1.1 Poverty headcount ratio

Column 2 (Table 7) illustrates the results when poverty is measured using the headcount ratio. The coefficient for per capita GDP is negative and indicates that, on average, if income increases by 10%, ceteris paribus, the headcount ratio is expected to decrease by 6.5%.

The Gini coefficient carries a positive sign and is significant. This supports the hypothesis that greater inequality is associated with higher poverty.

The coefficient for remittances is significant and indicates that a 10% increase in the share of remittances in GDP is expected to lead to an approximate 1% decrease in the headcount poverty ratio, ceteris paribus. This outcome is similar to that found by Gupta, Pattillo and Wagh (2009) who found that a 10% increase in remittances is associated with an estimated 1% fall in the poverty headcount ratio. On the other hand, using a sample of 33 African countries, Anyanwu and Erhikakpor (2010) found that a 10% increase in the share of remittances in GDP reduces the headcount ratio by 2.7%. Their findings, however, were limited by a small sample size of only 51 observations.

As previously mentioned, the model includes income group dummy variables to control for unobserved heterogeneity across countries. Countries that share similar characteristics often face similar challenges (Sy & Rakotondrazaka, 2015:4). Using the World Bank's income group classification, countries are classified into low-income, lower-middle- and upper-middle-income groups, based on their gross national income (GNI) per capita. The dummy variable constants tell us that, keeping all else constant, the poverty headcount ratio is expected to be

47% lower in lower-middle-income countries, than in low-income countries. Similarly, the headcount ratio is expected to be 58% lower in upper-middle-income countries, than in low-income countries. Thus low-income countries generally have higher rates of poverty incidence and a larger poverty gap than middle-income countries (Sumner, 2012:7).

Exports are found to have an insignificant effect on poverty. This is unexpected given that one would expect exports to positively contribute towards poverty reduction, at least indirectly through higher GDP. Nonetheless, this result is line with the outcome obtained by Thelle et al., (2015). Using a sample of 78 countries, over the period 1996 to 2010, they found that, on average, exports do not in themselves have a significant impact on poverty outcomes.

Equally surprising, ODA flows are found to have an insignificant impact on poverty. Arvin and Barillas (2010:2155) obtained the same result when testing for the causal link between ODA and poverty. Such donor aid is often used for political or commercial interests, objectives that are not always consistent with poverty reduction; consequently, the gains from ODA do not always reach the poor. A technical reason behind the lack of a significant relationship between ODA and poverty may be explained by the methodology used to estimate the sign of Development Assistance Committee (DAC) concessional financing, which assumes a constant 10% discount rate and thus over-estimates concessional financing.

Dollar and Pritchett (1998) suggest that for ODA to be more effective in decreasing poverty it needs to be specifically targeted to developing countries with sound economic policies and management. In a good policy environment, financial assistance could promote economic growth which could translate to poverty reduction. However, in a poor policy environment, financial assistance would have less of an impact on growth and poverty outcomes. The poor are therefore more likely to benefit from the gains of both exports and ODA when there are complementary policies in place.

5.1.2 Poverty gap ratio

Column 3 (Table 7) illustrates the results when poverty is measured using the poverty gap ratio. As previously defined, the poverty gap ratio measures the distance by which the average income of the poor deviates from the poverty line (expressed as a percentage of the poverty line). Note that the regression results are broadly similar to those for the poverty headcount.

Income is found to have a negative relationship with poverty, and the coefficient is substantially more negative (-0.96 versus -0.65) suggesting that income has a larger impact on closing the mean income shortfall from the poverty line than it has on bringing people out of poverty.

Using the poverty gap ratio, the coefficient for remittances is not different to that of the poverty headcount ratio (-0.10 and -0.09 respectively).

The Gini coefficient remains positive and statistically significant; however the magnitude of the coefficient, under the poverty gap ratio, is larger.

Exports and ODA still have a statistically insignificant effect on poverty when using the poverty gap.

In summary, both the regression results support the hypothesis that remittances have a positive and statistically significant effect on poverty reduction. Exports and ODA have no impact on poverty, which suggests that the gains from exports and ODA fail to trickle down to the poor. Note that when exports and ODA are excluded from the regression, the coefficient for remittances remains about the same.

5.2 Gauss-Markov Assumptions

5.2.1 Homoscedasticity of the errors

OLS assumes that the errors are homoscedastic, with the same variance across countries and across time. However, this may be a restrictive assumption for this study. The estimated impact of remittances on poverty may be biased by unobservable country specific factors, which either cannot be measured or have not been accounted for. In other words, there could be latent heterogeneity present in the errors. Although this will generally not interfere with consistent parameter estimation, failing to account for the presence of heterogeneity will yield inconsistent estimates of the standard errors of the estimated parameters and can invalidate statistical inferences (Driscoll & Kraay, 1998). The Generalised Least Squares (GLS) estimator can be considered as an alternative to the OLS estimator. In the presence of panel-level heteroscedasticity, GLS provides efficient estimates over OLS (Arrelano, 2003: 20). The GLS estimator transforms the model equation into a new model by assigning weights to the errors. The variances of the errors in the transformed model are equal and constant, thus removing the problem of heteroscedasticity. A simple derivation of the GLS estimator is provided in Appendix B.

Table 8 provides the results when Equation (8) is estimated using the GLS estimator. A likelihood ratio test is performed and confirms the presence of panel-level heteroscedasticity; this justifies the use of the GLS estimator. The results of the likelihood ratio test can be found in Appendix C, Table C-1.

Table 8 below repeats the results of Table 7 but uses the GLS estimator to adjust for heteroscedasticity. As expected, the GLS coefficients are of the same sign and magnitude of OLS coefficients, however the standard errors are slightly smaller. The smaller standard errors under the GLS estimator point to the efficiency of the GLS estimation results over the OLS results.

Table 8. Generalised Least Squares Estimation

	Poverty headcount	Poverty gap
Per capita GDP (constant US$ 2005)	-0.65*** (0.128)	-0.96*** (0.161)
Gini coefficient	3.10*** (0.284)	4.52*** (0.355)
Remittances (% of GDP)	-0.09*** (0.033)	-0.10*** (0.041)
Exports (% of GDP)	0.08 (0.132)	0.20 (0.165)
ODA (% of GDP)	0.02 (0.056)	0.01 (0.070)
Lower-middle-income	-0.47*** (0.180)	-0.49** (0.225)
Upper-middle-income	-0.58* (0.334)	-0.64 (0.418)
Time	0.01*** (0.006)	0.01 (0.008)
Constant	-4.26*** (1.064)	-9.07*** (1.331)
Observations	130	130
Adjusted R^2	0.69	0.72
Wald chi2	321.48	364.40

Note: ***, **, and * indicate significance at 1%, 5% and 10% level. Standard errors are reported in parentheses.
Source: Author’s calculations.

5.2.2 Exogeneity of the variables

The relationship between remittances and poverty may not be unidirectional. There is a possibility of reverse causality, which would make remittances endogenous to poverty. Endogenous variables are correlated with the disturbance term; this violates the Gauss-Markov assumption that the regressors and the error term are uncorrelated. To take account of the possible endogeneity between remittances and poverty the study adopts the Two Stage Least Squares (2SLS) estimation technique. The 2SLS approach replaces the endogenous remittances variable (r) with predicted values of the variable $(\hat{r})$. A simple derivation of the 2SLS estimator is provided in Appendix B.

In the first-stage of the 2SLS estimation technique, the endogenous remittances variable (r) is regressed on the exogenous variables, per capita GDP (y_{it}) and the Gini coefficient(g_{it}), and a set of instruments. In applying 2SLS, the study uses instruments suggested by the literature that can impact remittance flows. The instruments used are lagged remittances, trade and educational attainment. Lagged remittances are included to capture the dynamic effect. Given the stable nature of remittance flows, the expectation is that lagged remittances are a significant predictor of current remittances. The second instrument used is trade openness. Trade openness, as measured by the trade to GDP ratio, represents how open an economy is. The final instrument used is educational attainment. Educational attainment represents the average years of schooling among the over 25 population. The outcome of this variable depends on whether migration is more prevalent among the more educated or less educated members of a population (Gupta, Pattillo and Wagh, 2009).

Once the-first stage regression is estimated, the predicted values of the endogenous remittances variable $(\hat{r})$ are substituted in the poverty regression:

$$log(P_{it}) = \alpha_i + \beta_1 \log(y_{it}) + \beta_2 \log(g_{it}) + \beta_3 \log(\hat{r}_{it}) + \gamma t + \beta_6 D_1 + \beta_7 D_2 + \gamma t + \varepsilon_{it} \quad (9)$$

Table 9 shows the results of the 2SLS estimation.[7] When instrumenting for remittances the results are consistent with the OLS estimation results, with some variation in the size of some coefficients.

In order to justify the use of the instrumented remittances variable, we test for endogeneity using the Durbin-Wu-Hausman (DWH) test. The DWH test estimates the first-stage regression

[7] Table C-2 in Appendix C.

model by regressing remittances against the exogenous variables and the instruments. This is followed by substituting the predicted values of the residuals ($\hat{u}$) from the first-stage regression into the poverty regression. The regressors are exogenous if the coefficient of the residuals is not significantly different from zero.

Table C-3 in Appendix C presents the results of the DWH test. The DWH test statistic is not significantly different from zero, therefore we fail to reject the null hypothesis of exogeneity. This result affirms that remittances are exogenous to poverty.

Table 9.Two-Stage Least Squares Estimation

	Poverty headcount	**Poverty gap**
Per capita GDP (constant US$ 2005)	-0.67*** (0.142)	-0.93*** (0.175)
Gini coefficient	3.48*** (0.332)	4.96*** (0.410)
Remittances (% of GDP)	-0.10*** (0.044)	-0.11** (0.055)
Lower-middle-income	-0.40* (0.225)	-0.37 (0.277)
Upper-middle-income	-0.67* (0.393)	-0.72 (0.484)
Time	0.01 (0.008)	0.01 (0.010)
Constant	-5.28*** (1.360)	-10.20*** (1.677)
Observations	83	83
R^2	0.71	0.75
Wald chi2	206.25	241.09

Note: ***, **, and * indicate significance at 1%, 5% and 10% level. Standard errors are reported in parentheses.
Source: Author’s calculations.

Chapter Six

Conclusion and Recommendations

6.1 Conclusion

This study uses data on remittances, poverty and inequality from 32 countries across Africa to examine the impact of remittances on poverty in Africa. The study expands upon previous work by including two additional foreign currency flows in the standard poverty-remittance model, exports and ODA.

Controlling for heteroscedasticity we find that, on average, a 10% increase in the share of remittances in GDP leads to an approximate 1% decrease in the poverty headcount ratio, ceteris paribus. This outcome is supported by Gupta, Pattillo and Wagh (2009) who find that a 10% increase in remittances is associated with an estimated 1% fall in the headcount ratio. Using the poverty gap ratio, the coefficient for remittances is not different to that of the poverty headcount ratio (-0.10 and -0.09 respectively).

A number of cross-country studies from other developing regions, however, show remittances to have more of a significant impact on poverty. For example, Jongwanich (2007) estimated the impact of remittances on poverty for developing Asian-Pacific countries and found that a 10% increase in remittances leads to a 2.8% decrease in poverty. While Adams and Page (2005) estimated the impact of migration and remittances on poverty for 71 developing countries and found remittances to reduce poverty by 3.5%. Thus, remittances appear to have a smaller impact on poverty in Africa compared to other continents across the world. This is mainly attributed to the high cost of sending remittances to Africa relative to other developing regions. Therefore, by reducing remittance transaction costs in Africa, remittances may have more of an impact on poverty and development outcomes.

Exports are found to have an insignificant effect on poverty. This is unexpected given that one would expect exports to positively contribute towards poverty reduction, at least indirectly through higher GDP. Equally surprising, ODA flows are found to have an insignificant impact on poverty.

In summary, the regression results support the hypothesis that remittances have a positive and statistically significant effect on poverty reduction. Exports and ODA have no impact on poverty, which suggests that the gains from exports and ODA fail to trickle down to the poor. Note that when exports and ODA are excluded from the regression, the coefficient for remittances remains about the same. Thus, remittances appear to be a major source of development finance to Africa.

6.2 Recommendations

Despite the growing importance of remittances as a source of finance for development, Africa's high remittance costs limit their full impact on poverty and development outcomes. A number of factors contribute to maintain Africa's high transaction cost structure, these include: "limited competition, regulatory practices that limit market entry, and a lack of financial inclusion in African countries" (Watkins & Quattri, 2014:24).

Exclusivity agreements involving major MTOs and commercial banks are one of the drivers of Africa's high remittance costs as they restrict competition (Watkins & Quattri, 2014:24). Exclusivity agreements with commercial banks allow MTOs to carry out transactions through designated banks (Ratha, Mohapatra, & Scheja, 2011). These agreements have the effect of reducing competition, increasing the cost of market entry and creating highly segmented markets characterised by limited competition.

The G7 and the G20 have taken a number of steps to reduce the high transaction costs of remittances (Watkins & Quattri, 2014). In 2008, the G7 adopted a quantitative goal towards halving the average global cost of remittances, from 10% to 5% over five years (Watkins & Quattri, 2014). Although this commitment has been reaffirmed and taken up in a number of countries, the commitment has had no discernible effect on the high transaction costs in African countries.

Reducing remittance transaction costs in Africa and increasing transparency and competitiveness in the market for remittances will maximise the flow of remittances directly to the hands of recipients. Moreover, formalising remittance transaction services will help reduce the cost of sending remittances and will leverage remittances for development purposes (Kamuleta, 2014:50).

6.2.1 Recommendations for policy and regulation

Efforts need to be taken to reduce the costs of remitting money to and within Africa. At present, high transaction costs limit the impact that remittances can have on development outcomes in African countries. Reducing the costs of remittances will facilitate the use of remittances for developmental outcomes.

Regulatory authorities need to permit post offices and microfinance institutions to play a greater role in the market for remittances in Africa. Post offices and microfinance institutions offer more coverage, particularly in rural areas where formal financial services are often limited. Allowing more RSPs to operate in the remittance market and perform money transfers will bring about greater competition, with potential benefits for price and service quality (Watkins & Quattri, 2014:28).

Given that remittances are private transfers, their primary objective is not to support economic development. Therefore, it is important to understand, at an individual level, how they are used and the type of development activities they are invested in. For that reason, policymakers need to work directly with migrants and Diasporas, while collectively addressing the specific impediments that inhibit the developmental use of remittances (Kamuleta, 2014:61).

Lastly, regulatory authorities should vigorously assess the practices of MTOs. In a market dominated by such limited competition, there is a risk of monopolistic abuse. This calls for anti-trust bodies to investigate whether exclusivity agreements involving MTOs inflate costs in remittance markets and prevent consumers benefiting from competition.

6.2.2 Recommendations for further research

The availability of poverty and remittances data was one of the major limitations of the study. Poverty data are based on household surveys that only take place every few years. Moreover, a number of African countries generally do not record or publish data on international remittances. In view of this, more attention needs to be paid to collecting and reporting data on remittances in African countries in order to capture their magnitude (as accurately as possible) and to understand their contribution to development outcomes.

RSPs, their cost structures, and transaction costs are moderately understood. Therefore, an improved knowledge base is needed to guide policy and regulation changes in order to improve financial services for remittances (Sander & Maimbo, 2003:32).

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Appendix A: Data for regression analysis

Table A-1.Data for regression analysis

Country	Income group	Survey year	Poverty headcount ratio	Poverty gap ratio	Per capita GDP (2005 constant US$)	Gini coefficient	Remittances (millions US$)	Remittances (% of GDP)	Exports (% of GDP)	ODA (% of GDP)
Algeria	UM	1988	7.1	1.05	2579.94	40.19	379	0.64	15.51	0.29
Algeria	LM	1995	6.38	1.27	2339.66	35.33	1120	2.68	26.19	0.70
Benin	L	2003	48.85	16.25	535.95	38.58	55.36	1.56	20.98	8.43
Benin	L	2011	53.11	18.98	552.62	43.44	171.96	2.36	14.26	9.47
Botswana	LM	1986	42.56	17.87	2619.57	54.21	37.25	2.67	68.33	7.23
Botswana	LM	1993	34.82	13.49	3878.59	60.79	74.29	1.79	47.10	3.12
Botswana	UM	2003	29.75	11.41	5108.25	64.73	38.87	0.52	48.83	0.37
Botswana	UM	2009	18.24	5.78	5695.95	60.46	15.21	0.15	34.80	2.72
Burkina Faso	L	1994	83.06	48.44	279.12	48.07	80.35	4.24	14.20	22.83
Burkina Faso	L	1998	81.61	42.99	334.45	49.94	71.67	2.56	12.81	14.26
Burkina Faso	L	2003	57.26	23.71	380.33	43.25	53.75	1.28	8.71	12.86
Burkina Faso	L	2009	55.29	19.94	446.71	39.76	95.99	1.15	12.70	12.93
Cameroon	L	1996	48.08	15.29	806.46	44.45	13.41	0.14	23.38	4.21
Cameroon	L	2001	23.12	6.07	883.91	42.14	20.31	0.21	21.92	4.75
Cameroon	LM	2007	29.27	8.32	926.72	42.82	167.34	0.82	23.93	9.43
Cape Verde	LM	2002	21.02	6.05	1739.00	50.52	85.08	13.70	32.55	14.74
Cape Verde	LM	2007	13.72	3.18	2511.66	43.82	138.87	9.17	31.54	10.91
Cote I'voire	LM	1985	6.81	2.03	1264.38	45.53	24.04	0.34	46.77	1.68
Cote I'voire	LM	1986	3.1	0.63	1257.30	37.97	35.81	0.39	39.50	1.90
Cote I'voire	LM	1987	6.66	1.6	1208.04	40.51	42.92	0.43	33.43	2.38
Cote I'voire	LM	1988	10.68	2.53	1178.97	36.89	42.64	0.42	30.49	4.14
Cote I'voire	LM	1992	21.58	6.45	1040.98	39.39	49.52	0.44	31.91	6.78
Cote I'voire	L	1993	19.22	5.41	1004.13	39.35	57.56	0.52	29.44	6.91
Cote I'voire	L	1995	19.11	4.67	1016.30	40.56	151.06	1.37	41.76	11.02
Cote I'voire	L	1998	25.66	7.57	1091.51	38.96	142.57	1.13	41.40	7.67
Cote I'voire	L	2002	23.03	7.05	978.74	41.34	120.09	0.97	47.46	8.65

Cote I'voire	LM	2008	29.02	10.3	939.63	43.18	198.92	0.82	47.12	2.58
Egypt	L	1990	4.46	0.6	878.22	32	4283.5	9.93	20.05	14.04
Egypt	LM	1996	2.46	0.34	966.31	30.13	3107	4.59	20.75	3.24
Egypt	LM	2000	1.81	0.31	1103.44	32.76	2852	2.86	16.20	1.37
Egypt	LM	2004	2.26	0.43	1166.46	32.14	3340.7	4.24	28.23	1.97
Egypt	LM	2008	1.68	0.37	1392.25	30.75	8694	5.34	33.04	1.07
Ethiopia	L	1995	67.9	27.07	127.02	44.56	27.36	0.36	9.62	11.44
Ethiopia	L	1999	55.25	16.03	132.59	29.98	33.73	0.44	11.87	8.35
Ethiopia	L	2004	36.31	8.34	148.85	29.81	133.74	1.32	14.75	18.05
Ethiopia	L	2010	33.54	9.04	237.36	33.17	345.15	1.15	13.60	11.78
Ghana	L	1987	63.84	25.13	356.31	35.35	0.7	0.01	19.66	8.06
Ghana	L	1988	62.8	24.61	366.25	35.99	6	0.12	18.18	11.07
Ghana	L	1992	47.38	16.4	389.43	38.44	7.30	0.11	17.23	9.55
Ghana	L	1998	33.9	11.33	431.47	40.07	29.5	0.39	33.87	9.38
Ghana	L	2006	25.15	8.41	520.17	42.77	105.25	0.52	25.19	6.09
Guinea	L	1991	92.31	62.96	277.33	46.84	13.6	0.45	30.33	12.52
Guinea	L	1994	48.54	19.01	264.26	46.08	0.49	0.01	22.75	10.59
Guinea	L	2002	61.6	26.14	301.95	43	15.19	0.51	26.48	8.61
Guinea	L	2007	59.7	23.71	301.73	39.36	15.07	0.36	28.76	5.52
Guinea	L	2012	35.27	10.34	303.49	33.73	66.3	1.17	29.72	5.99
Guinea-Bissau	L	1993	64.02	28.37	485.82	43.61	1.5	0.63	8.87	39.91
Guinea-Bissau	L	2002	53.87	18.63	396.81	35.57	17.63	4.24	17.83	14.44
Guinea-Bissau	L	2010	67.08	30.53	422.17	50.66	45.89	5.41	19.98	14.80
Kenya	L	1992	23.08	7.93	523.46	57.46	114.84	1.40	26.26	10.76
Kenya	L	1994	18.84	6.38	507.16	43.86	137.28	1.92	37.04	9.47
Kenya	L	1997	21.5	5.59	511.16	46.3	351.78	2.68	22.69	3.42
Kenya	L	2005	33.6	11.7	530.08	48.51	424.99	2.67	28.51	4.05
Lesotho	L	1987	74.77	44.17	443.63	56.02	353.09	95.60	13.02	28.39
Lesotho	L	1994	69.56	44.79	573.68	63.24	319.65	42.34	24.48	15.31
Lesotho	L	2003	61.31	31.99	685.95	51.57	556.89	57.46	60.07	8.14
Lesotho	LM	2010	59.65	31.83	867.66	54.18	610.13	27.89	44.38	11.71
Madagascar	L	1993	69.36	30.35	290.31	45.26	13.54	0.40	15.32	10.72

Madagascar	L	1997	65.85	28.12	275.78	39.47	12.18	0.34	21.87	23.49
Madagascar	L	1999	64.13	27.71	281.63	38.61	11.62	0.31	24.47	9.63
Madagascar	L	2001	68.68	34.36	294.05	47.44	10.87	0.24	29.08	8.17
Madagascar	L	2005	74.06	31.7	275.52	38.88	115.17	2.29	28.21	18.12
Madagascar	L	2010	81.76	40.32	275.00	40.63	547.03	6.27	24.97	5.38
Mali	L	1994	84.88	51.88	304.17	50.44	103.19	5.85	23.01	24.94
Mali	L	2001	57.92	22.91	384.46	39.87	88.17	3.35	33.30	13.38
Mali	L	2006	50.58	17.46	432.79	38.93	211.84	3.46	30.77	14.14
Mali	L	2010	49.25	15.19	459.65	33.04	472.75	5.02	26.00	11.55
Mauritania	L	1987	40.05	17.35	681.87	43.94	6.70	0.74	49.09	21.31
Mauritania	L	1993	41.16	13.66	663.85	50.05	2.27	0.18	32.00	27.00
Mauritania	L	1996	20.62	6.13	685.14	37.75	4.37	0.30	49.41	18.85
Morocco		1984	10.95	2.31	1170.72	39.19	873.73	6.17	26.64	2.40
Morocco	LM	1990	2.81	0.4	1401.45	39.2	2006.35	6.96	25.69	4.30
Morocco	LM	1998	7.4	1.29	1600.02	39.46	2010.74	5.02	24.41	1.33
Morocco	LM	2001	6.18	1.28	1697.64	40.64	3260.92	8.64	29.41	1.28
Morocco	LM	2007	3.12	0.61	2092.82	40.72	6730.47	8.95	35.75	1.62
Mozambique	L	1996	85.36	47.28	196.80	44.41	61	1.88	14.79	27.32
Mozambique	L	2002	80.36	41.53	271.30	47.04	52.55	1.25	27.34	52.82
Mozambique	L	2009	68.74	31.41	357.11	45.58	111.13	1.04	29.05	18.78
Namibia	L	1994	52.87	27.77	2878.74	74.33	14.90	0.41	44.47	3.77
Namibia	L	2004	31.46	10.17	3536.23	63.32	15.24	0.23	39.81	2.62
Namibia	L	2010	22.6	6.65	4122.14	60.97	15.12	0.13	47.80	2.27
Niger	L	1993	78.19	34.12	261.42	36.1	15.87	0.99	15.64	21.07
Niger	L	1994	81.38	43.13	262.67	41.53	6.90	0.44	16.53	23.86
Niger	L	2005	74.93	35.5	252.50	44.43	66.37	1.95	16.59	15.33
Niger	L	2007	72.02	28.75	255.79	37.3	79.35	1.85	17.43	12.68
Niger	L	2011	50.34	13.91	264.53	31.45	165.93	2.59	20.90	10.13
Nigeria	L	1985	46.01	17.39	639.54	38.68	10	0.03	17.39	0.11
Nigeria	L	1992	57.06	27.37	559.82	44.98	56	0.19	37.51	0.88
Nigeria	L	1996	63.5	31.07	546.25	51.92	947	2.71	32.24	0.54
Nigeria	L	2004	53.46	21.92	797.68	40.06	2272.7	2.59	30.16	0.66
Nigeria	LM	2010	53.47	21.76	997.45	42.97	19817.84	5.37	25.26	0.56
Rwanda	L	1984	63.65	19.9	263.23	28.9	2.94	0.19	12.63	10.25
Rwanda	L	2000	76.97	37.93	224.90	48.55	6.63	0.38	6.32	18.53

Rwanda	L	2006	68	31.14	305.48	52.04	28.99	0.93	12.30	19.39
Rwanda	L	2011	60.25	23.7	393.02	51.34	174.26	2.72	14.43	19.73
Senegal	LM	1991	67.97	36.11	677.30	54.14	162.56	2.89	23.09	11.17
Senegal	L	1994	56.78	21	635.06	41.44	113.83	2.94	31.75	16.39
Senegal	L	2001	48.58	16.1	716.65	41.23	304.68	6.25	28.73	8.86
Senegal	L	2006	37.58	12.44	770.51	39.22	925.24	9.89	25.63	9.24
Senegal	LM	2011	37.98	12.79	792.11	40.28	1613.91	11.18	25.17	7.34
Sierra Leone	L	2003	58.59	21.76	315.46	40.17	25.89	1.89	14.07	24.58
Sierra Leone	L	2011	52.33	16.7	381.38	33.99	58.81	2.01	16.32	14.50
South Africa	UM	1993	31.91	11	4668.25	59.33	101.70	0.08	21.83	0.20
South Africa	UM	1995	34.94	13.84	4757.96	62.97	105.32	0.07	22.14	0.25
South Africa	LM	2001	35.2	13.28	4884.44	57.77	297.39	0.24	29.37	0.35
South Africa	UM	2006	23.13	7.23	5671.15	64.79	691.93	0.25	29.27	0.26
South Africa	UM	2009	15.07	4.16	5820.66	63.01	862.05	0.29	27.91	0.36
South Africa	UM	2011	16.56	4.9	6010.41	63.38	1158.42	0.28	30.44	0.34
Swaziland	LM	1995	81.66	51.04	2099.84	60.45	82.55	4.86	60.02	3.40
Swaziland	LM	2001	48.44	17.49	2191.33	53.11	52.88	3.92	85.44	2.16
Swaziland	LM	2009	42.03	16.64	2440.41	51.45	93.46	2.97	59.15	1.78
Tanzania	L	2000	84.74	44.54	361.66	37.3	8	0.08	13.36	10.45
Tanzania	L	2007	52.73	18.95	481.23	40.28	25.46	0.12	18.92	13.12
Tanzania	L	2012	46.6	14.35	556.06	37.78	67.38	0.17	21.29	7.30
Togo	L	2006	55.55	21.05	383.95	42.21	232.17	10.54	38.20	3.63
Togo	L	2011	54.18	23.21	395.72	46.02	244.13	6.50	39.43	14.45
Tunisia	LM	1985	13.93	3.47	1975.90	43.43	270.82	3.22	32.10	1.91
Tunisia	LM	1990	9.82	2.44	2033.42	40.24	551.04	4.48	43.65	3.19
Tunisia	LM	1995	10.86	2.54	2237.69	41.66	679.88	3.77	44.90	0.41
Tunisia	LM	2000	5.32	1.02	2758.46	40.81	795.95	3.71	39.55	1.03
Tunisia	LM	2005	3.09	0.65	3217.89	37.73	1392.67	4.32	44.93	1.12
Tunisia	UM	2010	1.99	0.4	3847.59	35.81	2063.29	4.64	50.05	1.24
Uganda	L	1999	52.13	19.19	274.43	43	232.60	3.88	12.25	10.09
Uganda	L	2002	62.21	24.47	293.98	45.17	422.58	6.84	11.21	11.74
Uganda	L	2005	53.18	19.4	321.44	42.94	321.81	3.57	14.18	13.23
Uganda	L	2009	41.46	13.16	393.62	44.2	781.10	4.60	19.81	10.50
Uganda	L	2012	33.24	10.13	429.40	42.37	910.32	3.84	19.91	6.98

Zambia	L	2003	49.44	17.45	635.32	42.06	36.30	0.74	25.68	15.80
Zambia	L	2005	56.69	27.26	691.81	54.29	52.87	0.63	30.61	14.07
Zambia	L	2006	60.46	30.1	726.11	54.62	57.68	0.45	32.59	11.50

Source: Poverty and Gini coefficient data are from World Bank (2015d), and remittances, exports and ODA data are from World Bank (2015b), supplemented with data from IMF (2015).

Appendix B: Derivation of GLS and 2SLS estimators

Derivation of GLS estimator

In Section 5.2.1 we estimated the poverty model using the GLS estimator to account for possible heteroscedasticity in the model. As discussed in Section 5.2.1 the estimated impact of remittances on poverty may be biased by unobservable country specific factors, which either cannot be measured or have not been accounted for. In other words, there could be latent heterogeneity present in the errors. Although this will generally not interfere with consistent parameter estimation, failing to account for the presence of heterogeneity will yield inconsistent estimates of the standard errors of the estimated parameters and can invalidate statistical inferences (Driscoll & Kraay, 1998). In the presence of panel-level heteroscedasticity, GLS provides efficient estimates over OLS (Arrelano, 2003: 20). The GLS estimator transforms the model equation into a new model by assigning weights to the errors. The variances of the errors in the transformed model are equal and constant, thus removing the problem of heteroscedasticity.

The GLS estimator,

$$\hat{b}_{gls} = (X'\Sigma^{-1}X)^{-1}(X'\Sigma^{-1}Y) \quad \text{(B.1)}$$

can be considered as an alternative to the OLS estimator,

$$\hat{b}_{ols} = (X'X)^{-1}X'Y \quad \text{(B.2)}$$

The GLS estimation technique works as follows: suppose V is a symmetric square matrix with the property, $VV = \Sigma^{-1}$. V can be considered as being the square root of Σ^{-1}. V has the property that $\Sigma^{1/2}\, V = V\Sigma^{1/2} = I$. Now consider the model equation,

$$Y = XB + e \quad \text{(B.3)}$$

Multiply both sides of equation by the matrix V such that, $(VY) = (VX)B + (Ve)$. To simplify the expression the terms in parenthesis can be represented as starred variables, $Y^* = VY$, $X^* = VX$ and $e^* = Ve$.

Therefore, the new model equation is given by,

$$Y^* = X^*B + e^* \tag{B.4}$$

The errors of the transformed model are now homoscedastic and uncorrelated,

$$Cov(e^*) = e^*e^{*'} = (Vee'V) = V\Sigma V = V\Sigma^{1/2}\Sigma^{1/2}V = I \tag{B.5}$$

Note that the GLS estimator is the same as the OLS estimator of *b* and is also unbiased and consistent,

$$\hat{b}_{ols} = (X^{*'}X^*)^{-1}X^{*'}Y^* = (XVVX)^{-1}X'VVY = (X'\Sigma^{-1}X)^{-1}X'\Sigma^{-1}Y = \hat{b}_{gls} \tag{B.6}$$

Derivation of 2SLS estimator

In Section 5.2.2 we employed the 2SLS estimator to estimate the remittances and poverty relationship, while accounting for the possible reverse causality between remittances and poverty. As discussed in Section 5.2.2 reverse causality would make remittances endogenous to poverty. Endogenous variables are correlated with the disturbance term. This violates the Gauss-Markov assumptions making the OLS estimates biased. To take account of the possible enogeneity problem the study adopts the Two Stage Least Squares (2SLS) estimation approach. The 2SLS technique replaces the endogenous variable with predicted values of the endogenous variable when regressed on a set of instruments. The simple 2SLS estimation procedure works as follows:

Consider two equations where Y and X_1 are endogenous:

$$Y_i = \alpha_{10} + \beta_{11}X_{1i} + \beta_{12}X_{2i} + \beta_{13}X_{3i} + \cdots + \beta_{1k}X_{ki} + u_i \tag{B.7}$$

$$X_{1i} = \alpha_{20} + \beta_{21}Y_i + \beta_{22}Z_{2i} + \beta_{23}Z_{3i} + \cdots + \beta_{2k}Z_{ki} + v_i \tag{B.8}$$

Now substitute equation (B.7) into equation (B.8):

$$X_{1i} = \alpha_{20} + \beta_{21}(\alpha_{10} + \beta_{11}X_{1i} + \beta_{12}X_{2i} + \beta_{13}X_{3i} + \cdots + \beta_{1k}X_{ki} + u_i) + \beta_{22}Z_{2i} + \beta_{23}Z_{3i} + \cdots + \beta_{2k}Z_{ki} + v_i \tag{B.9}$$

In equation (B.9) we see that X_1 is a linear function of u, and therefore will be correlated with u. This violates the Gauss-Markov assumptions, and the OLS estimator $\hat{\beta}_{11}$ will be biased.

The objective of the 2SLS estimation technique is to find an instrument for X_1 that will not be correlated with u. In other words, finding an instrument, Z, that influences X_1 but does not influence Y.

In the first stage of the 2SLS estimation technique, the endogenous variable, X_1, is regressed on the set of instruments and the exogenous variables using OLS:

$$X_{1i} = \alpha_{30} + \beta_{31} Z_i + \beta_{32} X_{2i} + \beta_{33} X_{3i} + \cdots + \beta_{3k} X_{ki} + v_i \tag{B.10}$$

The estimated variable allows us to generate a new set of values for the variable $\hat{X}_1$:

$$\hat{X}_{1i} = \hat{\alpha}_{30} + \hat{\beta}_{31} Z_i + \hat{\beta}_{32} X_{2i} + \hat{\beta}_{33} X_{3i} + \cdots + \hat{\beta}_{3k} X_{ki} \tag{B.11}$$

Thus,

$$X_1 = \hat{X}_1 + \hat{v} \tag{B.12}$$

In the second stage of the 2SLS estimation technique, $\hat{X}_1$ is substituted for X_1 in equation (B.7):

$$Y_i = \alpha_{10} + \beta_{11}(\hat{X}_{1i} + \hat{v}_i) + \beta_{12} X_{2i} + \beta_{13} X_{3i} + \cdots + \beta_{1k} X_{ki} + u_i \tag{B.13}$$

This can be rewritten as:

$$Y_i = \alpha_{10} + \beta_{11} \hat{X}_{1i} + \beta_{12} X_{2i} + \beta_{13} X_{3i} + \cdots + \beta_{1k} X_{ki} + (u_i + \beta_{11} \hat{v}_i) \tag{B.14}$$

The new equation is estimated using OLS and produces consistent estimates of all the parameters.

Appendix C: Estimation results

Table C-1.Results of the Likelihood ratio test for heteroscedasticity

	LR chi2(31)	Prob > chi2
Poverty headcount	249.00	0.0000
Poverty gap	92.52	0.0000

Note: The null hypothesis states that the variances of the errors are homoscedastic.
Source: Author's calculations.

Table C-2.Results of First-stage regression for 2SLS estimation

	Remittances
Per capita GDP (constant US$ 2005)	-0.05 (0.091)
Gini coefficient	0.02 (0.195)
Lagged remittances (% of GDP)	0.96*** (0.027)
Educational attainment	-0.07 (0.076)
Trade openness	0.04 (0.113)
Lower-middle-income	0.05 (0.126)
Upper-middle-income	-0.06 (0.223)
Time	-0.00 (0.005)
Constant	0.20 (0.796)
Observations	83
Adjusted R^2	0.96
F(8, 74)	253.58

Note: ***, **, and * indicate significance at 1%, 5% and 10% level. Standard errors are reported in parentheses.
Source: Author's calculations based on World Bank (2015a).

Table C-3. Results of Durbin-Wu-Hausman test for endogeneity

	Durbin-Wu-Hausman	Prob F(1,78)
Poverty headcount	0.640308	0.4260
Poverty gap	0.928383	0.3383

Note: The null hypothesis states that the variables are exogenous.
Source: Author's calculations.