Determinants of remittances in South Africa

1 Introduction

According to the World Bank estimates, remittances to developing countries stood at $436 billion in 2014, a 4.4 percent increase over the 2013 level (World Bank 2015). Recent research shows that these remittances are as important as direct investment flows and have grown at a faster rate than the amount of official development assistance (see Bouoiyour et al (2015)). While remittances have gained increasing interest from both economists and policy makers, there is far less consensus about the factors which influence remittances in migrant-sending areas and countries.

In fact many studies have searched for empirical regularities between remittances and a variety of household and migrant characteristics. However, there is no general theory on which to base an empirical model of the determinants of remittances, Stark (1991). Numerous regression models incorporating a wide variety of explanatory variables have been specified to explain remittances and to find out as to what exactly are the main factors. However, the estimated effects are not always robust across specifications, particularly when other determinants are accounted for. This suggests that the robustness of the findings is still open to question.

The main aim of the chapter is to analyse the factors that affect the probability and the amount of remittances received by households from migrants who are currently away in South Africa, with special reference to Hlokozi. We use two sets of data — the National Income Dynamic data Survey (NIDS) and the Hlokozi data. However given the absence/lack of migrant information on the NIDS data, we also use Hlokozi data which collected remittance information from both the sending and receiving end. In particular, our research examines the socio-economic circumstances of both the household household's and migrant's specific variables which influence the incidence and amount of remittances. We use these factors to interpret the main determinants for these transfers. In what follows we provide a critical review of this literature on the determinants of the incidence and amount of remittances.

2 Literature review

In this review, Section 2.1 reviews the theoretical economic literature on migrants' remittances. Sections 2.2 to 2.3 will review the literature on the factors that influence remittances. These factors have been grouped into microeconomic and macroeconomic factors. At the micro level we first identify two broad classes of underlying causes of remittances, namely migrant characteristics and household characteristics. The set of migrant characteristics include income, age, gender, education level, along with duration of migration. On the other hand, the household characteristics that are likely to affect remittances include household income, household size, age of the household head, and education of the household head. Finally, macroeconomic determinants affecting primarily international remittances of such factors as interest rate differentials, wages in the host countries, inflation, exchange rates, economic conditions in both home and destination countries.

2.1 Theoretical Literature

Why do migrants remit? Previous research on remittances has identified three distinct sets of motives to explain why migrants send money to their household of origin. These are: altruistic motive, a self-interest motive and tempered or enlightened self-interest. The latter category can include all sorts of contractual arrangements (such as co-insurance, exchange-motive and loan repayment) between the migrant and the household of origin (Hagen-Zanker and Siegel, 2007).

According to the altruistic model, migrants send money to the household of origin with the intention of helping or because he/she cares about the members left behind. In other words, the migrant derives utility not only from his own consumption but also from the consumption of those left behind (Atanov 2010). Thus a negative shock (e.g. death of a member of the household) experienced by the household of origin should be accompanied by an increase in remittances. As Vanwey, (2004: 740-1) puts it "altruism is acting to increase the income, consumption, or standard of living of someone else, even to the detriment of one's own standard of living". Previous studies have identified some important predictions from the altruistic model. First, remittances are expected to be positively related to migrant's income and negatively related to household's net income (Hagen-Zanker and Siegel 2007, Cox 1987, Cox et al. 1998 and Lucas and Stark 1985).

Secondly, Altruistic migrants are expected to send more money to the household of origin as the number of household members increase (Osili (2007), Lucas and Stark (1985) and Massey and Basem (1992)). Thirdly, remittances are expected to decrease with (a) economic assets available to a household of origin such cars and land and (b) number of migrants (Agarwal and Horowitz (2002), Funkhouser (1995), Massey and Basem (1992)).

If motivated by self-interest, a migrant would send money to the household of origin if and only if there is something he/she will get in return. For example, a migrant might send money if he/she is to inherit some assets, or send money in order to uphold his/her reputation in the community. In this case remittances will increase with the possibility of inheritance. Cox and Stark, (1994), argue that in a three generation setting, remittances may be sent to parents to ensure that the remitter's own children also take care of him/her in old age — the demonstration effect. This model predicts that, remittances should be positively associated with household's assets, income, the probability of inheriting, the migrant's wealth and income, and decreases with risk aversion (Hagen-Zanker and Siegel, 2007).

As already noted tempered or enlightened self-interest model of remittances comprise three aspects: exchange-motive, loan repayment and co-insurance. In an exchange model of remittances, a migrant remits to buy services, or to secure future inheritances, from other household members (Cox 1987). There are similarities between this model and the self-interest mode. For example, this model predicts that remittances increase with amount of inheritable assets in the origin household, the migrant is a potential heir and the presence of other migrants from the same household, (de la Briere et al. (2002), Hoddinott (1994), Lucas and Stark (1985) and VanWey (2004)).

Remittances may be seen in co-insurance framework, where both migrant and household of origin attempt to diversify economic risks (Rosenzweig (1988), Stark (1991) and Stark and Levhari (1982)). In this case the migrant will send money when the household of origin is experiencing any financial difficulties. Likewise, the migrant will receive financial support if confronted with any challenges such as losing a job, (Solimano, (2003), de la Brière et al. (2002) and Stark (1991)).

Finally, the loan repayment view implies that the household of origin initially invest in the education of the potential migrant and may finance the costs of future emigration. After finding a job, the migrant will feel the need to repay this obligation to his/her family.

Prior empirical studies have found evidence to support the predictions from altruistic, a self-interest and tempered or enlightened self-interest models. For example, Lucas and Stark (1985) found support for the co-insurance, education repayment, and inheritance in an empirical application to data from Botswana. Consistent with Lucas and Stark (1985), Poirine (1997) and Lillard and Willis (1997) found evidence in support of the co-insurance, education repayment, and inheritance using data from Nepal and Malaysia respectively. Hoddinott (1994) also found particular support for the argument that migrants remit in anticipation of future inheritance in Kenya. Regmi and Tisdell (2002) found similar support for the remittances-inheritance connection in Nepal. It is important to point out that although there may be evidence in support of either altruism or contract, these motives may operate simultaneously. For example, Chami and Fisher (1996) argue that contractual arrangements may not be as self-interested as they may appear from theory and show that altruism can lead to risk-sharing arrangements that are self-enforcing.

Table 1 summarises the model of remittance behaviour and its main predictions, Each column corresponds to a specific model and each row lists an explanatory factor. Each cell displays the expected effect of a factor on the probability (or amount) of remittances.

Table1, Overview of the empirical predictions of remittance theories

Variables	Altruism	Exchange	insurance	Loan repayment	Self interest
Migrants Education		[-]		[+]	
Migrant income	[+]	[+]		[+]	[+]
HH Shock	[+]		[+]		
intent to return	[+]				
Number of migrants	[-]	[+]			
HH assets(land and cattle)	[-]	[+/-]	[-]	[+/-]	[+]
HH income	[-]	[+/-]	[-]	[+/-]	[+]
Household size	[+]	[+]			

2.2 Migrant's characteristics

Many of the reviewed studies suggest that among the factors possibly influencing the flow of remittances are migrants' income, education, duration of migration and gender (see Banerjee (1984), Durand, Kandel, Parrado, Massey (1996), Funkhouser (1995), Germenji, Beka & Sarris (2001), Hoddinott (1994), Lianos & Cavoundis (2006), Lucas& Stark (1985) and Craciun (2006)).

A view that highly educated individuals tend to remit less than less educated individuals is common in the literature (see Banerjee (1984), Hoddinott (1994, Funkhouser (1995, Durand, Kandel, Parrado, Massey (1996), and Holst & Schrooten (2006). For example, using data from El Salvador and Nicaragua, Funkhousers (1995) examined the determinants of remittances from international migration by applying both Heckman's two-step technique and the Tobit model to account for the self-selection in the decision to remit. The study found for both El Salvador and Nicaragua that education is negatively correlated with the probability of remitting.

Applying the Censored Least Absolute Deviation (CLAD) method in addition to more standard parametric estimators Gubert (2002), investigated the determinants of remittances from both internal and international migrants in eight villages in the Kayes area (western Mali). The dependent variable was treated as a mixture of discrete (zero remittances) and continuous (positive remittances) parts, in line with the view that the decision to remit is either as a two-stage sequential decision process or as a one-stage simultaneous process. The findings of the

study suggest that emigrants with higher earning potential measured by human capital variables tend to remit more. In particular, those residing abroad, in France and elsewhere, and those with higher education levels were more likely both to remit and to remit more than emigrants who chose internal destinations or less educated.

There is evidence to suggest that the longer migrant workers stay away from home, the less money they remit to their family. Using data from a nationwide household survey to investigate the determinants of income transfers in Kenya, Knowles and Anker (1981), employed two different analytical models of the income transfer process. The first model focuses on the decision to make transfers, while the second model attempts to explain the amount of income transferred by households reporting the sending of transfers. Their evidence revealed that the number of years residing away from home was seen to have a significantly negative effect. More specifically, they found that households with migrant heads who have resided as long as 10 years away from their home areas are 24.3 per cent less likely to be making transfers..

However, a counter-intuitive finding is found in Simati and Gibson (2001). These authors collected survey data to analyse the remittance behaviour of Tuvaluan migrants in New Zealand. A Tobit estimation method was used to shed light on both parts of the remittance decision – whether to remit and conditional upon that decision, how much to remit. Their results suggest that remittance behaviour of Tuvaluan migrants in New Zealand, does not seem to be consistent with the hypothesis that remittances decrease with the length of time that migrants spend in the home country. In fact, remittances appear to rise for 30 years after a migrant has arrived in New Zealand.

The view that women are better remitters than man has been supported by evidence in various countries. For example, Osaki (1999) looked at gender differentials in economic linkages between migrants and their families using the National Migration Survey of Thailand and found evidence in support of this view. More specifically, she found that young female and unmarried daughters of households' heads had a higher propensity to support their household of origin via remittances than male migrants. This remittance behaviour by female migrants is usually explained by referring to their caring and altruistic nature and the fact that they either feel, or perhaps have imposed on them, greater responsibilities for maintaining family linkages (Nyberg Sørensen (2005), Piper (2005), Ramírez et al. (2005)).

These findings have been challenged, however, by a more recent study carried out by McDonald and Valenzuela (2012) which used a matched survey dataset from the Philippines to directly test remittance models using information from both remittance-sending and remittance-receiving households. Their results, in terms of amounts remitted show that the amount remitted by men are markedly higher than those remitted by women. For both men and women, the largest median amount remitted is from degree holders in the English speaking developed countries namely US, UK, Canada, and Australia (52,585 pesos for men and 36,101 pesos for women).

One of the variables that is commonly used to explain remittances is income of the remitter/migrant. Many studies show that the level of income of the migrant has a positive effect on the level of remittance (Banerjee (1984), Durand, Kandel, Parrado, Massey (1996), Funkhouser (1995), Germenji, Beka & Sarris (2001), Hoddinott (1994), Lianos & Cavoundis (2006), Lucas & Stark (1985) and Craciun (2006)). For example, a South Asia Network of Economic Research Institutes report (2010) documented the determinants of remittances in Delhi from Bihar. A multiple regression estimate for the sample size of 356 males and 105 females was used. The individuals or households having higher income (without remittances) send more remittance than others.

2.3 Household characteristics

Many microeconomic studies have shown that socio-economic characteristics of recipient households, such household size, sex of the household head, age of the household head, the education of the household head, and the marital status of the household head, affect the decision to remit and to receive remittances

Using a Probit model and an OLS regression model Samson (2011) examined the factors that contribute to whether or not a households receives remittances and how these factors affect the value of the remittances received in the Philippines. The results suggest that the income variable here is negative, which shows that as household income increases, they are -0.038 less likely to receive a remittance from the migrant worker. Samson's finding is not surprising because usually if a household has higher income, they are less likely to need a migrant worker or less likely to receive if there is a migrant – outside assistance is not needed.

Although the household income is considered to be an important determinant of remittances, the result as regards the size and the direction of influence remain inconclusive. Sackey studied the microeconomic determinants of inward remittances of migrants to their respective households in Ghana using the Logit model. He found that the household income has positive impact on remittances. These results seem counter-intuitive because one would expect that as income of the household increases remittances will decrease. The results from other studies such as Osaki (2003), de la Briere, Janvry, Lambert & Sadoulet (1997), Germenji, Beka, Sarris (2001) and Pleitez-Chavez (2004)) are not consistent with Sackey's results either. For example, Germenji, Beka, Sarris (2001) examined the factors that determine the decision to remit and the amount remitted by Albanian emigrants to their households of origin, using the Heckman two-step procedure and the censored Tobit. Their results as expected suggest that the income variable is negative and highly significant indicating that the probability of being a transfer recipient is higher for poorer households.

Many of the studies reviewed here such as (Banerjee (1984), Lucas& Stark (1985), Itzigsohn (1995), and Osili (2007)) have presumed a positive relationship between remittances and household size. Using data collected by the Colegio de la Frontera Norte (COLEF) on labor migration to the Northern Mexican border and to the United States (Encuesta sobre Migración en la Frontera Norte de México, EMIF) from Mexican migrants, Amuedo-Dorantes & Pozo, (2006) found that the migrant's likelihood to remit the fraction of earnings remitted home increases proportionally with the size of the migrant's family in Mexico, suggesting that the needs of the household of origin are important to the migrant and that the migrant is behaving in an altruistic manner.

There is a methodological issue involved in the studies reviewed in this and the previous section which has not yet been fully noted. Earlier studies have relied on OLS in modelling the determinants of migrant remittances, (for example Lucas & Stark, 1985). However, the use of OLS estimates are likely to be biased and inconsistent for two reasons. Firstly, some migrants do not remit at all, and those who do, can be considered to self-select themselves non-randomly into the "state" of remitting. Further, some of the earlier studies failed to distinguish between the determinants of the probability to remit and the determinants of the remitted amount.

Recent studies recognising this problem have attempted to avoid it by making use of either Tobit model or Heckmann two-stage approach or two part model. Modelling the determinants of remittances with the Tobit model treats the remittance process as a one-stage decision. That is the decision to remit and the amount of remittances made simultaneously, and they are both explained by the same factors. This method has been followed by Cox et al. (1998), Gubert (2002) and Amuedo-Dorantes and Pozo (2006).

An alternative to the Tobit model is the Heckman two-stage approach: where the decision as to whether to remit or not is modelled using the probit model and the decision on how much to remit is modelled by the OLS which corrects for the potential selection bias. In other words, the Heckman selection model distinguishes the determinants of migrants' decision to send remittances of those influencing the amount transferred. The Heckman selection model either as an alternative or as a complement to the Tobit model – has been employed widely in the remittance literature, for example in studies by Hoddinott (1992), Funkhouser (1995) and Agarwal and Horowitz (2002).

Lastly the two-part model has been used by some studies as a generalisation of the Tobit model. Unlike the Tobit model, it models the decision to remit and the amount of remittances as two separate decisions. This model first estimates the probability that individuals remit positive amounts separately, and the level of remittances by OLS based on the subsample of observations for which the remittances are positive.

2.4 Macroeconomic determinants

While the focus of this study is on the microeconomic determinants of remittances at the migrants and household level it is nonetheless instructive review the important literature on macroeconomic determinants to have a broader view of remittances behaviour. As already pointed out in the introductory paragraph to section 2 of this chapter, macroeconomic determinants consists of determinants such as inflation, interest rate differentials, wages in the host countries, exchange rates, economic conditions in both home and destination countries. Although most, if not all of these relate to international, rather than internal, remittance-sending, an attempt is made to shed some light on them.

Although some studies have observed a negative relationship between remittances and inflation such as Glytsos and Katselli (1986), Elbadawi and Rocha (1992) and Aydas *et al. (*2005) there are exceptions in the literature. Using data for Egypt, El-Sakka and Mcnabb (1999) investigated the macroeconomic determinants of emigrant remittances received in Egypt. The equations were estimated using Ordinary Least Squares (OLS) with two exceptions when an autoregressive procedure is used to correct for serial correlation. Domestic inflation was found to have a positive and significant impact on the inflow of remittances. This according to the author is expected and may reflect the need to increase family support when the domestic inflation is rising.

It has also been shown that remittances have an influence on interest rate differential. Aydas *et al.* (2005) investigated the effect of macroeconomic variables on workers remittances flows to Turkey. Their study is based on time series analysis using data for the period 1964-1993. They used ordinary least squares to estimate two models that are distinguished only on the basis of the two definitions of workers remittances: workers remittances receipts per worker and workers remittances flows. They found that interest rate differential is significantly positive – interest rates and remittances are positively related.

Many studies generally found that other variables such as real earnings of workers and total number of workers in the host country consistently have a significant and positive effect on the flow of remittances (see, for example, Swamy (1981), Straubhaar (1986), Elbadawi and Rocha (1992), and El-Sakka and Mcnabb (1999)).

It should be noted here that the macroeconomic evidence of the reviewed studies may be biased because most of the studies in the literature use the ordinary least squares to estimate the relationship between remittances and macroeconomic variables (see for example El-Sakka and Mcnabb (1999), Straubhaar (1986), Aydas, Neyapti Ozcan (2005)). Related to the above point about the methodology is the fact that some studies ignore the potential presence of unit root which may yield spurious regression.

3 The data and methodology

3.1 NIDS and Hlokozi matched Data

As already noted in the introduction, two different datasets were considered regarding determinants of and the motives for remitting behaviour of South African migrants. That is, cross-sectional survey data based on the Hlokozi survey and the NIDS data. Although the NIDS data provide good information on migration and remittances it is not good enough to investigate the determinants of remittances. This is because the information about migrants was only collected from migrant's areas of origin among potential recipients. However households of origin are likely to provide imprecise insights on the characteristics of migrants, especially earnings and remittances (Chort and Senne, 2013). In the NIDS data for example, no attempt was made to collect information about the earnings of the migrants. Despite these challenges NIDS data was used in this study because panel data greatly enhance the analytical capacities of the dataset and the rigour of the statistical analysis.

Given the limited information on the characteristics of migrants in the existing South African surveys, Hlokozi data was collected by the author. Hlokozi data is a unique matched and multi-sited dataset that was collected from Hlokozi households and the migrants from Hlokozi. The Hlokozi household survey gathered data about present household members, migrants, financial shocks, agricultural activities, remittances, incomes, and more. Whereas the Hlokozi migrant survey focused on the background information: age, education, gender, marital status, labour-force status and income (see fieldwork methodology section for more details). Although Hlokozi data can provide meaningful insight into remittance behaviour in South Africa, it encompassed exclusively Hlokozi area and thus data presented are not representative at country level.

Efficient estimation from each data require different estimation method. Thus an attempt was made to describe the estimation methods used for each data set. Estimation methods based on the panel data were discussed first followed by the estimation method used for the cross-section data.

3.1.1 Variables used in the empirical analysis

Dependent variables

It was noted in the previous section that households and migrant characteristics can affect both the propensity to remit and the level (or intensity) of remittances. Our empirical analysis allows for the possibility that the determinants of each of these decisions, participation and level, should be modelled separately. To determine the probability of receiving remittances we use a dummy variable for receipt (remittances=1 if household received remittances and 0 otherwise) and to determine the level of remittances we use log of remittances, defined as the total value of money, food or any other kind of contribution received by a household in the past 12-month.

Independent variables used in the study

Based on the review of literature (Crăciun (2006), Bouoiyour and Miftah (2015) and Holst et al (2008)), the independent variables were identified. They include the following variables:

Age: According to the theoretical literature, the age of the remitter plays a positive role. However, beyond a certain age, this tends to decline. This finding is reported in many empirical studies and often explained by the assumption that personal ties in the recipient countries become more distant with age.

Gender: Many empirical studies report a significant influence of gender on the amount of remittances sent. While Lucas and Stark (1985) found in their seminal work on remittances that women show a higher probability to remit, more recent studies have produced the opposite finding. Here we use a dummy variable to check for the gender effect. The variable "gender" is 1 in the case of a female recipient and 0 in the case of a male recipient.

Education: The value of the migrant's human capital is reflected in years of education. The theory predicts that the more educated is the person, the more he/she will remit. We expect that the more educated are household members, the less amount of money they will receive.

Income: According to the theoretical literature, remittances decreases with the household's per capita income. This finding is reported in all microeconomic models. Therefore, we expect this variable to show a negative sign for the income of the household.

Household size: One of the important determinant of the amount of remittances is the size of the household of origin. The theory predicts that altruistic migrants tend to send more money to the household of origin as the number of household members increase.

Number of migrants: Theoretical model predicts that in the case of pure altruism the average remittance level will fall with the number of migrants while under insurance it would be unaffected by the number of migrants.

How remit: bank transfer: Denote the method used to send remittances to the household of origin. 1 shows the remittance sending by official channels such as bank transfer and 0 otherwise.

How remit: bring it himself: Denote the method used to send remittances to the household of origin. 1 shows the remittance sending by informal channels such as hand carrying (or by appealing to bus drivers or through relatives and friends) and 0 otherwise.

Household shock: The literature suggest that remittances are sent as part of a co-insurance contract between migrants and households. Most studies that included household shocks, find that shocks of the household (e.g. illness) are positively related to the probability of remittances and amount of remittances, consistent with our findings in the consumption function chapter.

Urban areas: It is commonly acknowledged in the literature that location can significantly affect remittances. For example, Havolli (2009) found that migrants from rural areas in Kosovo remit more. In contrast, Rodriguez (1995) found that migrants from urban areas remit more due to higher living expenses of households in urban areas.

Staying with the spouse: The amount of migrants' remittance also depends on whether the migrant lives alone or with his or her partner. The theory predicts that married migrants who are accompanied by their spouse are much less likely to remit than those who have a spouse in the household of origin.

Table 2: explanatory variables used in the empirical analysis

Migrant characteristics	**Description**
Remit dummy	Probability to remit(1/0)
Remittances(log)	Migrant's remittances(log)
Married	marital status of the migrant (marr = 1 and not mar = 0)
Female	gender of the migrant (Female = 1 and male = 0)
Staying with the Spouse	whether the migrant stay with his/her partner(1/0)
Agreed to remit	whether the migrant agreed to send remittances to the HH of origin(1/0)
Secondary education	migrant has secondary education (1/0)
Matric education	migrant has matric education (1/0)
Income(log)	migrant monthly incomes(log)
How remit: bank transfer	money sent through the bank
How remit: bring it himself	money brought by the migrant himself (1/0)
Reason remit: buy food	remit in order to buy food (1/0)
Reason remit essential for survival	remit because remittances are essential for survival of household(1/0)
Household Characteristics	
HHHgender	gender of the household head (Female = 1 and male = 0)
HHshock	Cut off or decrease of government grant in the last 24 months (1/0)
HHHage	age of household head (in years).
Household size	total number of members in the household
Number of migrants	number of migrants in the household
HHHmarital status	marital status of the household head (marr = 1 and not mar = 0)
HHHemployed	employment status of the household head(empl = 1 and unempl= 0)
Income deciles 2	21-40 percent poorest(1/0)
Income deciles 3	41-60 percent middle income hhs (1/0)
Income deciles 4	61-80 percent better off hhs (1/0)
Income deciles 5	Top best off 20 percent hhs (1/0)
Coloured	Race of the household head (Coloured = 1 and 0 otherwise)
Indian	Race of the household head (Indian = 1 and 0 otherwise)
White	Race of the household head (White = 1 and 0 otherwise)
Farms	household in farms (1/0)
Urban	household in Urban areas (1/0)
Primary education	head of household has primary education (1/0)
Secondary education	head of household has secondary education (1/0)
Matric education	head of household has matric education (1/0)
Tertiary education	head of household has tertiary education (1/0)
HH-income	Household monthly income
HH-wealth	household assets (measured by land)

Empirical models

Panel estimation methods: Panel Random effect Tobit model, panel Heckman selection model and panel Two-part models

We estimate equations for the remitting behaviour of South African migrants using three different methods: Tobit model, Heckman selection model and two part models. Many studies of remittance behaviour (see Osili (2007) Piracha et al (2011), Kaczmarczyk (2013), Collier (2011), Osaki, (2003) Craciun (2006)) use cross-sectional regressions: Tobit model, Heckman selection model and Two part models. These models have been used to account for the fact that some migrants don't remit at all. However these models are likely to break down in the presence of unobserved household differences that may be correlated with observed characteristics. In this chapter remittance behaviour is examined within an econometric model that recognizes both the panel nature of data and the censored nature of the dependent variable. We adopt a panel Random effects Tobit model, panel Heckman selection model and the panel Two part model.

Panel Random effect Tobit

The standard Tobit model may not be appropriate for the modelling of censored panel data, due to the presence of unobserved heterogeneity. Therefore, the unobserved effects need to be taken into consideration. The random effects Tobit model is presented as follows:

$$R_{it} = \begin{cases} R_{it}^{*}, if x_{it}\beta + \delta_i + \varepsilon_{it} > 0 \\ 0 \; if \; R_{it}^{*} \; \leq \; 0 \end{cases} \quad (1)$$

Where: R_i^* is the latent dependent variable observed for values greater than 0 and R_i is actual value of remittances. $\boldsymbol{x_{it}}$ is the vector of the explanatory variables observed for all cases, $\boldsymbol{\beta}$ is the vector of coefficients to be estimated, and ε_{it} is the error term which is assumed to be independently normally distributed. The Maximum Likelihood estimator is used to estimate the models parameters. However, the main limitation of Random effect Tobit is that it makes a strong assumption that the process that determines the decision to remit is the same one that governs the amount of remittances sent. This makes it an inappropriate model for our analysis as we believe that the decision of whether to remit money at all may be partly separated from the decision on the amount of the remittance. Given the restrictive assumption underpinning the Random effect Tobit model, Heckman and the Two-part models have been used as superior alternatives or complementary models to Tobit model. Both models distinguishes the

determinants of migrants' decision to send remittances from determinants of the amount transferred.

Panel Heckman selection model

The Heckman selection model which is frequently used in studies with cross-section data does not account for individual specific effects which may bias the results in a panel setting. We account for both the selection problem and specific effects in a panel setting by adopting a selection model pioneered by Heckman (1979) with modifications tailored for panel data as suggested by Wooldridge (1995). Specifically, we first estimate a cross-sectional Probit model for each period *t* and computes the value of the inverse Mills ratio[1]. The value of the inverse Mills ratio comprise information about the unobserved factors that also affects the individuals decision to remit in that particular year.

In the second stage, the inverse Mills ratio derived from the cross-sectional Probit model for each period t enters the Pooled OLS regression as an additional explanatory variable. The inverse Mills ratio is included as an additional explanatory variable in order to control for possible sample selection. Thus, our panel Heckman selection model is:

Selection equation

$$h_{it}^{*} = x_{1it}\beta 1 + \delta_i + \varepsilon_{1it} \qquad (2)$$

.

Where:

$$h_i = 1 \; if \; h_i^{*} > 0$$
$$0 \; if \; h_i^{*} \leq 0 \qquad (2.1)$$

Outcome equation

.

$$Y_{it}^{*} = x_{2it}\beta_2 + \delta_i + \varphi it + \varepsilon_{2it} \qquad (3)$$

Equations 2 and 3 are the selection and outcome equations respectively, with $\beta 1$ and $\beta 2$ as the parameter vectors to be estimated. h_{it}^{*} is a dichotomous variable which takes a value of 1 if migrant remit and 0 otherwise. $\varepsilon_{1it}\; and \varepsilon_{2it}$ follow a normal distribution N (0,1) and N (0,σε), respectively. δ_i are individual specific time invariant unobservables. Y_{it}^{*} is the amount of

[1] The inverse Mills ratio can be intuitively described as the probability of not being selected into the sample

remittances sent or received and φit are the inverse Mills ratios estimated in the first selection stage using the probit model for each year. The coefficients of the inverse Mills ratios might suggest that the factors that predict whether a migrant make a decision to remit or not, are correlated with the factors determining how much is remitted. If the inverse Mills ratios is significant, we conclude that accounting for sample selection is important. Recall that in the in the second stage we estimate the fixed effect model. As can be seen in the specified equations above the Heckman procedure applies Probit estimates in the first step, accounting for migrants' decision to send remittances and OLS estimates in the second step to account for the level of remittances.

One of the critical steps in specifying the Heckman selection model is the selection of exclusion restrictions variables included in selection equation but excluded from outcome equation. In other words, the selection equation 2 must contain at least one variable that is not included in equation 3 and thus not influence the level of remittances (Cameron and Trivedi 2005:551). We estimate the selection model by using one variable as exclusion restrictions in the participation equation, namely, head of household gender which has been used in the existing literature.

Panel Two-part model

The two-part model specifies one model for the censoring mechanism and a second distinct model for the outcome, conditional on the outcome being observed. Thus, it allows for a different data generation process for the two parts. However, it does not account for the possibility that those households with positive levels of remittances are not randomly selected from the population, thereby raising selection issues. The probability of remitting could be estimated by using a Random Effect Probit model, and the remitted amount could be estimated by running a linear panel model only for those individuals who participated in the remitting process. A key distinguishing feature between the Two-part model and the Heckman selection model is that the second stage OLS regression of the latter is based on a conditional expectation that includes the inverse Mill's ratio as an additional regressor to control for sample selectivity.

Random Effect Probit

$$L_{it}^{*} = x_{1it}\beta 1 + \delta_i + \varepsilon_{1it} \quad (4)$$

.

Where:

$$L_i = 1\ if L_i^* > 0$$
$$0\ if\ L_i^* \leq 0 \qquad (4.1)$$

Truncation equation

$$Y_{it}^* = x_{2it}\beta 2 + \delta_i + \varepsilon_{2it} \qquad (5)$$

Equations 4 and 5 are the Random Effect Probit and truncation equations respectively, with β1 and β2 as the parameter vectors to be estimated. Rather like the Panel Heckman Selection Model, L_{it}^* is a dichotomous variable which takes a value of 1 if migrant remit and 0 otherwise. $\varepsilon_{1it}\ and \varepsilon_{2it}$ follow a normal distribution N (0,1) and N (0,σε), respectively. δ_i are individual specific time invariant unobservables. Y_{it}^* is the amount of remittances sent or received

Cross-sectional estimation

In modelling the determinants of remittances, it is important to consider the censored nature of the dependent variable. The conventional approach by many cross-sectional studies is to consider censored regression models such as Tobit (see Cox et al. (1998), Gubert (2002) and Amuedo-Dorantes and Pozo (2006)). Formally, it may be presented as follows:

$$R_i^* = x_i\beta + \varepsilon_i \qquad \varepsilon_i \sim N(0, \sigma^2) \qquad (6)$$

Where

$$R_i = \begin{cases} R_i^*, if R_i^* > 0 \\ 0\ if\ R_i^* \leq 0 \end{cases} \qquad (6.1)$$

Substituting equation (6) in (6.1) results in:

$$R_i = \begin{cases} R_i^*, if x_i\beta + \varepsilon_i > 0 \\ 0\ if\ R_i^* \leq 0 \end{cases} \qquad (6.2)$$

Where: R_i^* is the latent dependent variable observed for values greater than 0 and R_i is actual value of remittances. $\boldsymbol{x_i}$ is the vector of the explanatory variables observed for all cases, $\boldsymbol{\beta}$ is the vector of coefficients to be estimated, and ε_i is the error term which is assumed to be independently normally distributed. Given the restrictive assumption underlying the Tobit

model as already discussed in the previous section, Heckman selection model and Two part models have been used by some studies.

Heckman selection

The Heckman selection model is predominantly used to account for selection bias. This bias comes about because migrants that sent positive amount of remittances are not randomly selected from the population. Hence, the selection model developed by Heckman (1976) considers the possibility of such bias by allowing for possible dependence in the two parts of the model. The Heckman model is expressed as follows:

Selection equation

$$T_i^* = x_i\theta + \pi_i \quad (7)$$

.

Where:

$$T_i = 1 \; if T_i^* > 0 \quad 0 \; if \; T_i^* \leq 0 \quad (7.1)$$

Outcome equation

.

$$Y_i = x_i\partial + \varepsilon_i \quad (8)$$

Where the dependent variable T_i^* is a latent variable that is positive when the remitted amount is observed and 0 otherwise. Y_i is the logarithm of the total remittances sent by migrants. $\pi_i$and εi follow the normal distributions N (0,1) and N (0,σε), respectively. In a nutshell, the Heckman selection model comprise two steps. The first step estimate the decision to remit, and then from that, an inverse Mill's ratio is calculated and included as an additional regressor in the outcome equation so that the bias due to the fact that data are missing "non-randomly" is seen to arise from the ordinary problem of omitted variables.

Two-part model

The two-part model is similar to Heckman selection model in that it incorporates an explicit two-stage process that permits different mechanisms to generate the alternative outcomes. However, it does not account for the possibility that those with positive levels of remittances

are not randomly selected from the population, thereby raising selection issues. The Two part model can be expressed as follows:

Selection equation

$$h_i^* = x_{1i}\alpha + \omega_i \quad (9)$$

.

Where:

$$h_i = 1 \; if \; h_i^* > 0 \quad 0 \; if \; h_i^* \leq 0 \quad (9.1)$$

Truncation equation

.

$$Y_i^* = x_{2i}\sigma + \mu_i \quad (10)$$

Equation (9) represents the remittance decision of migrants. The variable h_i^* is a latent variable which determines the decision to remit. x_i is a vector of regressors and β a vector of unknown parameters. Equation (10) represents the remittance level. Again, x_i is a vector of regressors that may include those contained in equation (9) or additional ones. Assuming the errors ω_i, and μ_i are standard normal, consistent estimates of β can be obtained using maximum likelihood estimation (MLE).

Results

Panel estimates

The following tables (3-5) present the estimates from the empirical specifications to model migration and remittance behaviour in South Africa: Random Effect Tobit, Panel Two-Part model and Panel Heckman Selection model. The results of the Random Effect Tobit model are reported in table 3. The coefficients of the explanatory variables such as age of the household, household wealth, household income, household size, gender of the household, whether the head of household is employed are statistically significantly different from zero. In other words these variables, do appear to affect remittance behaviour in South Africa. In contrast, the education level of household members, household shock, do not appear to affect remittance behaviour in South Africa.

Table3: Random effect Tobit estimates

Variables	
HHHage	-0.0108***
	(0.00143)
HH-wealth	0.0626
	(0.0460)
HH-shock	-0.0406
	(0.0582)
Income	0.768***
	(0.0324)
HH-size	-0.0915***
	(0.0119)
HH-empl	-0.432***
	(0.0413)
Courlad	-0.301***
	(0.116)
Indian	-0.378
	(0.310)
White	-0.0293
	(0.254)
Primary	-0.0201
	(0.0602)
Secondary	0.00202
	(0.0721)
Matric	-0.104
	(0.0946)
Tertiary	-0.153
	(0.119)
Gender	0.154***
	(0.0440)
Urban	
Farms	
Log likelihood =	**-3311.1515**
Observations	**2,459**

Notes: Standard Errors in parentheses. * Significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4 presents the Panel Heckman Selection model for the likelihood of receiving remittances and for the amount remittances received. The estimate of the mills ratio, measuring the correlation between the errors of the selection and the outcome equations is negative and statistically significant in the selection-corrected Heckman model – statistic for *Mills ratio* at the bottom of the table. This statistically shows that the two decisions: whether to remit money at all and the decision on the amount of the remittance to remit are correlated, and that ignoring this correlation may lead to biased parameter estimates.

There are similarities between the Heckman Selection model estimates and those of the Random Effect Tobit model. More specifically, we found that most of the variable coefficients (such as age of the household, household income, gender of the household, whether the head of household is employed) that were statistically significant in the Random Effect Tobit model are also significant in the selection equation of the Heckman Selection model, and have the same signs as those in the Random Effect Tobit model. This implies that the results are generally robust to the choice of econometric method used in this study.

However the results of the outcome equation of the Heckman selection model presented in Column 1 of table 4 differ compared to the Random effect Tobit model or the selection equation. For example, while wealth of the household had an insignificant impact on the incidence of remittances and Random effect Tobit it is an important determinant of the *amount* of remittances. Having some form of wealth increases the amount of remittances by 5%. Along the same lines, the household shock which positively and significantly increase the likelihood of receiving remittances in the selection equation, does not significantly impact on the amount of remittances received by the household.

Table 4:Panel Heckman 2-Step estimates

Variables	Outcome Equation	Selection Equation	Marginal effect
HHHage	-0.00730***	-0.007***	-0.00126***
	(0.00177)	(0.000938)	(0.00018)
HH-wealth	0.0539*	0.0210	0.003961
	(0.0322)	(0.0238)	(0.00449)
HH-shock	-0.0206	0.0448*	0.008461*
	(0.0463)	(0.0254)	(0.0048)
Income	0.701***	0.101***	0.019122***
	(0.0323)	(0.0142)	(0.00267)
HH-size	0.0584***	0.0243***	0.004583***
	(0.0143)	(0.00446)	(0.00084)
HH-empl	-0.382***	-0.375***	-0.06922***
	(0.0662)	(0.0291)	(0.00523)
Coloured	-0.266***	-0.108***	-0.01946***
	(0.0781)	(0.0399)	(0.00681)
indian	-0.0496	-0.00144	-0.00027
	(0.281)	(0.116)	(0.02182)
white	-0.0161	-0.361***	-0.05552***
	(0.188)	(0.0706)	(0.00855)
Primary	0.0266	0.0566	0.010844
	(0.0631)	(0.0381)	(0.00741)
Secondary	0.0855	0.0773*	0.014879
	(0.0725)	(0.0428)	(0.00839)
Matric	-0.0699	0.0778	0.015189
	(0.0935)	(0.0515)	(0.01038)
Tertiary	-0.0461	-0.0416	-0.0077
	(0.120)	(0.0616)	(0.01115)
Urban	0.330***	0.227***	0.044454***
	(0.0853)	(0.0496)	(0.01005)
Farms	0.0672	0.111**	0.020863**
	(0.0829)	(0.0472)	(0.00885)
Gender		0.227***	0.042239***
		(0.0263)	(0.00482)
Mils ratio	-.9789362***		
	(.0042861)		
Observations	20,643	20,643	20,643

Notes: Standard Errors in parentheses. * Significant at 10%; ** significant at 5%; *** significant at 1%.

Although our results suggest that migration and remittance decisions are related to each other, for robustness check, we nonetheless present the results based on the Panel Two-Part Model which treats these decisions separately. As expected, the truncated coefficient estimates present a similar pattern in their signs, magnitudes and level of significant as the coefficient estimates and in the Heckman selection model's outcome equation, except for household size variable.

While household size significantly increases the amount of remittances received in the Heckman selection model's outcome equation; it significantly reduces the amount of remittances in the two-part model's truncation equation.

Likewise, the Random Effect Probit coefficient estimates and the related marginal effects display a similar pattern in their signs and magnitudes as the coefficient estimates and marginal effects in the Heckman selection model's participation equation, except for household size. First, household size, which significantly reduces the propensity to receive remittances in the Heckman selection model's participation equation, has no significant effect in the Two-Part Model's Random Effect Probit. Moreover, health shock which significantly reduces the likelihood of receiving remittances in the Heckman selection model's participation equation, is not significant in the Two-Part Model's Random Effect Probit.

Table 5: Panel Cragg's two-part model estimates

Variables	Random effect Probit	Marginal effect	Truncated model
HHHage	-0.00758***	-0.001***	-0.0116***
	(0.00105)	(0.000)	(0.00141)
HH-wealth	0.0283	0.004	0.0541*
	(0.0267)	(0.004)	(0.0312)
HH-shock	0.0494*	0.008*	-0.0270
	(0.0279)	(0.004)	(0.0404)
Income	0.115***	0.018***	0.752***
	(0.0167)	(0.003)	(0.0269)
HH-size	0.00193	0.000	-0.0857***
	(0.00516)	(0.001)	(0.00974)
HH-empl	-0.402***	-0.062***	-0.463***
	(0.0326)	(0.005)	(0.0430)
Coloured	-0.132***	-0.020***	-0.346***
	(0.0443)	(0.006)	(0.0716)
indian	-0.0277	-0.004	-0.140
	(0.126)	(0.019)	(0.284)
white	-0.401***	-0.049***	-0.0935
	(0.0793)	(0.007)	(0.181)
Primary	0.0613	0.010	-0.0151
	(0.0420)	(0.007)	(0.0554)
Secondary	0.0748	0.012	-0.0139
	(0.0472)	(0.008)	(0.0658)
Matric	0.0806	0.013	-0.0937
	(0.0573)	(0.010)	(0.0848)
Tertiary	-0.0482	-0.007	-0.106
	(0.0692)	(0.010)	(0.106)
Gender	0.239***	0.037***	0.143***
	(0.0294)	(0.004)	(0.0396)
Urban	0.260***	0.043***	0.335***
	(0.0549)	(0.009)	(0.0769)
Farms	0.129**	0.020**	0.124
	(0.0521)	(0.0080	(0.0783)
Log pseudolikelihood	**-7237.9854**		**-3146.9064**
Observations	**20,643**	**20,643**	**2,450**

Notes: Standard Errors in parentheses. * Significant at 10%; ** significant at 5%; *** significant at 1%.

Are these results compatible with the theory on remittances? Some of the results are compatible with the theory. For example, we found that the recipient household's wealth increases with remittances. This happens if migrants have bequest motive (Pure self-interest) – more likely to send remittances and send greater sums of remittances if their parents household of origin are

wealthy (e.g. they own land). Similar result was found in other studies such as Lucas & Stark (1985) and Hoddinott (1994).

While most papers find a negative relationship between the household's income and remittances (see Agarwal & Horowitz (2002), Germenji, Beka & Sarris (2001), Osaki (2003)), Random Effect Tobit estimates show a positive relationship between the level of remittances received and households' income. This clearly, contradict a prediction of the altruistic model. Our results are consistent with (Osili, 2007) and Lucas & Stark (1985). This suggests that exchange, investment and inheritance could play a key role in determining remittance flows.

Contrary to the hypothesis of the altruistic model (that altruistic migrants tend to send remittances and greater sums of remittances to larger households or households with a greater dependency ratio), we found that migrants send lower amounts of remittances to larger households. This finding is resonant of that reported by Osaki (2003). The potential reason for such results in the South African context is that social grants such as Child Support Grant could crowd out remittances. It is also likely that in households with many dependants there are other able members to take care of the family.

Contrary to the theoretical prediction that remitters send more remittances to relatively older household head, the Random Effect Tobit results, show that the household age reduces the propensity to remit. There is no supporting evidence of co-insurance contract between migrants and households. According to most studies that included household shocks, shocks of the household such as illness lead to a higher probability of remittances and larger sums of remittances. The results from the Random Effect Tobit suggest that when the households experiences a shock such as illness, they receive less likely to receive remittances, though insignificant.

There are some consistent results that can be drawn from the three analyses (Random Effect Tobit, Panel Heckman selection model and Panel Two part model) regarding motives for remitting. First, neither analysis shows support for pure altruistic motives. They show a positive relationship between the level of remittances received and households' income and wealth. Similarly, all models suggest that the remittance behaviour of migrants is influenced by the size of household, with larger households lowering the probability and the amount of

remittances received. As regards the co-insurance hypothesis, both the Heckman selection model's participation equation and Random Effect Probit of the Two-Part model provides support the co-insurance hypothesis, whereas the outcome equation and the truncation equation do not provide support for it.

Cross sectional estimates

In this section three sets of results are reported in Tables 6-8. The first set present results based on the Tobit model. The second set presents the results obtained by the method of Heckman selection, the third set presents the Two part model. It is worth noting that the results for the three models are relatively similar, with only a few instances where a variable is statistically significant for one but not for the other model. Although the parameter estimates vary depending on specification and estimation method, it is clear that the best specification corresponds to the Heckman model. The reason for this is twofold: First, some regressors of both equations affect the remittance decision slightly differently than the level of remittances. For example, while the variable indicating migrant education has a significant effect on the decision to remit, it has no impact on the amount remitted. These differences in effects lead us away from our analysis the Tobit model. Second, when estimating the Heckman model, there is statistically significance of the Mills ratio. This implies that there is a significant selection bias and therefore we should use an estimation method that takes into account this selection bias. Therefore, in the following, we exploit the results from the Heckman selection model.

The effects of migrant characteristics

The estimation results of the Heckman selection model are presented in table 8. The estimates from this model lead us to the following conclusions: female migrants are significantly more likely to remit, and remit larger amounts than male migrants, consistent with the findings of Connell (2004), Craciun (2006), Phongpaichit (1993) and Osaki (1999). There are exceptions in the literature, however, as shown by Niimi et al. (2008). The probability of remitting decreases with the educational attainments of the migrants, in line with previous findings in the literature (see Funkhousers 1995). It may be reasonably argued that skilled migrants are more likely to remain in the host country relatively longer-term and have a high probability of settling in the host country with their family (Faini 2006).

Interestingly enough, we also found that the probability of remitting depends on the on the mix of transfer means available to migrants. More specifically, migrants are significantly more likely to send money using informal methods such as hand carrying and significantly less likely to use formal methods such as bank transfer. This finding may be reasonably explained by the fact that migrants from rural areas may find banks unapproachable. Quibria (1986) and Quibria and Thant (1988) found that in Bangladesh both lack of banking facilities and unfamiliarity with banking procedures prompted an extensive use of informal methods of sending money.

Lastly, our results suggest that an explicit prior agreement to remit significantly and positively influence the decision to remit. This finding provide support for mutually beneficial contractual arrangements in the form of co-insurance.

Table 6:Tobin estimates

	Coef.	Robust SE
Migrant characteristics		
Married	0.12147023	[0.1214702]
Female	0.22984871	[0.2298487]
Staying with the Spouse	-0.17690778	[-0.1769078]
Agreed to remit	-0.0186112	[-0.0186112]
Secondary education	0.24407594	[0.2440759]
Matric education	0.38611037	[0.3861104]
Income(log)	.20546649*	[0.2054665]
How remit: bank transfer	-0.08076452	[-0.0807645]
How remit: bring it himself	-.30789078*	[-0.3078908]
Reason remit: buy food	-0.12912841	[-0.1291284]
Reason remit essential for survival	-0.16693382	[-0.1669338]
Household Characteristics		
HHHgender	-0.01091965	[-0.0109196]
HHHage	-0.00103414	[-0.0010341]
Household size	-0.01516445	[-0.0151645]
Number of migrants	.32723745*	[0.3272374]
HHassets (land)	0.24285304	[0.242853]
Income deciles		
21-40 percent poorest	.90474529*	[0.9047453]
41-60 percent middle income hhs	.97025974*	[0.9702597]
61-80 percent better off hhs	1.3285687**	[1.328569]
Top best off 20 percent hhs	1.6416726***	[1.641673]

Notes: Standard Errors in parentheses. * Significant at 10%; ** significant at 5%; *** significant at 1%.

The effects of household characteristics

From the theoretical models, remittances are expected to increase with the number of migrants if remittances are driven by bequest motive. In line with this theory we found that the number of migrants are positively related to the amount of remittances received. The literature suggest that each migrants send more money because of greater competition with other migrants from the same household (Hoddinott (1994) and Agarwal and Horowitz(2002)). There are other variables which provide support for self-interest motive: notably households with higher levels of income and land holdings/ assets are significantly more likely to receive remittances than those with lower land holdings. Similar findings can be found in Osili (2004), Hoddinot (1994), de la Briere et al (1997), Chavez (2004) and Schreider and Kneerr (2000).

Suggestive of an altruistic motive, we found that migrant's income has a positive and significant effect on the amount of remittances sent. These results are consistent with existing work on remittances. For example, Lucas and Stark (1985) report a positive relationship between the predicted wage of the migrant and the amount remitted.

Furthermore, the results show that larger family size is associated with higher probability of receiving remittances, although insignificant. This suggest that the needs of the family back home are important to migrants and that migrants behave in an altruistic manner (Lucas and Stark 1985).

Table 7: Cragg's two-part model estimates

	Probit model		Truncated model	
	Marginal Effects	**Robust SE**	**Coef**	**Robust SE**
Migrant characteristics				
Married	0.010008	[0.0821475]	0.122095	[0.150039]
Female	0.4972044**	[0.1889352]	0.227188	[0.147764]
Staying with the Spouse	0.027073]	[0.13014]	-0.18018	[0.122994]
Agreed to remit	0.166364**	[0.0537874]	-0.01493	[0.102439]
Secondary education	-0.4004466*	[0.1629412]	0.23341	[0.181625]
Matric education	-0.7842657**	[0.3017207]	0.381532	[0.2127]
Income(log)	0.056758	[0.0462486]	.20557139*	[0.084623]
How remit: bank transfer	-0.3791634*	[0.1790385]	-0.07832	[0.119888]
How remit: bring it himself	0.615022*	[0.2854139]	-.30848961*	[0.125103]
Reason remit: buy food	-0.14581	[0.1203242]	-0.13364	[0.144027]
Reason remit essential for survival	-0.71876	[-0.7187603]	-0.14843	[0.508769]
Household Characteristics				
HHHgender	0.1027357	[0.095239]	-0.00505	[0.181932]
HHHage	0.0044437	[0.0048711]	-0.00088	[0.00543]
Household size	0.0575761	[0.0336833]	-0.01612	[0.028456]
Number of migrants	0.3017794	[0.2982841]	.32415613*	[0.157008]
HHassets(land)	0.2437689**	[0.062094]	0.244879	[0.149598]
Income deciles				
21-40 percent poorest	0.776079***	[0.1157462]	-1.5860965*	[0.633508]
41-60 percent middle income hhs	0.9361838***	[0.1776762]	-.73937125*	[0.309817]
61-80 percent better off hhs	0.9635672***	[0.1691151]	-.67379544*	[0.273703]
Top best off 20 percent hhs	1.545288***	[0.3602883]	-0.31275	[0.28046]

Notes: Standard Errors in parentheses. * Significant at 10%; ** significant at 5%; *** significant at 1%.

Table 8: Heckman 2-Step estimates

	Selection equation		Outcome equation	
	Marginal Effects	**Robust SE**	**Coef**	**Robust SE**
Migrant characteristics				
Married	0.0100083	[0.0821475]	0.01946563	[0.2051799]
Female	0.4972044**	[0.1889352]	0.42332082*	[0.1859165]
Staying with the Spouse	0.027073]	[0.13014]	-0.0453456	[0.1645485]
Agreed to remit	0.166364**	[0.0537874]	0.05161541	[0.1294421]
Secondary education	-0.4004466*	[0.1629412]	0.11677431	[0.208591]
Matric education	-0.7842657**	[0.3017207]	0.06278128	[0.2577943]
Income(log)	0.0567575	[0.0462486]	.27360553*	[0.1159119]
How remit: bank transfer	-0.3791634*	[0.1790385]	-0.2113545	[0.1602274]
How remit: bring it himself	0.615022*	[0.2854139]	-0.2419434	[0.147107]
Reason remit: buy food	-0.1458144	[0.1203242]	-0.0501042	[0.2214173]
Reason remit essential for survival	-0.7187603	[0.4663795]	-0.3887988	[0.6119452]
Household Characteristics				
HHHgender	0.1027357	[0.095239]	-0.0960743	[0.2025529]
HHHage	0.0044437	[0.0048711]	0.0008199	[0.0084812]
Household size	0.0575761	[0.0336833]	0.04172529	[0.0324425]
Number of migrants	0.3017794	[0.2982841]	0.40179012*	[0.1816833]
HHassets(land)	0.2437689**	[0.062094]	0.20140262	[0.2172662]
Income deciles				
21-40 percent poorest	0.776079***	[0.1157462]		
41-60 percent middle income hhs	0.9361838***	[0.1776762]		
61-80 percent better off hhs	0.9635672***	[0.1691151]		
Top best off 20 percent hhs	1.545288***	[0.3602883]		
R-squared	0.6668		0.4418	
Mills ratio			0.80194159*	[0.389444]

Having explained the results from the matched data from Hlokozi, we assess whether these findings are consistent with the panel Heckman selection model specifications in table 4. More specifically we only highlight their differences and similarities. There are some noticeable differences between the two models. For example, in the panel selection model the variable indicating whether the head of household is a male or female has statistically significant positive impact on both the probability of remitting and the amount remitted, yet it has no effect on the amount of remittances sent in the matched data. Furthermore, the estimated coefficient on the household wealth which was only significant in the outcome equation of the panel Heckman is now significant in the selection equation of the matched data. Different than the panel Heckman selection model, in matched data, household size no longer seems to have any effect on both the probability and amount of remittances sent. This to some extent indicate that in some instances observing either the household in isolation of the other migrant might be insufficient.

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