"Poverty and remittances in South Africa: an instrumental variables analysis"

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Poverty and remittances in South Africa: an instrumental variables analysis

Abstract

The purpose of this paper is to investigate the impact of remittances on poverty in South Africa. This paper uses fixed effects estimation to avoid unobserved heterogeneity. The data used is a panel data covering about 7 305 African households for the period of 2008 to 2010. After controlling for certain variables such as household size, gender, age and other variables our results show that remittances have a strong statistically significant negative impact on poverty. The head count, poverty gap and poverty gap squared decreased by 0.03%, 0.06% and 0.078% respectively.

Introduction

This paper investigates the link between poverty and remittances in South Africa. Although a large number of studies have highlighted the importance of remittances in relation to poverty in South Africa (see, Woolard and Klasen, 2004; Wilson and Ramphele, 1989; Cross, 2003; Carter and May, 1999; Posel, 2001; Posel, 2010; Casale and Posel, 2006), some of these studies have been restricted to static analysis of poverty, because of the cross-sectional nature of the data available. Secondly, lack of data on remittances has constrained researchers from exploring other aspects of remittances. Casale and Posel (2006), for instance, argue that part of the reason why migration has been less explored in South Africa has to do with the fact that there is inadequate and incomplete data to investigate these important issues. By exploiting the panel nature of the National Income Dynamics (NIDS) data set, this paper aims to determine the link between remittances and poverty in South Africa. This study is justified for two main reasons: first, although there has been a slight decline in poverty at a national level from 46% to 44% between 2008 and 2010, the level remains high (Finn et al., 2012). Secondly, none of the above-mentioned studies have used the NIDS data to investigate the link between remittances and poverty in South Africa.

Making use of this newly available longitudinal data (NIDS) has some advantages. It has incorporated a lot of questions which were missing in the previous surveys such as the Labor Force Survey, the October Household Survey and the Income and Expenditure Survey. Many of these surveys (except NIDS) suffer not only in terms of limited migration and remittance content but also suffer from the fact that migration questions tend to vary from one period to another. Thus, the migration and remittance data tend to be very scarce, unreliable and difficult to compare.

This paper is divided into an introduction and five subsections: Section 1 reviews the literature on the effects of remittances on poverty. Section 2 provides a discussion of the econometric methodology employed in the analysis of the empirical data. Section 3 presents the empirical results. The final section provides some concluding remarks.

1. Literature review

There is a large and growing body of literature on the impact of remittances on poverty. Most of the empirical work has been done for Latin American and Asian countries.

Two approaches are used to study the impacts of remittance on poverty: one considers remittances as an exogenous transfer. Here the focus is on how remittances, in total or at the margin, affect the observed level of poverty. The second approach considers remittances as a potential substitute for home earnings. When treated as a potential substitute for home earnings, the focus is on how the observed level of poverty compares with a counterfactual scenario without migration and remittances but including an imputation for the home earnings of migrants had those people stayed and worked at home.

Shaw attempted to distinguish between the studies that treat remittances as an "exogenous transfer" and those that regard them as a "potential substitute". The former studies include the works of Gustafson et al. (1993). For example, Gustafsson and Makonnen (1993) used the data of 7,680 households from a 1986-1987 survey to examine the impact of remittances on poverty and welfare in rural and urban Lesotho. They found that those households depended very much on remittances – which constitute 35% of income for households in Lesotho. The paper tried to simulate how the termination of remittances would affect poverty in Lesotho. They found that holding other things constant, if remittances were set at zero, the poverty headcount index would increase by 26 percent.

The latter studies include the works of Barham and Boucher (1998), Adams (2005), Adams (2006), Brown and Jimenez (2008), Acosta et al. (2008), and Gubert et al. (2010) and others. Adams (2005) examined the relationship between remittances, poverty and inequality in Guatemala with the use of the counterfactual estimation method. Using predictive equations to develop counterfactual income estimates for households with and without remittances, Adams' (2005) findings suggest that both internal and international remittances reduce the depth and severity of poverty in Guatemala. More specifically, Adams (2005) found that remittances had a more significant impact on the poverty gap compared to the poverty headcount. The poverty gap fell from .24 to .23.

Gubert et al. (2010) used a household survey in Mali to compare current poverty rates and inequality levels with counterfactual ones in the absence of migration and remittances. They found that remittances substantially reduce both poverty and inequality for remittance-recipient households. In particular Gubert et al. (2010) found that poverty rates are reduced by 5% while the Gini coefficient is also reduced by about 5%.

Brown and Jimenez (2008) estimated the impact of migration and remittances on income distribution and measures of poverty, using survey data from Fiji and Tonga. They compared the estimated impacts using the counterfactual approach, with the more naive method which treats remittances as an exogenous addition to other sources of household income. They found that in both countries the impact on poverty measures is considerably high when the counterfactual estimation method is used. In Fiji where 43% of the households receive international remittances the headcount and the poverty gap ratios respectively decreased from 49% to 34% and from 17% to 15%. In Tonga where the remittance receivers account for 90% of the sample, the headcount and poverty gap ratios decreased from 62% to 32% and from 27% to 12% respectively.

Adams and Page (2005) examined the impact of international migration and remittances on poverty, using household surveys of 71 developing countries. After controlling for certain variables such as the level of income, income inequality, and geographical region, they find that international remittances have a strong statistically significant negative impact on poverty. A 10 per cent increase in the share of remittances in a country's GDP, lead to a reduction of 1.6 per cent of people living in poverty. Lopez-Cordoba (2004) analyzes the impact of remittances on poverty indicators, using a cross-section of 2 443 Mexican municipalities. His results show that a 1% increase in the proportion of remittance-receiving households in a community leads to a 4.5% decline in the proportion of the population earning less than the minimum wage.

Taylor et al. (2005) examined the effect of the remittances on inequality and poverty using the rural data collected from 14 Mexican states. Using the decomposition method they found that remittances tend increase inequality and that the impact varied from one region to another. For example, in the West-Central Mexico, where migration prevalence is the highest, remittances have an equalising effect whereas in the South-Eastern region where migration is the lowest remittances have the highest an unequalising effect on the margin. The effects of remittances on poverty depended on the type of remittances (i.e. internal or international remittances). Poverty reducing effect is substantially greater for international remittances than for remittances from internal migrants irrespective of the poverty measures used.

Yang and Martinez (2005) investigated effect of remittances on poverty and inequality in the Philippines. They used changes in foreign exchange rates as an instrument. A positive exchange rate shock was associated with rise in remittances which led to a fall in poverty. In regions where remittance increases were higher due to the shock, the fall in poverty rates were also higher. Non-remittance receiving households in such regions also benefited and their chance of being poor decreased suggesting that remittances have indirect effect on the overall population by increasing economic activities. They did not find strong effect on inequality.

In South Africa the importance of remittances particularly in rural areas has been highlighted by various studies. For example in their paper, Woolard and Klasen (2004), find that changes in remittance income alone accounted for around 10% of household transitions into and out of poverty in KwaZulu-Natal province between 1993 and 1998.

Wilson and Ramphele (1989), Cross (2003) found that many Africans send substantial portions of their incomes to their families, which constituted one of the most important sources of income for families left behind. Similarly Adato et al. (2003), Leliveld (1997), James (2001) found that remittances are the major source of income for the recipient households and that they play a very important role.

The literature reviewed in this section mainly focused on the link between poverty and remittances. Despite the conflicting results regarding the nature of the relationship between remittance and poverty, an overwhelming amount of the empirical literature suggests that remittances helps to reduce poverty in many countries.

However the results from these studies should be interpreted cautiously and should not be taken at face value. For example implicit in cross country studies is the assumption that countries are homogeneous. This is misleading because countries have different characteristics that may influence remittances patterns. Country specific studies, on the other hand, allow for richer analyses particularly if is there is already a large volume of existing studies looking at the same issues.

2. Methodology

This section describes the methodology used in this paperto analyze the relationship between remittances and poverty. Here we first discuss the data set and poverty line calculation used in this study and reviews the estimation techniques, and all the steps that will be carried out in order to reach a conclusion concerning the relationship.

2.1. Data set. We exploit the panel nature of the National Income Dynamics (NIDS) data set. This is a longitudinal survey of households in South Africa conducted by the Southern Africa Labor and Development Research Unit (SALDRU) between 2008 and 2010. It began in 2008 with a large nationally representative sample of over 28,000 individuals in 7,300 households across the country. Each year thereafter, those who were present in the initial sample as well as their spouses and children are re-interviewed. The survey continues to be repeated with these same household members every two years. It was commissioned by the South African government through The Presidency's Policy Coordination and Advisory Service, working with all the relevant government departments including Statistics South Africa (the official statistical agency of the government). NIDS focuses on the livelihoods of individuals and households over time. More specifically, it provides information about how households cope with positive or negative shocks, such as a death in the family or an unemployed relative obtaining a job; changes in poverty and well-being; household composition and structure; fertility and mortality; migration; labor market participation and economic activity; human capital formation, health and education; vulnerability and social capital. The reason for choosing the NIDS data is that it provides very rich data on migration and remittance. This has not been the case with many of the national surveys such as Labor Force Survey, October Household Survey and Income and Expenditure Survey. Many of these surveys suffer not only in terms of limited migration and remittance content but also suffer from the fact that migration questions tend vary from one period to another. Ultimately, migration and remittance data tend to be very scarce, unreliable and susceptible to problems of comparability.

2.2. Empirical strategies. In this paper we are going to use four panel data models: pooled ordinary least square (OLS), fixed effects model (FE) and random effects probit (REP). The major attraction of some of these panel data models is that they account for individual characteristics of cross-sectional units (i.e. allows controlling for unobserved differences across households or provinces) and help to minimize the problem of endogeneiety. This endogeneiety problem appears when the model specification is poor due to the left-out of important independent variables (Greene, 1993).

Depending on the nature of the dependent variables, relevant regression models were estimated. The random effects probit was used to investigate how remittances affect the probability of being poor (i.e. the dependent variable is binary). The other panel data models (OLS and FE) were used to measure the impact of remittances on the depth of poverty and the severity of poverty (i.e. dependent variable is continuous).

Econometric analysis was conducted in two steps and the results are presented in Section 4.1. The first step of the econometric analysis used the random effects probit to investigate how remittances affect the probability of being poor (i.e. the dependent variable is binary). Analysis of panel data in which dependent variable has dichotomous outcomes is challenging and requires more sophisticated methods than does panel data with continuous dependent variables. Two main methods may be used to estimate it under these circumstances: fixed-effects *logit or* random-effects probit. A fixed-effects *logit* model might be preferred by some researchers since it allows for correlation between individual-specific time-invariant effects and the regressors. However, the fixed-effects model has the drawback that time-invariable variables (like here e.g. sex variable) cannot be included in the regression. This would lead to the exclusion of several important variables. Some scholars such as Maddala (1987) have argued that it is dangerous to use fixed effect with a data where T is small and N is large, because it leads to inconsistent estimates. Needless to say, that this is a serious limitation to a range of micro-econometric topics of interest such as the one being investigated here.

An alternative would be to estimate random effect probit. Unlike the fixed effect, random effect probit has one major plus which has been highlighted by Maddala (1987): estimates from the random effects probit model are consistent. Given the limitations of fixed effect as outlined above, a random-effects probit model will be employed in this study. Although random-effects probit model was chosen as an appropriate model, its disadvantage is that one

loses information that is intrinsic in all binary outcome models, i.e., collapsing the entire distribution into two values (e.g. poor/non-poor) fails to capture the distribution of observations that fall within those two values.

The second step of the econometric analysis was to enhance random-effects probit model and overcome information loss that is intrinsic in all binary outcome models, by estimating panel data models, of the depth of poverty and the severity of poverty on the same set of explanatory variables as in the random-effect probit regression. Two panel data models used in study are pooled OLS and fixed effects. To measure the impact of remittances on the depth of poverty and the severity of poverty we start by estimating a pooled OLS regression model. The crucial assumption underpinning the pooled OLS regression is that the error term is uncorrelated with any covariates in the regression. This is quite an assumption and if violated we may run into econometric problem – estimates based on it will be biased. To address the heterogeneity bias, we use a fixed effects specification. The major attraction of the fixed effect model is that it accounts for heterogeneity among cross-sectional units.

One potential shortcoming of the both OLS and fixed effect estimators discussed so far is that they assume that the relationship between remittances and poverty are unidirectional and that there is no correlation between individual-specific time-invariant effects and the regressors. This is however quite an assumption, because while remittances may be reducing poverty, poverty may also be affecting the level of remittances being received (reverse causality). In other words, higher poverty levels may lead to higher migration and therefore higher remittances. If indeed this assumption fails OLS and fixed effect estimators will be biased and inconsistent. One way of accounting for possible endogenous regressors is to pursue an instrumental variables approach. Although it's important to account for endogeneity problem, this paper is unable account for it because the data is limited to only two waves – the time dimension is very short.

2.3. Econometric models. This section outlines the econometric models that were used to explore the relationship between remittances and poverty. As already mentioned the random effects probit was used to investigate how remittances affect the probability of being poor (i.e. where the dependent variable is binary). We followed earlier researchers in choosing the explanatory variables. These include the education (EDU), remittances (REM), gender (GEND), age (AGE), household size (HHSIZE) and finally ε is an error term that includes errors in the poverty measure, and α_0 captures specific effects.

The random effects probit model

The random effects probit model is estimated by equation 1 below:

$$Pov_i = \alpha_0 + \alpha_1 REM_i + \alpha_2 HHSIZE_{it} + \alpha_3 GEND_i + {} + \alpha_4 AGE_{it} + \alpha_5 EDU_i + \varepsilon_{it}, \tag{1}$$

where POV_i is the measure of poverty for individual i. In this study three poverty measures are being modelled – the poverty incidence, the depth of poverty and the severity of poverty. The widely used poverty incidence measures the proportion of the population that is poor. This measure is not without its limitation: it does not indicate the extent or the degree of poverty. In view of this limitation many scholars choose to use the poverty gap index which measures the extent to which individuals fall below the poverty line as a proportion of the poverty line. Put it another way, it measures the total amount of income necessary to eradicate poverty. However, one major pitfall of poverty gap measure is that it does not reflect changes in inequality. The squared poverty gap ("poverty severity") index averages the squares of the poverty gaps relative to the poverty line.

Pooled ordinary least square and fixed effects model

To estimate the effect remittances on the poverty gap and poverty severity we use pooled ordinary least square and fixed effects model expressed by equation 2 below:

$$logPov_{it} = \alpha_0 + \alpha_1 logREM_{it} + \alpha_2 logHHSIZE_{it} + \alpha_3 GEND_i + {} + \alpha_4 logAGE_{it} + \alpha_5 \log EDU_{it} + \varepsilon_{it}, \tag{2}$$

where Pov is the measure of poverty for households i at time t, α_0 is a fixed effect reflecting differences between households, α_1 is the elasticity of poverty with respect to remittances, α_2 is the elasticity of poverty with respect to household size, α_4 is the elasticity of poverty with respect to age, α_5 is the elasticity of poverty with respect to education, we also control for gender and marital status.

3. The empirical results

3.1. Random-effects probit, pooled OLS and fixed effects. The section reports the results based on the three different techniques: random effect probit, fixed effects and pooled OLS. The dependent variable in all equations is one of the three measures of poverty: poverty incidence, the depth of poverty and the severity of poverty. The random effect probit estimates of equation (1) are presented in Table 1 below. Many of the estimated parameters have the

expected signs. For example, remittances, education and gender (male) have a negative relationship with the poverty status i.e. the probability of the household becoming poor decreases as these variables increase. On the other hand, household size has a positive influence on the poverty status of the household. This means that as this variable increases the probability of a household to be poor increases. The household size regression coefficient has positive sign and statistically significant; implying that as the household size increases by one individual, the probability of the household to be poor increases by 0.254. Our coefficient of interest remittances significantly decreases the likelihood of household individual poverty by about .0355 percentage points. Education also significantly but weakly decreases the likelihood of falling in poverty.

Table 1. Random-effects probit estimates of the effects of remittances on poverty (headcount ratio) 2008-2010

	Coefficient	*P*-values
Remittances	-.0355	0.000
HHsize	.254	0.000
HH-age	-.031	0.000
HH-unempl	1.044	0.000
HH-married	-.219	0.040
HH-Female	.263	0.000
Coloured	-.371	0.002
Indian	-1.22	0.000
White	-1.395	0.000
Own cell phone	-.226	0.000
Tribal Auth	.254	0.003

Urban Formal	-.226	0.015
Urban Informal	-.021	0.463
Eastern Cape	.393	0.002
Northern Cape	.212	0.943
Free State	.473	0.003
KwaZulu-Natal	.064	0.146
North West	.010	0.923
Gauteng	-.051	0.709
Mpumalanga	-.089	0.843
Limpopo	.304	0.006
Primary	-.128	0.050
Secondary	-.449	0.000
Matric	-.977	0.000
Tertiary	-1.491	0.000

Pooled OLS and fixed effects estimates of equation (2) are presented in Table 2 and 3 below. Given the fact that most of the variables are estimated in log terms, the results can be interpreted as elasticities of poverty with respect to those relevant variables. We first focus on the pooled OLS estimates. As expected the coefficients of our variable of interest (i.e. remittances), present (negative) and significant estimate on poverty. These OLS estimates are similar for both dependent variables (i.e. poverty gap and poverty gap squared). A closer look at the poverty elasticities with respect to education (EDU), age (AGE), household size (HHSIZE), reveals that they are of the expected signs, irrespective of the dependent variable. More specifically, whether the dependent variable is poverty gap and poverty gap squared, household size present positive and significant estimate on poverty whereas education and age, present negative and significant estimates on poverty.

Table 2. Pooled OLS, fixed effects estimates of the effects of remittances on poverty gap, 2008-2010

	Pooled OLS		Fixed effects model	
	Poverty gap	*P*-values	Poverty gap	*P*-values gap
Remittances	-.053	0.000	-.068	0.000
HHsize	.0156	0.000	.010	0.000
HH-age	-.002	0.000	-.006	0.000
HH-unempl	.078	0.000	.082	0.000
HH-married	-.012	0.000	-.011	0.358
HH-Female	.014	0.000	-.053	0.759
Coloured	-.020	0.000		
Indian	-.025	0.050		
White	.018	0.008		
Own cell phone	-.025	0.000	-.022	0.000
Tribal Auth	.034	0.000	-.051	0.181
Urban Formal	-.0003	0.943	-.042	0.140
Urban Informal	.019	0.004	.060	0.170
Eastern Cape	.029	0.000	.143	0.225
Northern Cape	.006	0.322	-.054	0.704
Free State	.025	0.001	.028	0.849
KwaZulu-Natal	.005	0.473	.080	0.551
North West	-.002	0.816	-.120	0.413
Gauteng	.006	0.326	.007	0.960
Mpumalanga	.001	0.860	-.005	0.971

Table 2 (cont.). Pooled OLS, fixed effects estimates of the effects of remittances on poverty gap, 2008-2010

	Pooled OLS		Fixed effects model	
	Poverty gap	*P*-values	Poverty gap	*P*-values gap
Limpopo	.012	0.104	-.042	0.778
Primary	-.010	0.008	-.016	0.369
Secondary	-.026	0.000	-.037	0.114
Matric	-.049	0.000	-.045	0.132
Tertiary	-.049	0.000	-.033	0.279

Table 3. Pooled OLS, fixed effects estimates of the effects of remittances on poverty gap squared, 2008-2010

	Pooled OLS		Fixed effects model	
	Poverty gap SQ	*P*-values	Poverty gap SQ	*P*-values
Remittances	-.078	0.000	-.103	0.000
HHsize	.027	0.000	.019	0.000
HH-age	-.004	0.000	-.006	0.002
HH-unempl	.120	0.000	.123	0.000
HH-married	-.021	0.000	-.017	0.357
HH-Female	.027	0.000	-.213	0.393
Coloured	-.036	0.000		
Indian	-.044	0.017		
White	.027	0.007		
Own cell phone	-.035	0.000	.008	0.001
Tribal Auth	.057	0.000	.055	0.964
Urban Formal	-.003	0.564	.041	0.195
Urban Informal	.024	0.012	.063	0.078
Eastern Cape	.047	0.000	.169	0.475
Northern Cape	.014	0.108	.205	0.602
Free State	.040	0.000	.218	0.611
KwaZulu-Natal	.011	0.229	.192	0.475
North West	-.001	0.869	.211	0.756
Gauteng	.012	0.191	.201	0.523
Mpumalanga	.002	0.814	.222	0.687
Limpopo	.023	0.029	.217	0.808
Primary	-.014	0.013	.006	0.828
Secondary	-.042	0.000	-.029	0.401
Matric	-.082	0.000	-.043	0.325
Tertiary	-.082	0.000	-.022	0.617

Recall that the assumption underpinning equation of pooled OLS regression is that the error term is uncorrelated with any covariates in the regression and the fact that it treats the crossectional units as homogenous. This is a dangerous assumption to make and if violated we may run into econometric problem – estimates based on equation (1) will be biased. To address the heterogeneity bias, we used a fixed effects specification. The fixed effects estimates of equation (2) are presented in column 4 of Table 2 and 3 for the two measures of poverty (i.e. poverty gap and poverty gap squared). The remittance variable again has a negative and statistically significant impact on both poverty measures: poverty gap, and squared poverty gap. The household size variable has a positive and statistically significant impact on both poverty measures. It is interesting to observe that ignoring the panel nature of the data (as in OLS) will result in inappropriate estimates. This is because a quick glance at the results shows that the fixed effect results are not only significant but also have stronger magnitudes compared to OLS results. Thus we conclude that our results that remittances reduce poverty in South Africa are robust to the measurement of poverty.

Conclusion

The primary objective of this study was to address the question of how remittances impact on poverty in South Africa. In estimating the impact of remittances in South Africa we used Wave 1&2 of the National Income Dynamics datasets. The poverty line of R502 was used in this study. Our results show that, a 1% increase in remittances reduces the head count, poverty gap and poverty gap squared by 0.03%, 0.06% and 0.078% respectively, ceteris paribus. Our results are robust to the measurement of poverty (headcount, poverty gap, poverty gap squared), as well as the estimation method (Random effect probit, fixed effects and pooled OLS).

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