

Remittances, consumption patterns and household investment: The case of Zimbabwe

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ABSTRACT

Using nationally representative household survey data on Zimbabwe we utilize propensity score matching and multinomial treatment regression approaches to investigate the impact of domestic and international remittances on household expenditure. The results from the propensity score matching approach suggest that remittances, in general, tend to stimulate all categories of household expenditure (food, durables, education and health), indicating that remittances tend to reduce liquidity constraints faced by households in Zimbabwe. We find that domestic remittances increased expenditure on food and healthcare emergencies but had no impact on durables and education. International remittances, on the other hand, stimulated the expenditure on all expenditure categories (including on durables and education). Furthermore, households that received international remittances witnessed larger increases in all categories of expenditure, compared to domestic recipients. This suggests that international remittances are important in not only reducing household liquidity constraints but in stimulating expenditure on important household investment in durables and education. We also found corroborating evidence when using the robustness checks from the multinomial treatment regression approach. That domestic remittances largely stimulate expenditure on food and healthcare emergencies while international remittances stimulate expenditure on all household categories indicates that household treat domestic and international remittances differently. This suggests that households perhaps consider domestic remittances to be compensatory and international remittances to be transitory income.

1. INTRODUCTION

When it comes to international financial flows to developing countries, researchers have tended to give greater attention to foreign direct investment (FDI), portfolio investment

and official development assistance (ODA). Since the late 1990s, development economists have however started paying more attention to remittances sent home by international migrants (Yang, 2011). This is because international remittances to developing countries have significantly increased, sometimes exceeding ODA and sometimes even approaching the magnitudes of FDI.¹ Given the large magnitudes of remittances and also the fact that they are a more stable financial resource (compared to FDI, for example) researchers have expended more research effort (by conducting both macro and micro level studies) to better understand the drivers and impact of international remittances.²

Important questions have been raised in the literature regarding the household usage of remittances (Adams and Cuecuecha, 2010, 2013). For example, how are remittances used by households in the migrant source countries and what is the impact of such remittances on poverty? There is no consensus on the impact of international remittances: findings on the usage and impact of remittances tend to be either optimistic or pessimistic. For example, Chami et al. (2003)³ argue that a significant proportion of remittances are used to finance status-oriented consumption goods and, when invested, the remittances are invested inefficiently.⁴ This view is however challenged by Adams and Cuecuecha (2010, 2013), Yang (2008), Randazzo and Piracha (2019) and Osili (2004), who argue that households that receive remittances tend to use a significant proportion of them on household investment goods such as health and housing.⁵ In fact, Adams and Cuecuecha (2010) found that households receiving international remittances tend to spend less on food consumption and more on education and housing.

In the extant literature it is argued that the household is the main decision unit that determines how remittances are used (Randazzo and Piracha, 2019). The impact of remittances on household expenditure, or even their developmental role, depends on how remittances are perceived by the households: as transitory income, compensatory income or as any other income type. When they view remittances as transitory income, households tend to invest a significant amount more productively, investing in education, health and physical capital. However, when they view it as compensatory income, households tend

1 According to the World Bank's World Development Indicators database, in 2018 international remittances to developing countries amounted to more than USD500 billion and Zimbabwe received almost USD2 billion from international remittances.

2 Examples of macro studies include Gupta et al. (2009). Examples of micro studies include: Adams and Cuecuecha (2010, 2013) and Acosta (2011).

3 Also see for Entzinger (1985) and Lewis (1986) for similar sentiments.

4 Indeed there is some anecdotal evidence at the household level on the misuse of international remittances in Zimbabwe. For example, a migrant's remittances sent home to build a house being used for consumption purposes.

5 Adams and Cuecuecha (2010) investigated the impact of remittances on household expenditure and investment in Guatemala. Adams and Cuecuecha (2013) investigated the impact of remittances on household investment and poverty in Ghana. Yang (2008) investigated the impact of remittances on household investment in Philippines. Osili (2004) investigated the impact of remittances on housing investment in Nigeria.

to use remittances to finance recurrent expenditure rather than productive investments (Adams and Cuecuecha, 2013). When they perceive it like any other income type there is no expectation that households will use remittances differently.

The main objective of this study is to investigate the usage and impact of remittances in Zimbabwe. The country is an interesting case study for a number of reasons. First, the country's economic and political instability (since the early 2000s) drove a large number of Zimbabweans out of the country, with most of them migrating to South Africa, the United Kingdom and the US.⁶ Given that a large number of Zimbabweans in South Africa may have entered the country illegally and may thus be unrecorded it is difficult to know the exact number that have left the country since 2000. However, data (which can only be used as indicative) from the Global Migration online database shows that the number of Zimbabweans residing outside the country increased by about 2% per year (in 1990-2000) to 5% per year (in 2000-2017). Most of these individuals maintain social and economic ties with their families back home. They therefore send money back home. Whilst some remittances may be sent for consumption purposes, or are discretionary, others may be for a specific purpose⁷ (for example, to build a house, to send a child to school, for the medical care of a relative, etc). The World Bank online database has information on remittances covering the period 1980-1994 and 2009-2019. The information on remittances for the period 1980-1994 shows that remittances to Zimbabwe averaged about USD10 million per year. Figure 1 shows the amount of remittances to Zimbabwe for the period 2009-2019.⁸ It shows that, compared to the 1980s and early 1990s, remittances in 2009 (and beyond) had increased to billions (USD1.2 billion in 2009). In 2012 the country received over USD2 billion in remittances (13.17% of the country's GDP). The annual average amount of remittances during the 2009-2019 period was USD1.78 billion.

Second, most studies on remittances have focused on large remittance recipients like India, China, Mexico and the Philippines. Although African countries such as Nigeria, Senegal and Ghana have received some attention, smaller countries like Zimbabwe have received little. This may be due to data unavailability.⁹ Given that the structure of the Zimbabwean economy is quite different from, say, Mexico or the Philippines, it is important

6 Given that a large number of Zimbabweans in South Africa may have entered the country illegally and may thus be unrecorded it is difficult to know the exact number of Zimbabwean that left the country since 2000. However, data (which can only be used as indicative) from the Global Migration online database shows that the number of Zimbabweans residing outside the country increased by about 2% per year (during the period 1990to 2000) and 5% per year (during the period 2000-2017).

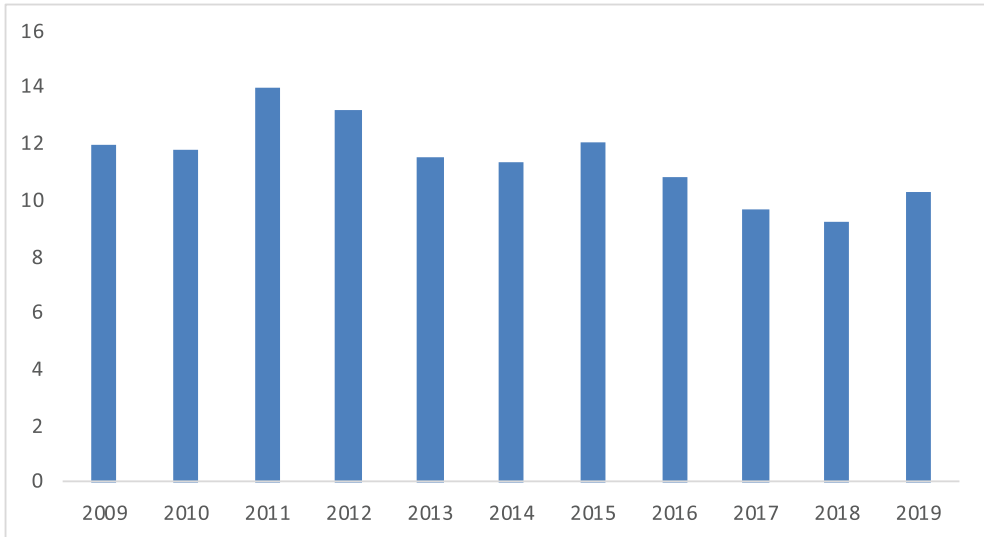
7 According to Yang (2011) another important question is whether migrants have or desire greater control over how family members back home use the remittances they receive.

8 See also Table 1 in the appendix.

9 The study uses survey data from the Poverty Income, Consumption and Expenditure Surveys PIC-ES), which were conducted in 2011 and 2017. The PICES is one of the few data sources with a module on remittances.

to investigate how Zimbabwean households perceive and spend remittances. Also, given that data distinguish between internal and international remittances, it is important to assess if the two are spent differently and if they have different impacts.

Figure 1: Remittances in Zimbabwe (2009 – 2019)



Source: WDI Online Database

For policy makers, understanding how remittances are spent is important. If it is true that they are used inefficiently or are for conspicuous consumption, it may be necessary to come up with incentives to encourage better usage. Given the many Zimbabweans who left the country since the early 2000s, it is important to have a clearer understanding of not only the amount of resources being remitted but the impact of such remittances on the welfare of those left behind. For examples, are the remittances being considered as transitory income and thus being used for capital investments into education, health or housing? Or are they being perceived as compensatory income and thus being used to finance recurrent consumption rather than investment goods? Or do households simply view remittances like any other income and therefore do not give them any special treatment? Understanding all these issues will help the government craft the right policies to ensure efficient remittance usage, enhancing the impact of remittances on the welfare of its citizens and harnessing them for development.

It also is important to note that the Zimbabwean government has since independence in 1980 invested significantly into education. A large number of those who left the country may have benefitted from that investment. Although the brain drain may be considered harmful to the country, the inflows of remittances from those in the diaspora can help the

government revitalise the education and health sectors, whose infrastructure has been deteriorating for quite some time.

Given the above, the main objective of the study is to assess the impact of remittances on household consumption patterns and household investment. More specifically, it seeks to investigate: (a) if the consumption patterns of households receiving remittances are different to those not receiving remittances; (b) if household investment (into health, education and housing) of those receiving remittances are different from those not receiving remittances; (c) if the impact of internal remittances differs from that of international remittances, and (d) to suggest policy implications emanating from the study. The study utilises household level survey data from the 2011 and 2017 Poverty Income Consumption and Expenditure Survey (PICES) conducted by Zimbabwe National Statistics Agency (ZimStat).

The remainder of the paper is organised as follows. Section 2 presents the relevant extant literature. In section 3 the data used for the study and the methodology are discussed. Section 4 presents the empirical results, followed by a number of diagnostics tests. In section 5 robust checks are conducted. Section 6, concludes the study, and section 7 presents policy recommendations.

2. LITERATURE REVIEW

There is a dearth of literature on micro-based studies that investigate the impact of remittances in Zimbabwe. Unlike the current study, which uses nationally representative survey data, most studies focus on particular regions; those that cover the entire country are mostly descriptive in nature and therefore do not adequately assess the impact of remittances on poverty or household expenditure. Examples include Nzima et al. (2017), Ncube and Gomez (2011) and Tevera and Chikanda (2008). Nzima et al. (2017) used survey data covering people from Zimbabwe's Tsholotsho district as well as Zimbabweans based in South Africa to investigate the usage of remittances in Tsholotsho. They found that the majority have been used to cushion family members from poverty, while a little has been used for investments and savings. Assessments of the remitting patterns of emigrant Zimbabwean medical doctors found that they were sending remittances to their families to cushion them against the harsh economic climate in the country. Ncube and Gomez (2011) also use survey data covering Tsholotsho District in Zimbabwe to explore the link between remittances and local development. They found that households used some of their remittances to acquire farming equipment and tended to invest mostly in traditional agricultural activities. Mugumisi (2014) used survey data to investigate the reasons why Zimbabweans based in South Africa and Botswana send remittances back home. He found the following as the major motives: altruism, self-interest, implicit family agreements, and portfolio investment. Using 2005 household-level survey data covering 723 households

in Zimbabwe, Tevera and Chikanda (2008) explore the impact of remittances on poverty. They argue that remittances reduced vulnerability to hunger, ill-health and poverty in both rural and urban households. The study shows that remittances are mostly used for the consumption of food, school fees, medical expenses, and building. A small number of households have been able to use their remittances to increase income through the purchase and sale of goods or in investment in transportation or farming.

From the above analysis, we note that the studies largely look at the motivation to remit and not on the relationship between remittances and household consumption. This study seeks to fill this gap in the literature. This study especially follows the approaches used by Adams and Cuecuecha, (2010, 2013), Acosta (2011), Randazzo and Piracha (2019), and Cox-Edwards and Rodriguez-Oreggia (2009). Randazzo and Piracha (2019) use nationally representative survey data from Senegal, as well as a combination of the propensity score matching and multinomial treatment regression approaches, to investigate the impact of remittances on household expenditure. They found that remittances stimulate household expenditure but domestic and international remittances were not treated differently by the households. Adams and Cuecuecha (2013) use the two-stage multinomial selection model to investigate the impact of remittances in Ghana, finding that remittances tend to reduce poverty. More importantly, they found that remittances stimulate expenditure on health, education and housing. These results from Ghana corroborate findings by Adams and Cuecuecha (2010) on Guatemala. Cox-Edwards and Rodriguez-Oreggia (2009) however found that remittances did not really affect labour force participation rates in Mexico. Acosta (2011) used survey data from El-Salvador and found that remittances had no effect on schooling, even though it tended to reduce the extent of child labour. These mixed results indicate that the debate on the impact of remittances remains unsettled, and that more country-level studies that adequately capture country specific factors need to be conducted.

3. METHODOLOGY AND DATA

3.1 Methodology

The objective of this study is to investigate the impact of remittances on household expenditure. There are two main problems that may affect the study results: selection bias and simultaneity (Adams and Cuecuecha, 2013). First, migration and sending remittances are selective processes (Randazzo and Piracha, 2019). The households receiving remittances and those not receiving remittances may be systematically different. For example, households receiving remittances may be more motivated and less risk averse. Second, choices made by households that lead them to being poor may be correlated to their choice of whether or not to receive remittances (Adams and Cuecuecha, 2013). An ordinary least squares regression approach may therefore fail to establish the causal

relationship being investigated.

To mitigate the above identification challenges we use two main identification strategies, i.e. propensity score matching and multinomial treatment regression (MTR) approaches to investigate the usage and impact of remittances. These approaches have been used by a number of authors in the literature. See for example, Adams and Cuenca (2013) on Ghana, Adams and Cuenca (2010) on Guatemala, McKenzie (2006) on Mexico, Randazzo and Piracha (2019) on Senegal, and Acosta (2011) on El Salvador.

The Propensity Score Matching Approach

This study uses the propensity score matching (PSM) approach to investigate the impact of remittances on household expenditure. Whilst there are a variety of other quasi-experimental approaches,¹⁰ the PSM approach seems to be appropriate given the data at our disposal. For example, it works quite well even when used with cross-sectional data.¹¹ Like any other quasi-experimental approach the PSM estimator seeks to solve a missing data problem. In this particular case the missing data problem arises from the fact that we only observe households that receive remittances but we do not know what their expenditure would have been if they did not receive remittances (counterfactual). That is, we cannot at the same time observe the same households with and without the remittances. Properly matching households receiving remittances and those not receiving remittances will help create the counterfactual. In order to match the remittance recipients to non-recipients we start by running a probit regression. The equation for the probit regression is stated as follows:

$$P_s = f(\text{household characteristics, regional characteristics}) \dots \dots \dots (1)$$

Where P_s is a dummy variable taking a value of 1 if a household received a certain type of remittances and 0 if not. Where s stands for the type of remittance received; we classify households into three mutually exclusive states: not receiving any remittances, receiving internal remittances only, and receiving international remittances only. Another possible state is the combined one where a household receives both internal and international remittances. We will therefore conduct the matching based on these different states. Specifically, we match households that receive internal remittances only to households that do not receive remittances to estimate the impact of domestic remittances. Similarly, we estimate the impact of international remittances by matching households that receive international remittances to non-recipient households. Lastly, we will combine the internal and international remittance recipients to estimate the impact of remittances in general. Working with these different categories of remittances will help us investigate if these two types of remittances have different effects on household expenditure.

If we consider a remittance recipient to be a treated unit and therefore a programme

¹⁰ Examples include the regression discontinuity, the difference-in-difference and the instrumental variable approaches.

¹¹ The PICES data used for the analysis is cross-sectional.

participant – as in impact evaluation literature – we can then state that being selected into the programme may be a function of a number of characteristics. These include household and regional characteristics, and include household wealth level, household size, age, gender, ethnicity, educational level of household head, household farm/plot size, rural/urban dummy, and provincial regional dummies. The following equation shows the probit/logit regression used to estimate the propensity score:

$$\begin{aligned}
 \text{Prob}(Y=\text{receive remittances}) = & f(\text{education level of HH, age of HH, gender of HH, ethnicity} \\
 & \text{of HH, household size, size of land owned by household, whether household} \\
 & \text{has children below age 5, number of adults in the household, urban/rural} \\
 & \text{dummy, provincial dummy}) \dots \dots \dots (2)
 \end{aligned}$$

When selecting the covariates to be included in the above model we especially need those variables that are likely to affect the probability of receiving the remittances. That is, we select characteristics that are not affected by the outcome but do affect participation (receiving remittances). For example, in our case we do not expect variables like age, gender, ethnicity, rural/urban dummy, provincial dummy, etc., to be affected by the status of being a remittance recipient. After selecting the right characteristics, we run the above regression and estimate the propensity score. The estimated propensity scores give us the probability of receiving remittances. The propensity scores capture the combined effects of the likelihood of receiving remittances thereby avoiding the curse of dimensionality.

The next step is to use the scores to match households receiving remittances with those not receiving remittances. Households receiving remittances that have propensity scores closer to those that are not receiving, are matched. The expectation is that, if matching was done correctly, the expenditure patterns observed for non-remittance recipients is what we would have observed for the recipients had they not received remittances. That is, the matched households not receiving the remittances are the counterfactual for the households receiving remittances. In the literature, several matching algorithms are used to conduct the matching. They include: the nearest neighbour, radius or caliper estimator, stratified or interval estimator and kernel method.

With the *nearest neighbour* matching estimator, for each remittance recipient we find a non-recipient household with the closest propensity score and match the two. The difference in outcomes for each matched pair is calculated, with the ATT being the average of the estimated differences (Randazzo and Piracha, 2019). One weakness of the nearest neighbour estimator is that it can easily yield bad matches, particularly if the difference between the propensity scores for a treated household and its closest untreated counterpart is high. To avoid this problem one can use the *caliper matching* estimator, which imposes a maximum distance between two neighbours being matched: a neighbour lying outside the threshold is excluded and only those falling within the caliper are used (Dehejia and Wahba, 2002). We will use the commonly used thresholds:

0.01, and 0.05. The choice of the threshold must take into account the fact that a very low threshold, while giving us the best matches, may come with very few such matches while a very high threshold, while giving us a high number of matches, comes with a large number of bad matches. The *interval matching* estimator divides the common support region into intervals and calculates the programme impact within each interval. The weighted average of these impacts is then the programme impact (Shahidur et al., 2010). The *kernel matching* estimator is a non-parametric estimator which matches a treated unit with a weighted average of all untreated units, with the closest units receiving more weight (ibid).

Each of the above matching estimators has its advantages and drawbacks. None of them can be considered superior to the other. One weakness of the propensity score matching approach is that there is no guidance in the literature on the choice of matching estimators. The superiority of a given matching estimator may therefore depend on the context and data being used (Randazzo and Piracha, 2019). We therefore conducted the matching using the following matching estimators for robustness: the nearest neighbour, caliper and kernel estimators. Depending on the results emanating from the matching it is also possible to test and ultimately select the best estimator among those used, à la the Hausmann test, when choosing between random effects and fixed effects model. The procedure entails using only those households that did not receive any remittances. We will start by estimating their propensity score, randomly assign some into a treatment group and some into a control group, conduct some matching using all the above matching estimators and then estimate an impact. Given that we are only using the control group (that is, those who are not receiving remittances) the expectation is that there should not be a significant difference in the household expenditure for those assigned into the 'control' and 'treatment' groups (i.e. no impact). The best matching estimator therefore should be the estimator that tells us that there is no difference in the outcome (household expenditure in this case) between these two groups that are essentially the same.

For credibility, the PSM approach requires two important assumptions to hold. These are the overlap condition and the conditional independence assumption (CIA). The common support or overlap condition ensures that there is sufficient overlap in characteristics of the treated and untreated units to find adequate matches. Those that fall outside the common support region are dropped and only those households (in the treatment and control groups – i.e. those receiving and not receiving remittances) falling in the common support region will be used for the analysis. The CIA states that the potential outcomes must, after controlling for the observable characteristics, be independent of treatment status. This means after controlling for the household and regional characteristics, the treatment assignment (i.e. whether one is receiving remittances or not) would be as good as random. This reduces selection bias and thus helps in creating a more credible control group or counterfactual. It must be noted that whilst one can check for the existence of

common support, the CIA cannot be tested for. A clear understanding of the context being studied is important for one to be sure that indeed the CIA is less likely to be violated.

Weaknesses of the Propensity Score Matching Approach

Like any other estimator the propensity score matching approach has a number of weaknesses. Firstly, the CIA condition may fail to hold. This may then affect the randomness of treatment assignment. Secondly, the PSM approach assumes that participants and non-participants are matched based on observable characteristics. It is however possible that unobservable characteristics such as the household head's innate ability, level of risk aversion, or the household's commitment level, may affect participation,¹² creating or worsening the selection bias problem as the treatment and control group may be systematically different due to the unobservable characteristics.¹³ Thirdly, the PSM estimator, which is also highly data-hungry, may be affected by the absence of common support. Some of the above weaknesses can be corrected by, for example, combining the PSM and difference-in-difference approaches. We however do not have adequate data to use this particular approach.

The Multinomial Treatment Regression (MTR) Approach

Even though the PSM approach described above helps create a counterfactual and a resultant impact, it still has the disadvantage of failing to control for unobservable characteristics. Households receiving remittances may therefore still be systematically different from those not receiving. This may affect both the migration-remit decision as well as the outcome. To reduce the selection bias we use the multinomial treatment regression approach (with and without instrumental variables).¹⁴ But it must be noted that according to McKenzie and Sasin (2007), in the absence of a good IV the PSM, compared to other quasi-experimental approaches, performs quite well and may even be better than a poor instrument (Randazzo and Piracha, 2019).

The MTR approach was proposed by Deb and Tirivedi (2006) and Deb (2009) and has been used by a number of authors including Randazzo and Piracha (2019) and Adams and Cuecuecha (2010, 2013). The approach is made up of two main components, an outcome equation and a selection equation, which are linked by observed and unobserved characteristics (Randazzo and Piracha, 2019). For our purposes, the outcome variable in the model is household expenditure or budget share and the treatment variable is remittance receiving status. The remittance receiving status has three categories: no remittances received, domestic remittances received, and international remittances

¹² And also outcomes that are being evaluated. For example, the choice of expenditures level.

¹³ Unfortunately, the presence or absence of selection bias cannot be tested.

¹⁴ Our approach is therefore to use the PSM approach, the MTR approach without IVs (as done in Randazzo and Piracha, 2019) and the MTR approach with IVs (as done in Adams and Cuecuecha, 2010, 2013).

received. The selection equation estimates the probability of a given household receiving a certain category of remittance. Following Randazzo and Piracha (2019) and Adams and Cuecuecha (2013), the probability that a given household receives a certain remittance type is given by:

$$Pr (REM_{dj} | z_j l_j) = \frac{\exp (z'_i \alpha_j + \delta_d l_{jd})}{1 + \sum_{k=1}^p \exp (z'_j \alpha_k + \delta_d l_{jk})} \dots\dots\dots(3)$$

Where REM_{dj} is a dummy variable capturing each of the remittance statuses. The probability depends on household characteristics captured by the variable Z_j and a latent factor l_{jd} (Randazzo and Piracha, 2019). The latent variable l_{jd} captures the unobserved household characteristics affecting the probability of receiving remittances. More specifically the model to be estimated in first stage is:

*Prob(Y=receive remittances) = f(education level of HH, age of HH, gender of HH, ethnicity of HH, household size, size of land owned by household, whether household has children below age 5, number of adults in the household, **instrumental variables**, urban/rural dummy, provincial dummy)*

.....(4)

Where *HH* stands for household head.

Because we are trying to estimate the expenditure share we use the following Working-Leser model:

$$Y_{ij} = \alpha_i + \beta_i \log EXP_j + \gamma_i X_j + \theta_i REM_{dj} + \lambda_d l_{jd} + \varepsilon_{ij} \dots\dots\dots(5)$$

Where Y_{ij} stands for household j 's budget share in good i . The budget shares to be used are budget shares of: durables, food, health and education. To estimate the impact of remittances on food budget share we run equation (5) using the food budget share as the dependent variable. To estimate the impact of remittances on the education budget share, we run equation (5) using the education budget share as the dependent variable.¹⁵ The variable X_j stands for household characteristics, REM_{dj} is a dummy variable capturing each of the remittance statuses. For example, if for household j , the impact being assessed is the impact of domestic remittances, REM_{dj} would take a value of 1 if household received remittances and 0 if not. This is then repeated for the other mutually exclusive remittance status categories. EXP stands for total household expenditure, θ_i is the parameter of interest. It shows the effect of the different categories of remittances on household expenditure or budget share. The variable l_{jd} represents the selection correction variable, and shows us the extent of the correlation between unobservable remittances determinants and the household expenditure or budget share.

Depending on what the household spends its money on, household expenditure will be categorised into the following categories: food, health, education, durables and

¹⁵ A similar procedure is followed for the rest of the budget shares.

other. The MTR model is estimated using STATA 16's 'mtreatreg' command.¹⁶ We start by estimating the above framework in the absence of instrumental variables and then, for robustness, add instrumental variables. Randazoo and Piracha (2019) estimate their model without the instrumental variable and simply rely on the nonlinear functional form of the remittance status equation.

We use two instrumental variables or exclusion restrictions to address the problem of endogeneity. The instrumental variables are distance to the post office and distance to growth points. In Zimbabwe post offices have traditionally been used as points to receive registered mail and money, particularly by those in the rural areas.¹⁷ For example, money sent to a rural household may be sent to a relative residing in urban areas, who then forwards it, through the post office located in the rural areas, to its final recipient. The growth points are also another channel used to send money to those in rural areas: money from the diaspora is received in towns and then get forwarded to the rural recipients for collection at a growth point. The shorter the distance to the growth point or post office the cheaper or easier it is to send remittances. So the distance to the post office or growth point is related to the probability of receiving remittances. Distance to the post office is unlikely to influence household expenditure,¹⁸ but it is possible that those closer to growth points may spend more than those staying far away. We therefore think that distance to the post office may be a better instrument than distance to growth points. We however use both and interpret our results with that weakness in mind.

3.2 Data used for the study

This study uses the data from the Poverty Income Consumption and Expenditure Survey (PICES) for 2011 and 2017. The 2017 survey contains more than 30,000 households and the 2011/12 PICES contains 29,765 households. The nationally representative surveys contain information on aspects of living conditions in Zimbabwe, including consumption expenditure, household income, informal sector contribution, poverty and inequality issues and social welfare interventions by the government. More important for this study, the surveys also contain information on income transfers within and outside the country. They include an international migration module which probes for information on migration, including the characteristics of people that emigrated from Zimbabwe, as well as information on households that received domestic and international remittances. The study uses information on general household characteristics as well as that on remittances to investigate the impact of remittances. The households were asked if they received any remittances in the last twelve months or in the last month. Their response was used to

16 See Deb (2009) for more details on the procedure.

17 Data from the World Bank's World Development Indicators online database indicates that in 2019 the rural population in Zimbabwe accounted for about 68% of the country's total population.

18 The first stage results shown in Table 13 and 15 for the MTR approach show that households located close to a post office or growth point are more likely to receive remittances.

categorise them into four groups: those that did not receive any remittances, those that received domestic remittances only, those that received international remittances only, and those that received both remittance categories. Our estimate of remittances are on a monthly basis, where annual figures are reported by the households the corresponding monthly remittances were derived by dividing the annual values by twelve.

The total household expenditure is the outcome of interest. For an in-depth analysis, we further categorise household expenditure into food, health, education and durables budget shares. Tables 2 and 3 show the consumption expenditure distribution as well as the variable summary statistics for both surveys years. Table 4 shows the expenditure patterns for remittance recipients and non-recipients. Tables 2, 3 and 4 all show that, for the years 2011 and 2017,¹⁹ households that receive remittances tend to spend more on all expenditure categories (food, education, health and durables) than those that do not receive remittances. Regarding other household characteristics we find that 68% of the non-remittance recipient households were male-headed, while 43% of the remittance recipients were male-headed (See Table 2). This may indicate that a large number of male household heads were migrating and sending remittances, hence the low proportion of male-headed households in the remittance receiving category. In terms of the population distribution by age group, we find that household heads aged 30-39 years dominated the other age groups (22% of them in remittance receiving households, 29% of them in the non-remittance receiving households). Migration seems to be a function of education and unemployment. For example, 50% of the remittance receiving households had household heads with secondary education, compared to 48% for non-remittance receiving households. Ten percent of the remittance receiving households had a family member with tertiary education, compared to 7% for the non-remittance receiving households. Families with larger shares of unemployed adults were likely to receive remittances. The share of unemployed adults was 21% for the remittance receiving households but only 4% for non-remittance receiving households. Regarding the provincial distribution of households receiving remittances we find four provinces to be dominant (accounting for 60% of remittance receiving households): Harare (19%), Midlands (16%), Manicaland (14%) and Bulawayo (11%).

4. EMPIRICAL RESULTS OF THE STUDY

This section presents results from the PSM and MTR approaches. The PSM approach has two main steps. The first entails estimating the propensity scores which are then used to conduct the matching (matching the remittance recipients to non-remittance recipients) and to estimate the average treatment effect on the treated (ATT) in the second step. Table 5 and 6 present the first step results for the years 2011 and 2017, respectively. Table 7

¹⁹ We observe a more or less similar pattern when looking at the descriptive statistics for the survey years 2011 and 2017. In this section we therefore focus on the more recent 2017 data.

shows the ATT results for both 2011 and 2017. We use the following matching estimators to estimate the ATT: nearest neighbour, caliper and kernel estimators. The remittance recipients were categorised into three main groups: domestic remittance recipients only, international remittance recipients only and those that received both international and domestic remittances. When it comes to the category of remittance recipients that received either domestic or international or both domestic and international remittances, the results suggest that remittances (for both years) had a positive and significant effect on all categories of household expenditure. For example, in 2011 (2017) households that received any kind of remittances spent an additional USD10²⁰ (USD6.56) per month on food than they would have spent if they did not receive remittances. Similar patterns are also observed for other expenditure categories. For this treatment category, the ATT estimates for both years and across all the categories of household expenditure were positive and significant, regardless of the matching estimator used. This suggests that remittances help in relaxing the budget constraints for households, enabling them to increase household expenditure. It is however important to separate remittance recipients (domestic versus international remittance recipients) as this enables us to further investigate if households perceive domestic and international remittances differently.

When it comes to domestic remittances we find that they have a positive and significant effect on the food and healthcare categories of expenditure.²¹ For example, in 2011 (2017) domestic remittance recipients spent an additional USD6.32 (USD4.77) per month on food than they would have if they did not receive remittances. The ATT estimates for the food category are positive and significant (for the 2011 data the ATT is significant at the 1% level regardless of the matching estimator used and for the 2017 data it is significant at the 10% level when using the nearest neighbour and at the 1% level when using the caliper and the kernel matching estimators). The ATT estimates (when using the 2011 data) for the health expenditure category are positive and significant (at the 10% level when using the nearest neighbour and caliper matching estimators, and at the 5% level when using the kernel matching estimator).

Regarding the impact of international remittances on household expenditure, we find that in 2011 (2017) those that received international remittances spent an additional USD20 (USD17.65) per month on food than they would have spent if they did not receive remittances.²² A similar pattern is observed for the other expenditure categories and matching estimators. Across both years the ATT estimates are significant across all categories of household expenditure, regardless of the matching estimator used. For example, the ATT estimates for food (in 2011), durables (in 2017) and education (in

20 Using the Kernel matching estimator.

21 In this category the treated are those that received domestic remittance only and the untreated are those that did not receive any remittance.

22 Using the Kernel matching estimator.

2017) were positive and significant at the 1% or 5% level of significance, regardless of the matching estimator used. For 2017 the food ATT was significant at the 1% level when using the caliper and kernel matching estimators, and at the 5% level when using the nearest neighbour matching estimator. The 2011 results also show that the ATT for durables was significant at the 10% level when using the caliper and nearest neighbour matching estimators. When using the 2011 data, the ATT for education expenditure was significant at the 1% level (when using the nearest neighbour and kernel matching estimators) and at the 5% level when using the caliper matching estimator. When using the 2017 data, the ATT estimate was significant at the 1% level when using the caliper and kernel matching estimators, and at the 5% level when using the nearest neighbour matching estimator. The ATT estimate, when using the 2011 data, for the health expenditure category was significant at the 5% level of significance (when using the nearest neighbour and caliper matching estimators) and at the 1% level (when using the kernel matching estimator). When using the 2017 data the ATT estimates on the impact of international remittances on health expenditure were significant at the 10% level, regardless of the matching estimator used.

As stated in the introduction, households can perceive remittances as transitory income (in which case they would spend them on durables and education), or compensatory income (in which case they would mostly spend them on food or healthcare emergencies), or just as any other income. The evidence from the study suggests that households spend their remittances on both durables and food, so it is difficult to conclude whether they perceive remittances as transitory or compensatory income. What is clear, however, is that households perceive domestic and international remittances differently. The fact that domestic remittances seems to be used for emergencies like food and healthcare while international remittances are used for durables and education (in addition to food and healthcare) suggests that, to a certain extent, households may be considering international remittances to be transitory income (hence the expenditure in education and durables) rather than compensatory income, while they may be likely to consider domestic remittances as compensatory income (hence its use on food and healthcare emergencies).

The impact of all forms of remittances (i.e. domestic or international or both) on food and healthcare expenditure weakened somewhat from 2011 to 2017. The impact of all forms of remittances on durables expenditure in 2017 was larger than the 2011 impact, and the impact on education expenditure in 2017 was smaller than the impact in 2011 (when using the caliper and kernel matching estimators). The impact of domestic remittances on food and healthcare expenditure also declined from 2011 to 2017, as did the impact of international remittances on food, education and healthcare expenditure. The impact of international remittances on durables, however, increased during the period.

Given the importance of common support when using the propensity score matching approach, we conducted some diagnostic tests to check the quality of matching. Table 8 and Figure 2 present the post-estimation results testing for the quality of matching. Figure 2 shows that there is overlap in the pcores across the three categories of treatment. Table 8 shows that matching reduced the bias by more than 99% for each treatment category. For each treatment category, the matched pcores for the treatment group were statistically identical, indicating the overall similarity between the treatment and control group, post-matching.

5. ROBUSTNESS CHECK USING THE MULTINOMIAL TREATMENT REGRESSION (MTR) APPROACH

One weakness of the PSM approach is that it matches on observable characteristics and does not correct for the selection bias emanating from unobservable characteristics. In this section we use the MTR approach to assess the impact of remittances. For this approach we establish three important categories of households: households that receive no remittances (the base category), households that receive domestic remittances only and households that receive international remittances only.²³ This helps us better understand whether households treat internal and external remittances differently. We therefore have three household statuses in this section: whether a household received no remittances, whether it received domestic remittances only or whether the household received international remittances only. As stated in the methodology section the impact of remittances is estimated using two equations (4 and 5). The results shown in Table 9 (using 2011 data) and Table 10 (using 2017 data) were estimated using equation 4 (from now on called first stage results). The results shown in Tables 11 and 12 (from now on called second stage results) were estimated using equation 5 and were based on the data from the years 2011 and 2017, respectively. The results based on the 2011 data show that receiving domestic remittances stimulates expenditure on durables (2.5%), healthcare (about 1%) and education (about 2%) (see Table 11). The results however indicate that receiving domestic remittances reduces expenditure on food (3.7%). The estimated parameters for durables, healthcare and education are all significant at the 1% level. The results from the 2017 data also show a positive relationship between receiving domestic remittances, on the one hand, and the expenditures on durables and education, on the other (see Table 12). When it comes to international remittances we find a positive relationship between receiving international remittances and food expenditure (using 2011 data) and between receiving international remittances, on the one hand, and expenditures on durables and education, on the other (using 2017 data). Results from the 2017 survey also show a negative relationship between receiving

23 Households that receive both domestic and international were not used in this section of the study.

remittances (international or domestic) and expenditure on food. This result suggests that households receiving emittances may be considering remittances to be transitory and therefore spending it on education and healthcare rather than on food. These results support findings by Adams and Cueduecha (2010) on Guatemala, Randazzo and Piracha (2019) on Senegal and Adams and Cueduecha (2013) on Ghana.

To further check the robustness of the above results in this section we introduce two exclusion restrictions or instruments. These restrictions must predict the probability of receiving remittances but must be uncorrelated to household expenditure. Also, although the relevance of the exclusion restrictions in terms of their explanatory power in the selection equation can be easily tested there is no formal over-identification test developed in this framework. It must however be noted that our mixed multinomial choice which models receiving remittances and their impact on household expenditure can in principle be identified even without the exclusion restrictions (that is, when one uses the same variables in both the selection and outcome equations as done above). See for example Randazzo and Piracha (2019). Based on data availability we selected the distance to the nearest post office and the distance to the nearest growth point as the exclusion restrictions. In Zimbabwe a significant proportion of the population still stays in the rural areas. It is common for people in the rural areas to receive groceries or remittances through post offices or at growth points. However if the distance to the post office or growth point is long it makes it difficult to receive remittances. We therefore hypothesize that distance to the post office or growth point is negatively related to the probability of receiving remittances, particularly for those in the rural areas. We however do not think that distance to the post office or growth point is directly related to household expenditure. We separately include the variables distance to the post office and distance to the growth point in the selection equation but not in the outcome equation. These first stage results are presented in Table 13 (when using the distance to the post office) and Table 15 (when using the distance to the growth point). The results indicate that distance to the post office or to the growth point both affect the probability of receiving remittances, especially domestic remittances.

Tables 14 and 16 show the second stage results when using distance to the nearest post office and distance to the nearest growth point as the exclusion restrictions (using 2011 data²⁴). Table 14 results are not very different from Table 11 results (Table 11 results do not include any instruments). For example, just as in Table 11, Table 14 results indicate that receiving domestic remittances increases expenditure on durables (2.7%) and health (0.9%), and reduces expenditure on food (4.8%). The results based on the IV however indicate that receiving domestic remittances reduces expenditure on education (0.5%), unlike the results in Table 11 which indicate a positive relationship between

²⁴ We could not get data on distance to the post office or growth point when using the 2017 survey. The results using instrumental variables are therefore based on the 2011 survey data.

domestic remittances and education. The impact of international remittances when using instrumental variables compared to the previous ones shown in Table 11 (when not using the IV method) did not change.

Table 16 presents second stage results obtained when using distance to the nearest growth point as the exclusion restriction. Just as in the previous set of results that did not use exclusion restrictions, the second stage results indicate that domestic remittances have a positive effect on expenditure on durables (2.7%), education (0.4%) and health (0.9%). However, we found no effect of domestic remittances on food expenditure when using distance to the nearest growth point as the exclusion restriction. Table 16 also shows that international remittances stimulate expenditure on education (1.5%) but reduce expenditure on food and durables. It must however be noted that distance to a post office may be a weak instrument since the correlation between receiving remittances (particularly international remittances) and distance to the post office is quite low (see Table 13). The same applies to distance to a growth point (see Table 15). Given the above we consider the propensity score matching results to be more reliable. According to McKenzie et al. (2010) and McKenzie and Sasin (2007) in the absence of a good IV the PSM, compared to other quasi-experimental approaches, performs quite well and may even be better than a poor instrument (Randazzo and Piracha, 2019).

6. CONCLUSION

The study uses the propensity score matching and multinomial treatment regression approaches to investigate the impact of remittances on household expenditure using Zimbabwe's 2011 and 2017 household survey data. The study findings suggest, and corroborate the view in the extant literature, that remittances help reduce credit constraints faced by households. Also, the results suggest that households perceive domestic and international remittances differently.

The results from the PSM approach suggest that remittances, in general, tend to stimulate all categories of household expenditure (food, durables, education and health), indicating that remittances tend to reduce liquidity constraints faced by households in Zimbabwe. This outcome is evident when using both the 2011 and 2017 survey data. In an attempt to assess the separate or differential effects of domestic and international remittances we used receipt of domestic remittances only or international remittances only as treatment. The results suggest that domestic remittances increased expenditure on food and healthcare but had no impact on durables and education. International remittances, on the other hand, stimulated the expenditure on all expenditure categories (including on durables and education). However households that received international remittances witnessed larger increases in all categories of expenditure, compared to domestic recipients. This suggests that international remittances are important in

not only reducing household liquidity constraints but in stimulating expenditure on important household investment in durables and education. Furthermore, even though both domestic and international remittances seem to positively stimulate expenditure on healthcare, international remittances have a larger impact than domestic remittances. Given the difficult economic condition faced by most households in Zimbabwe, the above results support the general view that those in the diaspora are playing a very important role in alleviating poverty in the country. In the recent past the education and health sectors have seriously deteriorated, and remittances (particularly international remittances) are helping reverse a situation that could have seriously worsened.

We also found corroborating evidence when using the robustness checks from the multinomial treatment regression approach. For example, as with PSM approach, we found that domestic remittances were positively related to expenditure on durables, health and education²⁵. When using 2017 data we also found that although both domestic and international remittances stimulate expenditure on durables and education, international remittances have a larger positive impact, with the impact on durables expenditure strengthening over time, but weakening for the rest of the expenditure categories.

Other than the stated weaknesses of the PSM and the MTR approaches²⁶ there are other weaknesses, and hence possible areas for future research. First, the study uses cross-sectional data. This makes it difficult for one to better investigate the dynamics around remittances and their impact. Future studies can be done using panel data and richer datasets that allow for the creation of better instruments. Second, an important issue is whether the impact of remittances on household expenditure depends on the gender of the household head. Third, there is need to investigate the impact of remittances on poverty in Zimbabwe.

7. POLICY RECOMMENDATIONS

It is quite evident that remittances are playing an important role in reducing the liquidity constraints faced by Zimbabwean households. It is also evident that the impact of international remittances is larger than that of domestic remittances. There is therefore need for the government to encourage the inflows of international remittances. One major problem is that sending remittances to Africa (or within Africa itself) is quite expensive (World Bank, 2006; Cirasino, 2013). For example, sending remittances through major corridors such as the US to Mexico may cost about 5% of the amount remitted, while sending remittances to Africa or within Africa can cost as much as 20% of the amount remitted (World Bank, 2006). One way to encourage the inflow of international

²⁵ The 2017 results from the multinomial treatment regression approach however indicate a negative relationship between remittances and expenditure on food.

²⁶ Including the weaknesses of the two suggested instruments.

remittances is therefore to significantly reduce the cost of sending remittances to Africa and within the continent. Most transfers are conducted through private players, like Western Union, MoneyGram, so it may be difficult to reduce their costs. The government can however encourage competition in the sector using a number of strategies. First, they need to reduce barriers to entry. Second, they need to allow competition between Money Transfer Operators (MTOs) and commercial banks. Third, they need to reduce capital requirements and other burdensome legal and compliance requirements for new MTOs (World Bank, 2006). There is also a need to open up the postal networks to the MTOs, join hands with G8 and G20 countries which are coming up with programmes to reduce the remitting cost to 5% of the remitted amount, and to develop an efficient modern payment infrastructure (World Bank, 2006; Cirasino, 2013). Increasing competition among all players involved in remittance transfers will help reduce costs, which is beneficial to both the remitters and the MTOs involved. Lower costs will incentivise remitters to send more money home while increasing the volume of business for the MTOs (Cirasino, 2013). The government also needs to create better investment opportunities for those in the diaspora (e.g. the issuance of diaspora bonds to finance infrastructure) so that such resources are also used for long-term investments like housing and infrastructure (road, hospitals, schools, etc). It is also argued that enfranchising those in the diaspora may also encourage them to send money back home.

Another policy option for the government is to increase digital financial inclusion for remittance recipients as well as better access to remittance receipt services in rural areas. More than 65% of the country's population stays in the rural areas. Therefore, initiatives to increase financial inclusion, particularly for those in the rural areas, will a long way in making it easier for people to receive remittances at low costs.

REFERENCES

- Acosta, P. (2011). 'School attendance, child labour and remittances from international migration in El Salvador', *The Journal of Development Studies*, 47(6), 913-936.
- Adams, R.H. and A. Cuecuecha (2010). 'Remittances, household expenditure and investment in Guatemala', *World Development*, 38(11), 1626-1641.
- (2013). 'The impact of remittances on investment and poverty in Ghana', *World Development*, 50, 24-40.
- Chami, R., C. Fullenkamp and S. Jahjah (2003). 'Are immigrant remittance flows a source of capital for development?' IMF Working Paper 03/189.
- Cirasino, M. (2013). 'How can we cut the high costs of remittances to Africa?' <https://blogs.worldbank.org/psd/how-can-we-cut-the-high-costs-of-remittances-to-africa>
- Cox-Edwards, A. and E. Rodriguez-Oreggia (2009). 'Beyond Remittances: The Effects of Migration on Mexican Households', *World Development*, 37(5), 1004-1014.

- Deb, P. (2009). 'MTREATREG: Stata Module to Fit Models with Multinomial Treatments and Continuous and Binary Outcomes using Maximum Simulated Likelihood', *Statistical Software Components* S457064.
- and P.K. Trivedi (2006). 'Specification and simulated likelihood estimation of a non-normal treatment-outcome model with selection', *Econometrics Journal*, 9(2), 307-331.
- Dehejia, R.H. and S. Wahba (2002). 'Propensity score-matching for nonexperimental causal studies', *The Review of Economics and Statistics*, 84(1), 151-161.
- Entzinger, H. (1985). 'Return migration in Western Europe: Current policy trends and their implications, in particular for the Second Generation', *International Migration*, 23(2), 263-290.
- Gupta, A.G., C.A. Pattillo and S. Wagh (2009). 'Effect of remittances on poverty and financial development in Sub-Saharan Africa', *World Development*, 37(1), 104-115.
- Lewis, J.R. (1986). 'International labour migration and uneven regional development in labour exporting countries', *Tijdschrift voor Economische en Sociale Geografie*, 77(1), 27- 41.
- McKenzie D.J. (2006). 'Beyond remittances: the effects of migration on Mexican households', in C. Ozden and M. Schiff (eds), *International Migration, Remittances and the Brain Drain* (Washington, DC: World Bank).
- and M.J. Sasin (2007). 'Migration, Remittances, Poverty, and Human Capital: Conceptual and Empirical Challenges', World Bank Policy Research Working Paper No. 4272.
- , J. Gibson and S. Stillman (2010). 'How important is Selection? Experimental Versus. Non-experimental Measures of the Income Gains from Migration', *Journal of the European Economic Association*, 8(4), 913-945.
- Mugumisi, N. (2014). 'Microeconomic Determinants of Migrant Remittances into Zimbabwe: A Survey of Zimbabweans in Botswana and South Africa', *International Journal of Economics, Commerce and Management*, II(9), 1-15.
- Ncube, G. and G. Gomez (2011). 'Local economic development and migrant remittances in rural Zimbabwe', *ISS Working Paper Series/General Series*, 523, 1-26.
- Nzima, D., V. Duma, P. Moyo and C.K. Hlatywayo (2017). 'Local development and migrant remittances: Education, skills, and capabilities as preconditions for investment in Tsholotsho, Zimbabwe', *Journal of Sociology and Social Anthropology*, 8(2), 69-76.
- Osili, U. (2004). 'Migrants and Housing Investments: Theory and Evidence from Nigeria', *Economic Development and Cultural Change*, 52(4), 821-849.
- Randazzo, T. and M. Piracha (2019). 'Remittances and household expenditure behaviour: Evidence from Senegal', *Economic Modelling*, 79(C), 141-153.
- Shahidur, R.K., B.K. Gayatri and A.S. Hussain (2010). *Handbook on impact evaluation: quantitative methods and practices* (Washington, DC: World Bank).
- Tavera, D., and A. Chikanda (2008). 'Migrant remittances and household survival in Zimbabwe', in J. Crush and D. Tavera (eds), *Zimbabwe's Exodus: Crisis, Migration, Survival* (Ottawa: IDRC).
- World Bank (2006). *Global Economic Prospects: Economic Implications of*

Remittances and Migration (Washington, DC: World Bank).

Yang, D. (2008). 'International migration, remittances and household investment: Evidence from Philippine migrants' exchange rate shocks', *The Economic Journal*, 118(528), 591-630.

----- (2011). 'Migrant remittances', *Journal of Economic Perspectives*, 25(3), 129-152.

TABLES

Table 1: Remittances in Zimbabwe: 2009 - 2019

Year	Remittances ²⁷ (USD in Millions)	GDP ²⁸ (USD in Millions)	Remittance as % of GDP
2009	1205.66	10 061.94	11.98
2010	1413.25	12 041.66	11.74
2011	1919.48	13 750.84	13.96
2012	2113.58	16 042.47	13.17
2013	1890.28	16 361.64	11.55
2014	1903.97	16 750.54	11.37
2015	2046.58	17 048.68	12.00
2016	1856.04	17 177.55	10.81
2017	1729.88	17 985.58	9.62
2018	1729.88	18 854.23	9.18
2019	1773.49	17 327.04	10.24

Source: WDI Online Database

²⁷ Constant 2010 USD in millions.

²⁸ Constant 2010 USD in millions.

Table 2: Summary statistics 2017

	Overall					Non- recipient household					Remittance recipient household				
	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max
Treatment variables															
Remittances domestic (\$)	29 555	12.5	53.5	0.0	900	24 856	0.0	0.0	0.0	0.0	4 699	70.7	109.8	0.0	900
Remittances international (\$)	29 555	6.7	47.7	0.0	1 500	24 856	0.0	0.0	0.0	0.0	4 699	38.1	108.1	0.0	1 500
Remittances (domestic + international - \$)	29 555	19.3	72.8	0.0	1 500	24 856	0.0	0.0	0.0	0.0	4 699	108.8	142.1	0.5	1 500
HH remittances recipient	29 555	0.18	0.38	0.0	1.0	24 856	0.0	0.0	0.0	0.0	4 699	1.00	0.00	1.0	1.0
HH remittances recipient (domestic)	29 555	0.14	0.35	0.0	1.0	24 856	0.0	0.0	0.0	0.0	4 699	0.81	0.39	0.0	1.0
HH remittances recipient (international)	29 555	0.04	0.20	0.0	1.0	24 856	0.0	0.0	0.0	0.0	4 699	0.23	0.42	0.0	1.0
Outcome variables:															
Food exp. (\$)	29 555	87.0	61.3	5.2	1 089	24 856	85.6	60.1	5.2	859	4 699	93.2	65.9	6.8	1 089
Non-food exp. (\$)	29 555	170.4	187.5	5.0	1 937	24 856	161.1	182.4	5.0	1 937	4 699	213.8	203.8	7.9	1 657
Total exp. (\$)	29 555	257.4	220.7	21.3	2 363	24 856	246.7	215.5	21.3	2 363	4 699	307.0	237.1	23.6	1 816
Education exp (\$)	19 843	18.9	30.6	1.2	831	16 532	17.6	24.8	1.2	532	3 311	24.6	47.9	1.4	831
Health exp. (\$)	29 555	4.6	28.6	0.0	1 430	24 856	4.0	25.3	0.0	1 430	4 699	7.3	40.6	0.0	744
Durables exp. (\$)*	29 555	77.5	167.8	0.0	2 000	24 856	74.7	166.2	0.0	2 000	4 699	90.8	174.4	0.0	1 950
Per capita food exp. (\$)	29 555	25.4	23.1	4.8	556	24 856	25.0	22.5	4.8	363	4 699	27.5	25.7	4.8	556
Per capita total exp. (\$)	29 555	78.6	86.8	8.0	1 703	24 856	75.3	83.3	8.0	1 703	4 699	94.1	100.2	9.6	1 427
Food share to total exp.	29 555	0.40	0.17	0.01	0.96	24 856	0.41	0.17	0.01	0.96	4 699	0.36	0.17	0.02	0.89
Other characteristics:															
Male headed hh	29 555	0.63	0.48	0.0	1.0	24 856	0.68	0.47	0.0	1.0	4 699	0.43	0.50	0.0	1.0
Female headed hh	29 555	0.37	0.48	0.0	1.0	24 856	0.32	0.47	0.0	1.0	4 699	0.57	0.50	0.0	1.0
Age (head) 16-19 years	29 398	0.01	0.08	0.0	1.0	24 724	0.01	0.07	0.0	1.0	4 674	0.01	0.12	0.0	1.0

20-29 years	29 398	0.14	0.35	0.0	1.0	24 724	0.14	0.35	0.0	1.0	4 674	0.14	0.35	0.0	1.0
30-39 years	29 398	0.28	0.45	0.0	1.0	24 724	0.29	0.45	0.0	1.0	4 674	0.22	0.42	0.0	1.0
40-49 years	29 398	0.22	0.41	0.0	1.0	24 724	0.22	0.42	0.0	1.0	4 674	0.19	0.39	0.0	1.0
50-59 years	29 398	0.14	0.34	0.0	1.0	24 724	0.13	0.34	0.0	1.0	4 674	0.14	0.35	0.0	1.0
60-64 years	29 398	0.07	0.25	0.0	1.0	24 724	0.06	0.25	0.0	1.0	4 674	0.09	0.29	0.0	1.0
≥ 65 years	29 398	0.15	0.36	0.0	1.0	24 724	0.14	0.35	0.0	1.0	4 674	0.20	0.40	0.0	1.0
No schooling (head)	29 555	0.06	0.24	0.0	1.0	24 856	0.06	0.24	0.0	1.0	4 699	0.05	0.21	0.0	1.0
Primary educ. (head)	29 555	0.34	0.47	0.0	1.0	24 856	0.34	0.47	0.0	1.0	4 699	0.34	0.47	0.0	1.0
Secondary educ. (head)	29 555	0.48	0.50	0.0	1.0	24 856	0.48	0.50	0.0	1.0	4 699	0.50	0.50	0.0	1.0
Tertiary education (head)	29 555	0.12	0.32	0.0	1.0	24 856	0.12	0.33	0.0	1.0	4 699	0.11	0.32	0.0	1.0
Hh. has member with tertiary educ	29 538	0.08	0.26	0.0	1.0	24 842	0.07	0.26	0.0	1.0	4 696	0.10	0.30	0.0	1.0
Female share (16years+)	29 538	0.34	0.23	0.0	1.0	24 842	0.33	0.22	0.0	1.0	4 696	0.38	0.24	0.0	1.0
Elderly share (65 years+)	29 538	0.07	0.18	0.0	1.0	24 842	0.06	0.18	0.0	1.0	4 696	0.09	0.20	0.0	1.0
Unemployed (head)	27 884	0.03	0.16	0.0	1.0	23 831	0.02	0.13	0.0	1.0	4 053	0.07	0.25	0.0	1.0
Number of unemployed hh. members	29 538	0.13	0.44	0.0	6.0	24 842	0.11	0.40	0.0	6.0	4 696	0.22	0.57	0.0	5.0
Share of unemployed adults in hh.	29 538	0.04	0.15	0.0	1.0	24 842	0.04	0.13	0.0	1.0	4 696	0.08	0.21	0.0	1.0
Household size	29 538	4.20	2.09	1.0	10.0	24 842	4.22	2.08	1.0	10.0	4 696	4.15	2.10	1.0	10.0
Number of adults (16 years +)	29 538	2.40	1.20	1.0	10.0	24 842	2.41	1.18	1.0	10.0	4 696	2.39	1.28	1.0	9.0
Number of children < 6 years	29 555	0.72	0.82	0.0	9.0	24 856	0.73	0.81	0.0	9.0	4 699	0.67	0.85	0.0	7.0
Per-capita household income	29 538	86	263	0	5 000	24 842	88	278	0	5 000	4 696	78	172	0	4 552
Household owns land	29 555	0.43	0.49	0.0	1.0	24 856	0.44	0.50	0.0	1.0	4 699	0.36	0.48	0.0	1.0
Urban	29 538	0.34	0.47	0.0	1.0	24 842	0.31	0.46	0.0	1.0	4 696	0.47	0.50	0.0	1.0
Bulawayo	29 538	0.06	0.23	0.0	1.0	24 842	0.04	0.20	0.0	1.0	4 696	0.11	0.32	0.0	1.0
Manicaland	29 538	0.14	0.35	0.0	1.0	24 842	0.14	0.35	0.0	1.0	4 696	0.14	0.34	0.0	1.0
Mashonaland Central	29 538	0.09	0.29	0.0	1.0	24 842	0.11	0.31	0.0	1.0	4 696	0.03	0.18	0.0	1.0
Mashonaland East	29 538	0.12	0.32	0.0	1.0	24 842	0.12	0.33	0.0	1.0	4 696	0.09	0.29	0.0	1.0
Mashonaland West	29 538	0.11	0.31	0.0	1.0	24 842	0.11	0.32	0.0	1.0	4 696	0.09	0.29	0.0	1.0
Matebeleland North	29 538	0.05	0.22	0.0	1.0	24 842	0.05	0.21	0.0	1.0	4 696	0.06	0.23	0.0	1.0
Matebeleland South	29 538	0.05	0.22	0.0	1.0	24 842	0.06	0.23	0.0	1.0	4 696	0.03	0.16	0.0	1.0
Midlands	29 538	0.11	0.31	0.0	1.0	24 842	0.10	0.30	0.0	1.0	4 696	0.16	0.37	0.0	1.0
Masvingo	29 538	0.12	0.33	0.0	1.0	24 842	0.12	0.33	0.0	1.0	4 696	0.10	0.30	0.0	1.0
Harare	29 538	0.15	0.36	0.0	1.0	24 842	0.15	0.35	0.0	1.0	4 696	0.19	0.39	0.0	1.0

Source: Own calculations from the PICES 2011 and 2017 Survey Data

Table 3: Summary statistics 2011

	Overall					Non- recipient household					Remittance recipient household				
	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max
Treatment variables															
Remittances domestic (\$)	29 652	16.1	65.0	0.0	535	23 045	0.00	0.00	0.0	0.0	6 607	69.0	120.1	0.0	535
Remittances international (\$)	29 652	10.0	76.4	0.0	1 775	23 045	0.00	0.00	0.0	0.0	6 607	42.9	153.4	0.0	1 775
Remittances (domestic + international - \$)	29 652	26.2	100.1	0.0	1 935	23 045	0.00	0.00	0.0	0.0	6 607	111.8	182.3	0.2	1 935
HH remittances recipient	29 652	0.23	0.42	0.0	1.0	23 045	0.00	0.00	0.0	0.0	6 607	1.00	0.00	1.0	1.0
HH remittances recipient (domestic)	29 652	0.19	0.39	0.0	1.0	23 045	0.00	0.00	0.0	0.0	6 607	0.81	0.39	0.0	1.0
HH remittances recipient (international)	29 652	0.05	0.22	0.0	1.0	23 045	0.00	0.00	0.0	0.0	6 607	0.22	0.41	0.0	1.0
Outcome variables:															
Food exp. (\$)	29 649	102.8	69.7	1.9	556	23 043	100.4	68.3	2.2	556	6 606	110.7	73.7	1.9	556
Non-food exp. (\$)	29 652	180.6	241.3	0.0	1 990	23 045	168.1	229.6	0.0	1 990	6 607	221.4	272.0	0.0	1 984
Total exp. (\$)	29 652	283.3	278.0	20.0	2 515	23 045	268.5	266.0	20.0	2 515	6 607	332.1	309.4	25.5	2 298
Education exp (\$)	29 652	14.6	62.2	0.0	956	23 045	13.9	61.6	0.0	956	6 607	16.7	64.2	0.0	956
Health exp. (\$)	29 652	4.9	27.8	0.0	1 293	23 045	4.5	27.0	0.0	1 067	6 607	6.3	30.2	0.0	1 293
Durables exp. (\$)*	29 652	21.2	69.3	0.0	1 865	23 045	20.8	68.8	0.0	1 865	6 607	22.6	71.2	0.0	1 369
Per capita food exp. (\$)	29 629	31.5	36.1	0.5	556	23 025	30.5	35.5	0.5	556	6 604	34.6	37.8	0.5	556
Per capita total exp. (\$)	29 632	86.5	122.0	2.5	2 169	23 027	80.9	114.7	2.5	2 169	6 605	104.9	141.8	3.2	1 772
Food share to total exp.	29 649	0.46	0.20	0.00	1.00	23 043	0.47	0.20	0.0	1.0	6 606	0.43	0.20	0.0	1.0
Other characteristics:															
Male headed hh	29 632	0.62	0.49	0.0	1.0	23 027	0.63	0.48	0.0	1.0	6 605	0.60	0.49	0.0	1.0
Female headed hh	29 632	0.38	0.49	0.0	1.0	23 027	0.37	0.48	0.0	1.0	6 605	0.40	0.49	0.0	1.0
Age (head) 16-19 years	29 414	0.01	0.11	0.0	1.0	22 864	0.01	0.11	0.0	1.0	6 550	0.01	0.11	0.0	1.0
20-29 years	29 414	0.16	0.37	0.0	1.0	22 864	0.16	0.36	0.0	1.0	6 550	0.17	0.38	0.0	1.0
30-39 years	29 414	0.26	0.44	0.0	1.0	22 864	0.26	0.44	0.0	1.0	6 550	0.24	0.43	0.0	1.0
40-49 years	29 414	0.19	0.39	0.0	1.0	22 864	0.19	0.39	0.0	1.0	6 550	0.20	0.40	0.0	1.0
50-59 years	29 414	0.15	0.36	0.0	1.0	22 864	0.16	0.36	0.0	1.0	6 550	0.15	0.36	0.0	1.0
60-64 years	29 414	0.06	0.24	0.0	1.0	22 864	0.06	0.24	0.0	1.0	6 550	0.06	0.25	0.0	1.0

≥ 65 years	29 414	0.16	0.37	0.0	1.0	22 864	0.17	0.37	0.0	1.0	6 550	0.16	0.37	0.0	1.0
No schooling (head)	26 795	0.05	0.23	0.0	1.0	20 788	0.05	0.22	0.0	1.0	6 007	0.06	0.24	0.0	1.0
Primary educ. (head)	26 795	0.41	0.49	0.0	1.0	20 788	0.41	0.49	0.0	1.0	6 007	0.40	0.49	0.0	1.0
Secondary educ. (head)	26 795	0.46	0.50	0.0	1.0	20 788	0.46	0.50	0.0	1.0	6 007	0.47	0.50	0.0	1.0
Tertiary education (head)	26 795	0.07	0.26	0.0	1.0	20 788	0.08	0.26	0.0	1.0	6 007	0.07	0.25	0.0	1.0
Hh. has member with tertiary educ	29 632	0.08	0.27	0.0	1.0	23 027	0.08	0.27	0.0	1.0	6 605	0.08	0.26	0.0	1.0
Female share (16years+)	29 632	0.33	0.21	0.0	1.0	23 027	0.33	0.21	0.0	1.0	6 605	0.33	0.21	0.0	1.0
Elderly share (65 years+)	29 632	0.06	0.17	0.0	1.0	23 027	0.06	0.17	0.0	1.0	6 605	0.07	0.17	0.0	1.0
Unemployed (head)	27 903	0.01	0.11	0.0	1.0	21 706	0.01	0.11	0.0	1.0	6 197	0.01	0.11	0.0	1.0
Number of unemployed hh. members	29 632	0.07	0.32	0.0	6.0	23 027	0.07	0.32	0.0	6.0	6 605	0.07	0.32	0.0	4.0
Share of unemployed adults in hh.**	29 548	0.02	0.11	0.0	1.0	22 960	0.02	0.10	0.0	1.0	6 588	0.02	0.11	0.0	1.0
Household size	29 632	4.58	2.30	1.0	15.0	23 027	4.61	2.29	1.0	15.0	6 605	4.49	2.30	1.0	15.0
Number of adults (16 years +)	29 632	2.56	1.31	0.0	12.0	23 027	2.56	1.30	0.0	12.0	6 605	2.54	1.31	0.0	12.0
Number of children < 6 years	29 632	0.67	0.78	0.0	7.0	23 027	0.67	0.78	0.0	7.0	6 605	0.65	0.77	0.0	5.0
Per capita household income	29 632	59.09	196.70	0.0	6 881	23 027	52.00	180.47	0.0	6 000	6 605	82.27	240.91	0.0	6 881
Household owns land	29 652	0.64	0.48	0.0	1.0	23 045	0.64	0.48	0.0	1.0	6 607	0.65	0.48	0.0	1.0
Urban	29 652	0.35	0.48	0.0	1.0	23 045	0.33	0.47	0.0	1.0	6 607	0.42	0.49	0.0	1.0
Bulawayo	29 652	0.06	0.23	0.0	1.0	23 045	0.05	0.21	0.0	1.0	6 607	0.10	0.30	0.0	1.0
Manicaland	29 652	0.15	0.36	0.0	1.0	23 045	0.16	0.37	0.0	1.0	6 607	0.13	0.34	0.0	1.0
Mashonaland Central	29 652	0.09	0.29	0.0	1.0	23 045	0.09	0.29	0.0	1.0	6 607	0.08	0.28	0.0	1.0
Mashonaland East	29 652	0.09	0.29	0.0	1.0	23 045	0.09	0.29	0.0	1.0	6 607	0.09	0.29	0.0	1.0
Mashonaland West	29 652	0.11	0.32	0.0	1.0	23 045	0.12	0.33	0.0	1.0	6 607	0.09	0.28	0.0	1.0
Matebeleland North	29 652	0.05	0.21	0.0	1.0	23 045	0.05	0.21	0.0	1.0	6 607	0.05	0.22	0.0	1.0
Matebeleland South	29 652	0.05	0.22	0.0	1.0	23 045	0.06	0.23	0.0	1.0	6 607	0.03	0.17	0.0	1.0
Midlands	29 652	0.12	0.33	0.0	1.0	23 045	0.12	0.32	0.0	1.0	6 607	0.14	0.34	0.0	1.0
Masvingo	29 652	0.11	0.32	0.0	1.0	23 045	0.11	0.31	0.0	1.0	6 607	0.12	0.33	0.0	1.0
Harare	29 652	0.16	0.36	0.0	1.0	23 045	0.15	0.36	0.0	1.0	6 607	0.17	0.37	0.0	1.0

Source: Own calculations from the PICES 2011 and 2017 Survey Data

Notes: *Consists of expenditure on clothing and footwear, furniture (e.g. stoves, refrigerators, solar panels), transport equipment (e.g. cars, bicycles) and electronics (e.g. radio, television, cell phones, computers). ** Number unemployed (age 16+)/ number of adults in hh (age 16+) : share female= number of females/household size.

Table 4: Expenditure patterns by remittance status in Zimbabwe (per household per month)

	2011					2017				
	non-Recipient	Recipient	diff	t-value	p-value	non-Recipient	Recipient	diff	t-value	p-value
Food exp. (\$)	97.0	106.0	9.038	9.7	0.000	84.1	92.4	8.255	8.8	0.000
Non-food exp. (\$)	133.1	167.2	34.140	12.7	0.000	130.0	164.9	34.913	15.4	0.000
Total exp. (\$)	230.1	273.3	43.171	13.6	0.000	214.1	257.2	43.168	15.7	0.000
Education exp (\$)	11.2	13.9	2.661	3.3	0.001	14.9	18.6	3.670	8.6	0.000
Health exp. (\$)	4.0	5.9	1.967	4.9	0.000	3.4	5.7	2.292	5.3	0.000
Durables exp. (\$)*	16.8	18.5	1.792	2.0	0.045	64.5	75.6	11.104	4.7	0.000
Per capita food exp. (\$)	29.4	32.3	-2.916	6.2	0.000	24.0	26.7	2.700	7.8	0.000
Per capita total exp. (\$)	69.6	83.6	14.035	10.0	0.000	64.2	77.0	12.760	11.0	0.000
Education share to total exp.	0.027	0.031	-0.003	3.0	0.003	0.071	0.074	0.003	2.0	0.047
Health share to total exp.	0.011	0.015	0.004	5.8	0.000	0.008	0.012	0.003	5.5	0.000
Food share to total exp.	0.504	0.471	-0.033	-12.7	0.000	0.437	0.405	-0.032	-12.2	0.000

Source: Own calculations from the PICES 2011 and 2017 Survey Data

Table 5: Estimation of the propensity score for 2011

VARIABLES	Domestic recipient	International recipient	Remittance recipient
Household size	-0.013 (-0.523)	-0.030 (-0.710)	-0.016 (-0.646)
Urban	0.087*** (3.424)	0.284*** (7.376)	0.125*** (5.198)
Tertiary Education HH Head	0.009 (0.262)	0.019 (0.350)	0.018 (0.545)
Unemployment share	0.074 (0.682)	-0.040 (-0.218)	0.048 (0.449)
Unemployed head	0.003 (0.033)	-0.011 (-0.063)	0.004 (0.041)
Adults (>15 years)	0.016* (1.656)	-0.006 (-0.370)	0.014 (1.394)
Children (<6 years)	-0.016 (-1.192)	0.004 (0.176)	-0.014 (-1.072)
Female head	0.845 (0.958)	0.002 (0.055)	0.041** (2.033)
Female share	-0.810 (-0.919)	0.080 (0.954)	-0.012 (-0.244)
Elderly share (> 65 years)	-0.031 (-0.556)		
Number of elderly (> 65 years)		-0.054* (-1.687)	-0.020 (-1.097)
Provincial control	Yes	Yes	Yes
Constant	-0.875*** (-28.431)	-1.987*** (-37.214)	-0.996*** (-28.584)
LR Chi2()	232.68***	503.41***	363.25***
Pseudo R-squared	0.09	0.05	0.01
Log-likelihood	-13338.08	-4399.76	-14562.55
Observations	27,842	27,842	27,842

z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 6: Estimation of the propensity score (probit) for 2017

VARIABLES	Domestic Recipient	International Recipient	Remittance Recipient
Household size	0.058* (1.703)	0.156*** (4.538)	0.030*** (5.134)
Urban	0.050 (1.326)	0.480*** (11.203)	0.025 (0.689)
Tertiary Education HH member	-0.014 (-0.275)	0.145** (2.325)	0.219*** (4.375)
Female share (>15 years)	-0.099* (-1.684)	-0.199** (-2.473)	0.390*** (8.080)
Unemployment share	-0.027 (-0.206)	0.236** (2.114)	0.111 (0.909)
Pov_emp_member	-0.254*** (-4.768)	-0.224*** (-2.961)	-0.337*** (-6.549)
Female head	0.422*** (17.068)	0.582*** (15.014)	
Own land	0.047* (1.898)	0.027 (0.721)	0.047** (2.010)
Children (<6 years)	-0.011 (-0.732)	-0.038* (-1.859)	-0.011 (-0.799)
percap_cons_r	0.001*** (3.556)	-0.000 (-0.879)	-0.000 (-0.395)
Elderly share (> 65 years)	0.333*** (5.906)		0.271*** (4.975)
Unemp_head	0.639*** (5.641)		0.579*** (5.336)
Adults (>15 years)	0.027** (2.144)		
Education	-0.015 (-1.132)	0.289*** (3.911)	0.543*** (4.691)
Provincial controls	Yes No	No Yes	Yes No
Education squared		-0.041*** (-3.518)	-0.101*** (-3.965)
Hsize*female head		-0.013 (-1.575)	
Married			-0.221*** (-9.722)
Tertiary education head			0.246 (1.268)
Constant	-1.361*** (-22.397)	-2.789*** (-21.700)	-1.372*** (-9.395)
LR chi2(k)	1150.79***	576.16***	1164.74***
Pseudo R-squared	0.06	0.07	0.052
Log likelihood	-9655.78	-4060.85	-107047.36
Observations	27,884	29,538	27,218

z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 7: PSM Estimates of ATT by type of Treatment (Remittance Recipient, Domestic Remittance Recipient, and International Remittance Recipient) for 2011 and 2017 (per household per month)

	Food		Durables		Education		Health	
	2011	2017	2011	2017	2011	2017	2011	2017
Recipient (domestic, international or both)								
Nearest Neighbour	7.576*** (1.15)	5.534*** (1.27)	0.304 (1.10)	10.853** (3.97)	2.051** (1.02)	2.924*** (0.49)	1.810** (0.54)	1.438* (0.59)
Caliper	7.684*** (1.02)	6.264*** (1.10)	0.327 (0.96)	8.527** (3.55)	1.776* (0.91)	1.893*** (0.44)	1.500*** (0.48)	1.308* (2.48)
Kernel	9.964*** (1.13)	6.553*** (1.03)	1.331 (0.89)	8.357** (2.22)	2.606*** (0.82)	2.287*** (0.53)	1.823*** (0.44)	1.401** (0.42)
Domestic Recipient								
Nearest Neighbour	5.688*** (1.18)	2.852* (1.54)	0.926 (1.05)	-4.910 (3.69)	-0.477 (0.99)	0.296 (0.60)	1.196* (0.53)	0.878 (0.74)
Caliper	5.539*** (1.07)	3.946*** (1.13)	-0.459 (0.95)	-2.33 (2.50)	-0.270 (0.89)	0.593 (0.40)	1.141* (0.49)	0.419 (0.59)
Kernel	6.316*** (0.99)	4.769*** (1.12)	0.181 (0.88)	-1.838 (1.31)	0.326 (0.33)	0.954 (0.50)	1.367** (0.48)	0.811 (0.70)
International Recipient								
Nearest Neighbour	18.146*** (2.56)	7.077** (3.09)	5.082* (2.94)	28.123*** (8.24)	9.839*** (2.71)	3.997** (1.79)	3.940** (1.47)	3.480* (1.39)
Caliper	17.943*** (2.31)	14.796*** (2.43)	5.799* (2.75)	42.977*** (6.48)	7.608** (2.59)	6.109*** (1.48)	3.945** (1.39)	2.971* (1.30)
Kernel	20.204*** (2.11)	17.651*** (2.31)	7.430	57.100*** (5.69)	10.297*** (2.68)	9.702*** (1.61)	4.673*** (1.21)	3.851* (1.39)

Notes: Robust standard errors in brackets

Table 8: Quality of matching test for the propensity score matching based on the Nearest Neighbour Matching Estimator

Pscore for each treatment		Treated	Control	%bias	% reduct bias	t-test	p>t	V(T)/V(C)
Recipient	Unmatched	0.2325	0.2191	27.1		19.46	0.000	1.27
	Matched	0.2325	0.2325	0.0	100	0.00	1.000	1.00
Domestic	Unmatched	0.19434	0.1863	23.7		14.81	0.000	0.76
	Matched	0.19434	0.19435	-0.0	99.9	-0.01	0.990	1.00
International	Unmatched	0.0633	0.0387	57.4		26.03	0.000	3.21
	Matched	0.0625	0.06326	-0.0	100	-0.00	1.000	1.00

Table 9: Mixed multinomial logit regression for treatments (First Step) for 2011 Data

VARIABLES	Durables		Food		Health		Education	
	Internal Recipient	International Recipient	Internal Recipient	International Recipient	Internal Recipient	International Recipient	Internal Recipient	International Recipient
log_hsize	-0.011 (-0.219)	-0.065 (-0.655)	-0.012 (-0.234)	-0.074 (-0.754)	-0.012 (-0.242)	-0.070 (-0.710)	-0.013 (-0.252)	-0.068 (-0.681)
Urban	0.155*** (3.159)	0.585*** (6.657)	0.197*** (4.033)	0.653*** (7.463)	0.187*** (3.859)	0.597*** (6.828)	0.174*** (3.552)	0.592*** (6.764)
Tertiary Education HH Member	0.020 (0.299)	0.088 (0.659)	0.024 (0.357)	0.099 (0.752)	0.023 (0.332)	0.087 (0.651)	0.025 (0.372)	0.079 (0.590)
Female head	0.074** (1.968)	0.089 (1.190)	0.077** (2.026)	0.106 (1.431)	0.077** (2.024)	0.092 (1.220)	0.076** (2.016)	0.091 (1.214)
Unemp_share	0.129 (0.574)	-0.264 (-0.575)	0.136 (0.599)	-0.251 (-0.559)	0.122 (0.535)	-0.261 (-0.573)	0.137 (0.608)	-0.254 (-0.554)
Unemp_head	0.053 (0.251)	0.112 (0.258)	0.039 (0.183)	0.101 (0.236)	0.049 (0.230)	0.104 (0.239)	0.041 (0.190)	0.098 (0.225)
Elderly share	-0.082 (-0.727)	-0.408* (-1.705)	-0.080 (-0.701)	-0.379 (-1.613)	-0.084 (-0.742)	-0.406* (-1.699)	-0.083 (-0.731)	-0.404* (-1.691)
Adults (> 15 years)	0.029 (1.453)	-0.019 (-0.453)	0.029 (1.442)	-0.017 (-0.426)	0.029 (1.477)	-0.017 (-0.401)	0.029 (1.463)	-0.018 (-0.427)
Children (< 6 years)	-0.035 (-1.283)	-0.002 (-0.034)	-0.035 (-1.284)	0.002 (0.030)	-0.035 (-1.288)	-0.000 (-0.000)	-0.035 (-1.284)	0.000 (0.005)
Provincial controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-1.868*** (-29.693)	-3.312*** (-28.322)	-1.876*** (-29.626)	-3.324*** (-28.696)	-1.875*** (-29.677)	-3.314*** (-28.352)	-1.869*** (-29.680)	-3.313*** (-28.344)
Log pseudolikelihood	10853.82	10853.82	-5144.82	-5144.82	29301.19	29302.19	15942.44	15943.44
Wald chi2	2449.43***	2449.43***	14765.67***	14765.67***	1169.71***	1169.71***	1665.41***	1665.41***
Observations	27,687	27,687	27,684	27,684	27,687	27,687	27,687	27,687

Robust z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 10: Mixed multinomial logit regression for treatments (First Step) for 2017 Data

VARIABLES	Durables		Food		Health		Education	
	Internal Recipient	International Recipient	Internal Recipient	International Recipient	Internal Recipient	International Recipient	Internal Recipient	International Recipient
log_hsize	0.147**	0.482***	0.143**	0.480***	0.143**	0.483***	-0.109	0.280
	(2.450)	(4.201)	(2.385)	(4.199)	(2.382)	(4.208)	(-0.970)	(1.430)
Urban	0.051	0.399***	0.056	0.414***	0.053	0.401***	0.060	0.473***
	(0.734)	(3.096)	(0.807)	(3.077)	(0.764)	(3.103)	(0.686)	(3.081)
Tertiary Education HH Member	-0.037	0.188	-0.039	0.176	-0.035	0.190	0.026	0.317*
	(-0.376)	(1.151)	(-0.395)	(1.062)	(-0.359)	(1.160)	(0.249)	(1.826)
Female head	0.865***	1.228***	0.865***	1.231***	0.864***	1.229***	0.871***	1.275***
	(19.465)	(14.342)	(19.437)	(14.328)	(19.432)	(14.345)	(16.090)	(12.453)
Unemp_share	-0.079	0.436	-0.093	0.424	-0.087	0.438	-0.416	0.888*
	(-0.313)	(1.029)	(-0.367)	(0.993)	(-0.345)	(1.033)	(-1.205)	(1.729)
Unemp_head	1.448***	0.900**	1.454***	0.890**	1.456***	0.897**	1.330***	0.435
	(6.779)	(2.340)	(6.780)	(2.304)	(6.803)	(2.336)	(4.809)	(0.927)
Elderly share	0.731***	0.570**	0.724***	0.566**	0.725***	0.570**	0.942***	0.545
	(6.590)	(2.408)	(6.516)	(2.399)	(6.530)	(2.411)	(4.074)	(1.249)
Adults (> 15 years)	0.034	-0.043	0.035	-0.042	0.034	-0.044	0.066**	-0.037
	(1.370)	(-1.000)	(1.406)	(-0.970)	(1.387)	(-1.013)	(2.224)	(-0.737)
Children (< 6 years)	-0.036	-0.032	-0.035	-0.032	-0.035	-0.032	0.030	0.017
	(-1.144)	(-0.536)	(-1.112)	(-0.540)	(-1.114)	(-0.543)	(0.835)	(0.257)
Provincial controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-3.028***	-5.049***	-3.024***	-5.055***	-3.023***	-5.050***	-2.727***	-4.821***
	(-38.848)	(-31.497)	(-38.726)	(-31.306)	(-38.768)	(-31.480)	(-18.645)	(-17.527)
Log pseudolikelihood	-33356.97	-33355.97	2087.43	2088.43	40641.88	40642.88	14837.3	14838.3
Wald chi2	2301.98***	2301.98***	13438.22***	13438.22***	1778.95***	1778.95***	2278.92***	2278.92***
Observations	27,783	27,783	27,783	27,783	27,783	27,783	18,722	18,722

Robust z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 11: Selectivity corrected estimated of budget share equations (2011)

VARIABLES	Durables	Food	Health	Education
Domestic recipient	0.025*** (12.488)	-0.037*** (-3.673)	0.009*** (8.427)	0.019*** (10.796)
International recipient	-0.025*** (-6.723)	0.092*** (12.002)	-0.001 (-0.521)	-0.002 (-0.538)
log_hsiz	-0.001 (-0.424)	-0.002 (-0.615)	0.001 (1.169)	-0.001 (-0.510)
log_tot_exp	0.043*** (35.377)	-0.102*** (-63.726)	0.011*** (16.366)	0.032*** (28.536)
Urban	0.009*** (4.250)	-0.101*** (-33.855)	0.001 (0.695)	0.001 (0.451)
Tertiary Education HH Member	-0.000 (-0.164)	0.003 (0.832)	0.000 (0.130)	-0.002 (-1.018)
Female head	0.001 (0.969)	-0.000 (-0.195)	-0.000 (-0.510)	0.000 (0.439)
Unemp_share	0.004 (0.539)	0.007 (0.568)	0.006 (1.341)	-0.007 (-1.387)
Unemp_head	-0.010** (-1.980)	0.010 (0.896)	-0.004 (-1.042)	0.003 (0.499)
Elderly share	0.002 (0.490)	-0.004 (-0.686)	-0.000 (-0.169)	0.000 (0.032)
Adults (> 15 years)	-0.001 (-1.046)	0.001 (1.339)	-0.001** (-2.264)	0.000 (0.586)
Children (< 6 years)	0.001 (1.083)	-0.002 (-1.394)	-0.000 (-0.073)	0.002** (2.349)
Provincial controls	Yes	Yes	Yes	Yes
Insigma	-2.507*** (-185.496)	-2.281*** (-33.090)	-3.102*** (-115.340)	-2.653*** (-162.896)
lambda_category2	-0.037*** (-21.044)	0.034*** (3.117)	-0.008*** (-9.833)	-0.024*** (-15.882)
lambda_category3	0.007*** (2.776)	-0.119*** (-18.991)	0.002* (1.812)	0.003* (1.680)
Constant	-0.185*** (-22.832)	1.016*** (96.954)	-0.050*** (-12.732)	-0.148*** (-21.172)
Observations	27,687	27,684	27,687	27,687

Robust z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 12: Selectivity corrected estimated of budget share equations (2017)

VARIABLES	Food	Durables	Education	Health
Domestic	-0.022** (-2.436)	0.060** (2.403)	0.009*** (4.378)	0.001 (0.461)
International	-0.059*** (-2.901)	0.083*** (3.217)	0.010*** (2.590)	-0.002 (-0.799)
log_hsize	0.052*** (20.809)	-0.097*** (-10.128)	0.062*** (21.624)	-0.005*** (-6.993)
log_tot_exp	-0.071*** (-39.126)	0.066*** (11.098)	-0.027*** (-26.010)	0.016*** (17.848)
Urban	-0.090*** (-31.307)	0.079*** (5.944)	0.039*** (16.190)	-0.005*** (-4.945)
Tertiary Education HH Member	-0.040*** (-10.808)	0.112*** (6.568)	0.016*** (5.556)	0.000 (0.077)
Female head	-0.002 (-1.050)	-0.042*** (-6.322)	0.011*** (9.867)	0.001* (1.958)
Unemp_share	-0.055*** (-5.636)	-0.051 (-1.122)	-0.037*** (-4.956)	0.003 (0.893)
Unemp_head	0.026*** (2.682)	0.027 (0.624)	0.007 (1.003)	-0.000 (-0.110)
Eldershare	0.016*** (3.080)	-0.174*** (-12.295)	-0.023*** (-4.001)	0.003** (2.566)
Adults (> 15 years)	-0.004*** (-3.777)	0.003 (0.747)	-0.003*** (-5.072)	-0.000 (-0.319)
Children (< 6 years)	0.007*** (5.513)	0.030*** (7.315)	-0.017*** (-24.817)	0.000 (0.335)
Provincial controls	Yes	Yes	Yes	Yes
Insigma	-1.974*** (-66.989)	-0.678*** (-19.968)	-2.687*** (-73.212)	-3.334*** (-109.365)
lambda_category2	0.021** (2.232)	-0.066** (-2.489)	-0.007*** (-5.490)	0.000 (0.152)
lambda_category3	0.027 (1.329)	0.018 (1.212)	0.001 (0.428)	0.001 (1.096)
Constant	0.719*** (71.307)	-0.070* (-1.885)	0.140*** (14.859)	-0.071*** (-15.618)
Observations	27,783	27,783	18,722	27,783

Robust z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 13: Mixed multinomial logit regression results for treatments using distance to the Post Office as the Instrumental Variable (First Step) for 2011 Data

VARIABLES	Durables		Food		Health		Education	
	Internal Recipient	International Recipient	Internal Recipient	International Recipient	Internal Recipient	International Recipient	Internal Recipient	International Recipient
log_hsize	-0.013 (-0.255)	-0.066 (-0.662)	-0.014 (-0.273)	-0.072 (-0.734)	-0.013 (-0.256)	-0.070 (-0.708)	-0.012 (-0.245)	-0.070 (-0.700)
Urban	-0.090* (-1.672)	0.585*** (5.873)	-0.056 (-1.049)	0.675*** (6.943)	-0.053 (-0.997)	0.588*** (5.910)	-0.048 (-0.892)	0.588*** (5.899)
Tertiary Education HH Member	0.031 (0.447)	0.094 (0.707)	0.034 (0.499)	0.112 (0.850)	0.033 (0.481)	0.094 (0.706)	0.033 (0.480)	0.094 (0.701)
Female head	0.073* (1.942)	0.092 (1.224)	0.075** (1.977)	0.109 (1.470)	0.075** (1.988)	0.091 (1.215)	0.075** (1.976)	0.091 (1.215)
Unemp_share	0.134 (0.592)	-0.354 (-0.764)	0.129 (0.567)	-0.321 (-0.706)	0.130 (0.570)	-0.357 (-0.773)	0.144 (0.636)	-0.356 (-0.770)
Unemp_head	0.049 (0.232)	0.159 (0.367)	0.037 (0.173)	0.140 (0.326)	0.041 (0.190)	0.158 (0.365)	0.034 (0.157)	0.158 (0.363)
Elderly share	-0.083 (-0.734)	-0.404* (-1.693)	-0.082 (-0.717)	-0.382 (-1.631)	-0.083 (-0.727)	-0.406* (-1.702)	-0.077 (-0.679)	-0.406* (-1.701)
Adults (> 15 years)	0.027 (1.348)	-0.019 (-0.467)	0.027 (1.363)	-0.019 (-0.473)	0.027 (1.353)	-0.018 (-0.428)	0.026 (1.327)	-0.018 (-0.433)
Children (< 6 years)	-0.035 (-1.296)	-0.001 (-0.021)	-0.035 (-1.266)	0.001 (0.013)	-0.036 (-1.306)	-0.000 (-0.005)	-0.035 (-1.285)	-0.001 (-0.010)
Provincial controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distance to post office	-0.008*** (-10.928)	-0.000 (-0.281)	-0.009*** (-10.843)	0.000 (0.366)	-0.008*** (-10.743)	-0.000 (-0.290)	-0.008*** (-10.623)	-0.000 (-0.290)
Constant	-1.564*** (-22.649)	-3.300*** (-25.703)	-1.554*** (-22.121)	-3.341*** (-26.749)	-1.574*** (-22.653)	-3.298*** (-25.650)	-1.579*** (-22.665)	-3.298*** (-25.649)
Observations	27,631	27,631	27,628	27,628	27,631	27,631	27,631	27,631

Robust z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 14: Selectivity corrected estimates of budget share equations (2011) IV corrected using distance to post office as the instrumental variable

VARIABLES	Durables	Food	Health	Education
Domestic	0.027*** (13.643)	-0.048*** (-6.805)	0.009*** (7.433)	-0.005** (-2.229)
International	-0.021*** (-5.783)	0.096*** (12.535)	0.001 (0.363)	0.001 (0.171)
log_hsize	-0.001 (-0.407)	-0.002 (-0.684)	0.001 (1.158)	-0.001 (-0.564)
log_tot_exp	0.043*** (35.297)	-0.102*** (-63.964)	0.011*** (16.348)	0.032*** (28.478)
Urban	0.009*** (4.249)	-0.100*** (-33.589)	0.001 (0.716)	0.001 (0.736)
Tertiary Education HH Member	-0.001 (-0.379)	0.003 (0.804)	0.000 (0.146)	-0.002 (-0.948)
Female head	0.001 (0.816)	-0.000 (-0.176)	-0.000 (-0.504)	0.001 (0.736)
Unemp_share	0.004 (0.605)	0.007 (0.540)	0.006 (1.353)	-0.007 (-1.375)
Unemp_head	-0.011** (-2.019)	0.011 (0.925)	-0.004 (-1.040)	0.003 (0.554)
Eldery share	0.002 (0.531)	-0.004 (-0.718)	-0.000 (-0.161)	-0.000 (-0.027)
Adults (> 15 years)	-0.001 (-1.010)	0.002 (1.397)	-0.001** (-2.229)	0.000 (0.838)
Children (< 6 years)	0.001 (1.091)	-0.002 (-1.328)	-0.000 (-0.084)	0.001** (2.185)
Provincial controls	Yes	Yes	Yes	Yes
Insigma	-2.515*** (-182.561)	-2.412*** (-27.457)	-3.100*** (-115.745)	-2.604*** (-171.467)
lambda_category2	-0.039*** (-22.391)	0.049*** (6.363)	-0.008*** (-8.743)	0.003 (1.445)
lambda_category3	0.003 (1.114)	-0.125*** (-18.844)	-0.000 (-0.239)	0.000 (0.009)
Constant	-0.186*** (-22.897)	1.018*** (97.840)	-0.050*** (-12.696)	-0.144*** (-20.730)
Observations	27,631	27,628	27,631	27,631

Robust z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 15: Mixed multinomial logit regression results for treatments using the growth point as the IV (First Step) for 2011 Data

VARIABLES	Food		Health		Education		Durables	
	Internal Recipient	International Recipient	Internal Recipient	International Recipient	Internal Recipient	International Recipient	Internal Recipient	International Recipient
log_hsize	0.020 (0.380)	-0.067 (-0.618)	0.020 (0.377)	-0.066 (-0.609)	0.020 (0.370)	-0.068 (-0.630)	0.020 (0.369)	-0.064 (-0.594)
Urban	0.296*** (5.355)	0.547*** (5.398)	0.288*** (5.267)	0.543*** (5.424)	0.293*** (5.345)	0.531*** (5.275)	0.258*** (4.659)	0.537*** (5.349)
Tertiary Education HH Member	0.001 (0.011)	0.100 (0.685)	0.000 (0.005)	0.106 (0.731)	0.001 (0.016)	0.112 (0.773)	-0.001 (-0.018)	0.108 (0.746)
Female head	0.073* (1.834)	0.067 (0.826)	0.073* (1.838)	0.069 (0.847)	0.073* (1.827)	0.070 (0.864)	0.070* (1.772)	0.069 (0.845)
Unemp_share	0.240 (1.016)	-0.399 (-0.773)	0.224 (0.947)	-0.399 (-0.772)	0.238 (1.008)	-0.387 (-0.751)	0.235 (1.002)	-0.393 (-0.761)
Unemp_head	-0.057 (-0.252)	0.149 (0.302)	-0.047 (-0.208)	0.150 (0.305)	-0.056 (-0.247)	0.147 (0.300)	-0.041 (-0.185)	0.151 (0.308)
Eldery share	-0.095 (-0.794)	-0.336 (-1.301)	-0.097 (-0.808)	-0.328 (-1.267)	-0.094 (-0.780)	-0.329 (-1.272)	-0.095 (-0.796)	-0.330 (-1.276)
Adults (> 15 years)	0.018 (0.877)	-0.020 (-0.427)	0.018 (0.881)	-0.019 (-0.422)	0.018 (0.864)	-0.019 (-0.413)	0.018 (0.869)	-0.020 (-0.438)
Children (< 6 years)	-0.029 (-1.016)	0.028 (0.498)	-0.030 (-1.061)	0.028 (0.488)	-0.029 (-1.033)	0.028 (0.494)	-0.029 (-1.034)	0.028 (0.483)
Provincial controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distance to growth point	-0.005*** (-9.045)	-0.001 (-0.751)	-0.005*** (-9.148)	-0.001 (-0.767)	-0.005*** (-9.039)	-0.001 (-0.721)	-0.005*** (-9.274)	-0.001 (-0.729)
Constant	-1.667*** (-23.556)	-3.281*** (-24.648)	-1.665*** (-23.622)	-3.283*** (-24.745)	-1.667*** (-23.616)	-3.280*** (-24.728)	-1.655*** (-23.614)	-3.284*** (-24.743)
Observations	25,423	25,423	25,426	25,426	25,426	25,426	25,426	25,426

Robust z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 16: Selectivity corrected estimates of budget share equations (2011) using distance to the growth point as IV

VARIABLES	Food	Health	Education	Durables
Domestic	-0.035 (-1.214)	0.009*** (8.102)	0.004** (2.046)	0.027*** (13.473)
International	-0.060* (-1.869)	0.002 (0.818)	0.015*** (3.995)	-0.022*** (-5.470)
log_hsize	-0.003 (-1.146)	0.000 (0.398)	-0.000 (-0.360)	-0.000 (-0.021)
log_tot_exp	-0.101*** (-59.412)	0.011*** (15.763)	0.031*** (26.989)	0.044*** (34.260)
Urban	-0.099*** (-30.168)	0.001 (0.752)	0.002 (1.096)	0.010*** (4.413)
Tertiary Education HH Member	0.004 (0.992)	-0.000 (-0.231)	-0.002 (-1.352)	0.000 (0.050)
Female head	-0.001 (-0.248)	-0.000 (-0.382)	0.001 (0.587)	0.001 (0.958)
Unemp_share	0.001 (0.082)	0.006 (1.356)	-0.010** (-1.966)	0.003 (0.471)
Unemp_head	0.011 (0.946)	-0.004 (-1.218)	0.005 (0.946)	-0.011** (-1.984)
Eldery share	-0.007 (-1.081)	-0.000 (-0.215)	-0.001 (-0.177)	0.002 (0.679)
Adults (> 15 years)	0.002 (1.602)	-0.001 (-1.531)	0.000 (0.646)	-0.001 (-1.020)
Children (<6 years)	-0.002 (-1.467)	0.000 (0.567)	0.001** (2.026)	0.001 (1.223)
Provincial controls	Yes	Yes	Yes	Yes
Insigma	-1.887*** (-23.975)	-3.110*** (-109.747)	-2.647*** (-157.563)	-2.531*** (-181.030)
lambda_category2	0.031 (0.965)	-0.009*** (-10.197)	-0.008*** (-3.877)	-0.039*** (-22.388)
lambda_category3	0.041 (1.252)	-0.001 (-1.315)	-0.016*** (-6.581)	0.004 (1.452)
Constant	1.029*** (79.657)	-0.052*** (-11.949)	-0.151*** (-19.468)	-0.206*** (-22.261)
Observations	25,423	25,426	25,426	25,426

Robust z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Appendix

Table A1: Data description for the used variables

Variable	Description
Domestic recipient	Dummy variable: 1 if household received domestic remittances, 0 otherwise.
International recipient	Dummy variable: 1 if household received international remittances, 0 otherwise.
Tot_exp	Total household expenditure
Age	Age of household head
Household size	Number of people in a household (hh)
Urban	Dummy variable: 1 if household is located in the urban area, 0 otherwise
Tertiary Education HH Member	Dummy variable: 1 if household has a member with tertiary education, 0 otherwise.
Female share (>15)	Number of females aged 16 years or in the hh divided by household size
Unemployment share	Number of household adults unemployed divided by household size
pov_emp_member	Dummy variable: 1 if household has a paid employee working in a registered/licensed establishment
Female head	Dummy variable: 1 if household head is female, 0 otherwise
Own land	Dummy variable: 1 if household owns a piece of land, 0 otherwise
Children (<6)	Number of household children aged 6 years or less.
percap_cons_r	Total household consumption expenditure divided by household size
Elderly share (>65 years)	Number of adults aged 65 years or more divided by household size
unemp_head	Dummy variable: 1 if household head is unemployed, 0 otherwise
Adults (> 16 years)	Number of adults in the family (16 years or more)
Provincial controls	Control for the provinces in Zimbabwe
Married	Dummy variable: 1 if household head is married, 0 otherwise
Tertiary Education HH head	Dummy variable: 1 if household head has a tertiary level of education, 0 otherwise
Distance to growth point	The distance from the growth point to the household
Distance to post office	The distance from the post office to the household