

Remittances, Household Investment and Poverty in Indonesia

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Abstract

This paper analyzes the impact of international remittances on household investment and poverty using panel data (2000 and 2007) from the Indonesian Family Life Survey (IFLS). Using a three-stage conditional logit model with instrumental variables to control for selection and endogeneity, it finds that households receiving remittances in 2007 spend more at the margin on one key consumption good (food) and more at the margin on one important investment good (education) compared to what they would have spent on these goods without the receipt of remittances. Using a bivariate probit model with random effects to control for selection and simultaneity, the paper also finds that households receiving remittances are less likely to be poor compared to a situation in which they did not receive remittances. These findings are important because they show that households can use remittances to help build human capital and to reduce poverty in remittance-receiving countries.

JEL Classifications: F24, O12, O15, O53

Keywords: remittances, investment, poverty, Indonesia

1. Introduction

1.1. The Importance of Remittances for Investment and Poverty

International remittances refer to the money and goods that are transmitted to households by migrant workers working outside of their origin communities. At the start of the 21st Century these

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resource transfers represent one of the key issues in economic development. In 2016 world international remittances amounted to US \$581 billion (World Bank, 2016) and were about 4.2 times larger than the level of official net flows of development aid (OECD, 2016).

From the standpoint of economic development, two key questions surround these large remittance flows: (a) How are international remittances spent or used by households in origin countries?; and (b) What is the impact of these remittances on poverty in the developing world? Answers to these two key questions seem central to any attempt to evaluate the overall effect of migration and remittances on the developing countries of Latin America, Asia and Sub-Saharan Africa.

1.2. Literature Review

In the literature there are at least three competing views on how international remittances are spent or used by households, and their effect on economic development. The first, and probably most widespread, view is that remittances are fungible and are spent at the margin like income from any other source, which implies that a dollar of remittance income is treated by the household just like a dollar of wage income, and remittance income is spent just like any other source of income. The second view argues that the receipt of remittances can cause behavioral changes at the household level and that remittances tend to get spent on consumption rather than investment goods. For example, a review of the literature by Chami, Fullenkamp and Jahjah (2003, p.10-11) reports that a “significant proportion, and often the majority” of remittances are spent on “status-oriented” consumption goods. A third, and more recent, view arising out of the permanent income hypothesis is that since remittances are a transitory type of income households tend to spend them more at the margin on investment goods – human and physical capital investments – than on consumption goods, and that this can contribute positively to economic development (Adams Jr., 1998). For instance, in a recent study in Guatemala, Adams Jr. and Cuecuecha (2010) find that households receiving remittances spend less at the margin on food and more at the margin on investment goods (education and housing). In a similar study in the Philippines, Yang (2008) reports that positive exchange rate shocks lead to a significant increase in remittance expenditures on education.

On the issue of remittances and poverty, the literature is a bit clearer: most studies find that international remittances reduce poverty in developing countries. For example, using data from household surveys in 71 developing countries, Adams Jr. and Page (2005) report that, on average, a 10 percent increase in international remittances in a developing country will lead to a 3.5 percent decline in the share of people living in poverty. In a similar study using household survey data from 10 Latin American countries, Acosta, Calderon, Fajnzylber and Lopez (2006) find that international remittances reduce poverty by 0.4 percent for each percentage point increase in the remittances to GDP ratio. Finally, at the country level, Lopez-Cordova (2005) in Mexico, Yang and Martinez (2006) in the Philippines and Lokshin, Bontch-Osmolovski and Glinskaya (2010) in Nepal all find that international remittances reduce poverty.

1.3. Panel Data and the Causal Effect of Remittances

The purpose of this paper is to extend the debate concerning the impact of international remittances on household investment and poverty by analyzing the results of a large, panel household budget survey in Indonesia. Indonesia represents a good case study for examining these issues because the country produces a large number of international migrants to Malaysia, Saudi Arabia and other countries.¹ Also, the presence of panel household data from Indonesia makes it possible to overcome several of the methodological problems – simultaneity, reverse causality, and omitted variable bias – that bedevil any economic work on international remittances.

¹ According to the Hernández-Coss *et al.* (2008, p.8), 85 percent of the Indonesians that were approved to work abroad in 2006 went to Malaysia and Saudi Arabia.

The paper is based on two methodologies, one for the analysis of the effect of international remittances on household investment, and another for the analysis of the impact of remittances on poverty. Evaluating the impact of remittances on household investment faces the obvious challenge of selection, that is, households receiving remittances might have unobserved characteristics (e.g. more skilled, able or motivated members), which are different from households not receiving remittances. If these unobserved characteristics are constant through time, the use of panel data methodologies can eliminate the bias that they produce; however, if the unobserved characteristics change over time, it is still important to address the problem of selection in unmeasured characteristics.

To address this issue we use a three-stage conditional logit model that tests for the existence of selection bias in the household receipt of remittances. The identification of this model is based on the use of instrumental variables. Since past research has found that historical distance to railroad lines and changes in rainfall patterns are important in the receipt of international remittances (e.g. Adams Jr. & Cuecuecha, 2010; Woodruff & Zenteno, 2007; Munshi, 2003), our identification strategy focuses on these variables.

This instrumental approach enables us to control for selection and to compare the predicted marginal budget shares for households conditional on their household characteristics and their receipt of remittances with the counterfactual marginal budget shares of households conditional on their household characteristics and on the hypothetical condition where they do not receive remittances. By comparing the predicted and counterfactual marginal budget shares of households we are able to pinpoint how households receiving remittances spend at the margin on a broad range of consumption and investment goods, including food, housing and education.

Our methodology for analyzing the impact of remittances on poverty not only faces the challenge of selection but also the problem of potential simultaneity. These problems exist because the levels of income and choices made by households that lead them to be poor are very likely correlated to their choice of whether or not to receive remittances. Moreover, these household decisions are all made in the presence of unobserved (to the econometrician) heterogeneity. To address these concerns, we use the type of bivariate probit model with random effects proposed by Carrasco (2001). This bivariate probit model allows us to calculate household probabilities of being poor and not being poor conditioning on the receipt of remittances. This in turn enables us to obtain the average treatment effects of remittances on the probability of a household being poor or not being poor.

The paper proceeds in seven further parts. Section 2 presents the data. Since the problems of selection and identification are so important, Section 3 presents the three-stage conditional logit model and discusses the various identification issues involved in estimating this model. Section 4 estimates the three-stage model with selection controls. Section 5 presents the predicted and counterfactual marginal budget shares for households receiving remittances and uses average treatment effects to compare outcomes. Section 6 presents the bivariate probit model for estimating the impact of remittances on the probability of a household being poor. Section 7 estimates this probit model and presents average treatment effects on outcomes. The final section, Section 8, concludes.

2. Data

Data come from the Indonesia Family Life Survey (IFLS), an on-going panel household survey in Indonesia. The IFLS Survey includes four waves of surveying, IFLS 1 (1993), IFLS 2 (1997), IFLS 3 (2000) and IFLS 4 (2007). However, since this paper is on international remittances, and consistent definitions of remittance variables could not be developed for all four waves of the IFLS survey, the focus here is on the last two waves of the survey, IFLS 3 (2000) and IFLS 4 (2007). These two waves include a total of 5301 urban and rural households. While the IFLS Survey was never designed to be nationally representative, the last two waves of the survey do include

households from 19 of Indonesia's 33 provinces. In terms of data collected, the IFLS Survey was comprehensive, collecting detailed information on a wide range of topics, including expenditure, education, health, nutrition, financial assets, household enterprises and remittances.

It should, however, be emphasized that the IFLS Survey was not designed as a migration or remittances survey. In fact, it collected very limited information on these topics. With respect to international migration, the survey collected only limited information on migrants who have been gone from the household for more than one year: their age, education or income earned away from home.² This means that limited data are available on the characteristics of most international migrants who are currently living outside of the household. With respect to international remittances, the IFLS Survey only contains information from three types of questions: (1) Does your household receive remittances from spouse, parents or children?; (2) Where do these people sending remittances live?; and (3) How much (remittance) money did your household receive in the past 12 months? The lack of data on individual migrant characteristics in the IFLS survey is unfortunate, but the presence of detailed information on international remittances and household expenditures makes it possible to use responses in the survey to examine the impact of remittances on household expenditure behavior.

Since the focus here is on remittances, it is important to clarify how these income transfers are measured and defined. Each household that is recorded as receiving international remittances is assumed to be receiving exactly the amount of remittances measured by the survey, which implies that households which have migrants who do not remit are not recorded in this study as receiving remittances; rather these households are classified as non-remittance receiving households. This assumption seems sensible because migration surveys in other countries generally find that about half of all migrants do not remit.³ Because of data limitations, the focus throughout this study is on the receipt of international remittances by the household rather than on migration or the type of person sending remittances. Finally, international remittances include both cash and in-kind remittances. The inclusion of in-kind remittances (food and non-food goods) is important because it leads to a more accurate measure of the actual flow of remittances to households in Indonesia.

Table 1 presents summary data from IFLS 3 (2000) and IFLS 4 (2007). It shows that the number of households receiving international remittances in Indonesia is fairly small: in 2000, 169 households (3.2 percent of all households) receive remittances, and in 2007, 179 households (3.3 percent of all households) receive remittances.⁴ According to the table, households receiving international remittances in Indonesia have older household heads, have fewer household members with high school and university education, and are more likely to be located in rural areas. Households receiving international remittances also tend to have lower mean per capita expenditures than households without remittances. For households receiving remittances, remittances represent 26.0 percent of total household expenditures in 2000 and 29.0 percent of expenditures in 2007. However, since households receiving international remittances in Indonesia also have low levels of expenditure, the absolute amount of remittances received in annual per capita terms by households is quite low: not exceeding US \$30 in either year.⁵

² The IFLS Survey contains detailed information on international migrants who are listed on the household roster (that is, migrants who have been gone less than one year), but it does not contain any information on migrants who are not listed on the household roster (that is, those who have been gone for more than one year).

³ For example, in their study in the Dominican Republic, de la Briere, Sadoulet, de Janvry and Lambert (2002) find that fully half of all international migrants do not remit.

⁴ By contrast, recent nationally representative household surveys in Guatemala (2000) and Ghana (2005/06) show that the share of households receiving international remittances was 7.1 percent and 5.4 percent, respectively. For details on these surveys, see Adams and Cuecuecha (2010) on Guatemala, and Adams and Cuecuecha (2013) on Ghana.

⁵ By contrast, the household surveys cited in note (4) show that the absolute amount of international remittances received in annual per capita terms by remittance-receiving households was US \$365 in Guatemala and US \$417 in Ghana (nominal terms).

Table 1. Summary of data on non-remittance and remittance-receiving households, Indonesia, 2000 and 2007

Variable	2000			2007		
	No remittances	Receive remittances	t-test ^a	No remittances	Receive remittances	t-test ^a
Mean age of household head (years)	50.17 (29.13)	55.03 (14.22)	2.19***	52.80 (12.82)	56.53 (15.26)	4.26***
Number of children below 5 years in household	0.38 (0.59)	0.40 (0.65)	0.37	0.28 (0.53)	0.35 (0.60)	1.93*
Number of children between 6 and 18 years old in household	1.38 (1.22)	1.22 (1.17)	-1.63	1.03 (1.08)	1.05 (1.06)	0.33
Number of household members with primary education	1.46 (1.15)	1.20 (.82)	-0.07	1.32 (1.10)	1.33 (1.06)	0.12
Number of household members with high school and university education	0.74 (1.17)	0.59 (.93)	-2.16**	.93 (1.25)	0.61 (0.93)	-3.78***
Area (0=rural, 1=urban)	0.33 (0.47)	0.21 (0.41)	-3.15***	0.38 (0.48)	0.28 (0.45)	-3.26***
Mean annual per capita household expenditures (000 Indonesian rupiah) at 2000 prices	702.5 (861)	614.2 (471)	-1.34	1007.8 (3573)	931.3 (1240)	-.032
Remittances as percent of total per capita household expenditure	NA	26.0 (42)	NA	NA	29.0 (63)	NA
N	5132	169		5122	179	

Notes: N=5301 households. Standard deviations are in parentheses. In 2000, 8422 Indonesian rupiah=US\$1.00; in 2007, 9141 Indonesia rupiah=US\$1.00

^a Receive remittances vs. no remittances

Source: Indonesia Family Life Survey (IFLS), 2000 and 2007

*Significant at the 0.10 level. **Significant at the 0.05 level. ***Significant at the 0.01 level

Since the focus of this paper is on household expenditure behavior, it is important to present the type of expenditure data contained in the IFLS Survey (2000 & 2007). Table 2 shows that the survey collected detailed information on five major categories of expenditure, and on several subdivisions within each category. While the time base over which these expenditure outlays were measured varied (from last 7 days for most food items, to last year for most durable goods), all expenditures were aggregated to obtain yearly values. For household durables (stove, refrigerator, automobile, etc), annual use values were calculated to obtain an estimate of the cost of one year's use of that good. Annual use values were also calculated to obtain an estimate of the one-year use value of housing (rented or owned).

Table 2 also shows the average budget shares devoted to the five categories of goods for each of the four groups of households. On average, each of the four groups of households spends over 53 percent of their budgets on one key consumption item – food – and less than 6 percent of their budgets on education.

Table 2. Expenditure categories and average budget shares, Indonesia, 2000 and 2007

Expenditure category	Description	No remittances in 2000, no remittances in 2007	Remittances in 2000, no remittances in 2007	No remittances in 2000, remittances in 2007	Remittances in 2000, remittances in 2007
		2000 2007	2000 2007	2000 2007	2000 2007
Food	Purchased food	0.600	0.609	0.615	0.627
	Non-purchased food	0.551	0.535	0.550	0.563
Education	Educational expenses	0.049	0.049	0.045	0.029
		0.051	0.051	0.056	0.049
Housing	Housing value	0.100	0.091	0.092	0.093
		0.112	0.157	0.114	0.110
Health	Health expenses	0.018	0.024	0.010	0.017
		0.020	0.030	0.020	0.052
Other	Household durables,	0.232	0.227	0.238	0.234
	Transport,	0.266	0.226	0.260	0.225
	Communications, Legal				
		1.000 1.000	1.000 1.000	1.000 1.000	1.000 1.000

Notes: N=5301 households. All values are weighted. International remittances include remittances received from spouse, parents and children

Source: Indonesia Family Life Survey (IFLS), 2000 and 2007

3. An Econometric Model of Household Incomes with Selection Controls and the Estimation of the Marginal Expenditure Behavior of Households

The purpose of this section is to analyze the marginal expenditure patterns of households receiving remittances. To do this, it is necessary to choose a proper functional form for the econometric model. The selected functional form must do several things. First, it must provide a good statistical fit to a wide range of goods, including food, housing and education. Second, the selected form must mathematically allow for rising, falling or constant marginal propensities to spend over a broad range of goods and expenditure levels. A model specification that imposes the same slope (or marginal budget share) at all levels of expenditure would not be adequate. Third, the chosen form should conform to the criterion of additivity (i.e. the sum of the marginal propensities for all goods should equal unity).

The Working-Leser model meets the three requirements and relates budget shares linearly to the logarithm of total expenditure. This model can be written as:⁶

$$\frac{C_s}{EXP} = \beta_s + \frac{\alpha_s}{EXP} + \gamma_s(\log EXP) \quad (1)$$

⁶ The functional form used in this analysis differs from the Working-Leser model because it includes an intercept in equation (1). In theory, C_s should always equal zero whenever total expenditure EXP is zero, and this restriction should be built into the function. But zero observations on EXP invariably lie well outside the sample range. Also, observing this restriction with the Working-Leser model can lead to poorer statistical fits. Including the intercept term in the model has little effect on the estimation of marginal budget shares for the average person, but it can make a significant difference for income redistribution results. For more on the Working-Leser model, see Prais and Houthakker (1971).

Where C_s / EXP is the share of expenditure on good s in total expenditure EXP . Adding up requires that $\sum C_s / EXP = 1$.

Equation (1) is equivalent to the Engel function:

$$C_s = \alpha_s + \beta_s EXP + \gamma_s (\log EXP) EXP \quad (2)$$

To estimate the marginal expenditure shares of households we use a three-stage model to estimate predicted and counterfactual expenditures for households taking into account selection bias. In the first stage of the model, we estimate the probability of a household receiving remittance using a conditional logit specification.⁷ In the second stage, we use a Gaussian kernel to estimate weights that assign larger weights to observations with lower selection bias. In the third stage of the model, we use a first difference regression for households that always receive remittances or households that never receive remittances in order to obtain the parameters for our expenditure equations. This regression is weighted according to the weights obtained in the second stage and controls for selection using the probabilities of receiving remittances that are estimated in the first stage.

The panel data from Indonesia is for two years (2000 and 2007) and this gives us certain advantages over simple cross-sectional data. For example, we know whether households have chosen to receive remittances in each of four states: (1) receive no remittances in either year; (2) receive remittances in 2000 but not in 2007; (3) receive remittances in both years, 2000 and 2007; and (4) receive remittances in 2007 but not in 2000. Moreover, some of the characteristics of our households are fixed, and thus do not change according to their remittance status, while other unobservable characteristics change depending on how the households choose between the four states.

In the first stage of our model, we assume that the decision process of the households can be represented as follows: in time period 1, households can select between two states (r): (1) receive no remittances; (2) receive remittances. Once households have chosen their state, they decide their level of expenditure C_{tr} , where C_{tr} is the optimal expenditure for households that chose $r=r$. At time period 2, they can again select between two states (r): (1) receive no remittances; (2) receive remittances. Once households have chosen their state, they decide their level of expenditure $C_{t+1,r}$. We assume that a conditional logit process represents the decision tree and that for any good s we have a system of equations (we abstract from the subscript s for simplicity):

$$d_{it} = I(X'_{it}\beta + \omega_i - u_{it} \geq 0) \quad (3)$$

$$C_{0it} = \beta_0 EXP_{it} + \gamma_0 (EXP_{it})(\log EXP_{it}) + \sum_j (\mu_{0j} Z_{jit} + \lambda_{0j} (EXP_{it}) Z_{jit}) + a_{0i} + \varepsilon_{0it} \text{ if } d_{it} = 0 \quad (4)$$

$$C_{1it} = \beta_1 EXP_{it} + \gamma_1 (EXP_{it})(\log EXP_{it}) + \sum_j (\mu_{1j} Z_{jit} + \lambda_{1j} (EXP_{it}) Z_{jit}) + a_{1i} + \varepsilon_{1it} \text{ if } d_{it} = 1 \quad (5)$$

Where X_j represents the j th characteristic of the i th household that enters the remittances decision equation, Z_j represents the j th characteristic of the household that enters the consumption equations, C_{0it} represents expenditure by household i in time t , when the household does not receive remittances; EXP_{it} is the total expenditure of the household, a_{0i} represents the fixed effect that enters the equation for households that do not receive remittances, and ε_{0it} represents the error term in the consumption equation for households that do not receive remittances. C_{1it} represents the expenditure for each household i in time t that receives remittances, a_{1i} represents the fixed effect that enters the equation for households that receives remittances, and ε_{1it} represents the error term in the consumption equation for households that receive remittances.

To identify the model, we need instrumental variables that enter the conditional logit estimation, but do not enter the other stages of the model. In our case, these instrumental variables are two: (1)

⁷ The original method proposed by Kyriazidou (1997) uses a conditional maximum score estimator. Charlier, Melenberg and van Soest (2001) propose the use of a conditional logit.

the distance from kabupaten (district) to railroad station in 1930; and (2) the level of rainfall in 1995-1999.⁸ Our rationale for using these two instrumental variables is as follows.

The first railroad line in Indonesia opened in 1867. A continuous railroad line between Jakarta and Surabaya, the two largest cities in Java, opened in 1894. Between 1900 and 1930 smaller railroad lines were constructed in Madura, Sumatra and South Celebes. In Indonesia distance to railroad lines in 1930 represents a good instrumental variable because it is related to migration costs in the past and to the need for sending migrants in the past, and therefore to the development of present day migrant social networks, but it is not correlated with the expenditure patterns of households at the time of the 2000 and 2007 IFLS Surveys. We calculated distance to railroad lines for each household using the distance from the kabupaten (district) to the nearest railroad station in 1930, using historical maps from the Indonesian Railway Authority, and then cross-checking this information with the IFLS Surveys. Woodruff and Zenteno (2007) used this type of instrument for the case of Mexico, and Adams Jr. and Cuecuecha (2010) for the case of Guatemala.

Changes in rainfall have also been used before in the literature as an instrumental variable in the cases of Mexico, the Philippines, and Guatemala (Munshi, 2003; Yang and Choi, 2007; Adams Jr. & Cuecuecha, 2010). The argument here is that rain is closely correlated with agricultural production and income, and so too little rain in one or several years may cause people to migrate out of rural areas. For this reason, changes in historical rain are correlated with the formation of migrant networks and with the receipt of remittances, but changes in historical rain are not correlated with unobserved changes in consumption patterns. We obtained historical rainfall information at the meteorological station level in Indonesia from the IFLS data. We then calculated the average level of rainfall for the period 1995 to 1999, by district. Our argument here is that changes in migration patterns and the receipt of remittances are influenced by the actual level of rainfall for 1995 to 1999, since the level of rainfall is exogenous at the beginning of the decision process estimated with our data.

For the two instrumental variables, our claim is that conditional on the set of human capital, household and district characteristics included in our specification, the unobserved components in the expenditure equation of the households are uncorrelated with the two instruments.

Equations (4) and (5) can be first differenced for households that did not change their remittance status, either because they have never received remittances or because they have always received remittances. We need to use first differences to eliminate the fixed effect in the expenditure equation. So, for households whose remittance status has always been r , the change in consumption is defined as:

$$\Delta C_{rit} = \beta_i \Delta EXP_t + \gamma_i [(EXP_t)(\log EXP_t) - (EXP_{t-1})(\log EXP_{t-1})] + \sum_j (\mu_{ij} \Delta Z_{jt} + \lambda_{ij} [(EXP_t)Z_{jt} - (EXP_{t-1})Z_{jt-1}]) + v_{it} \quad (6)$$

Where we have that $v_{it} = u_{it} - u_{it-1}$. Notice that equation (6) is only defined for either households that always receive remittances or for households that never receive remittances. Moreover, if unobservable components that participate in the expenditure function actually change over time, the estimation of equation (6) may still suffer from selection bias. In our case, since we have a time lag of seven years (2000 to 2007) between surveys, it is quite possible that unobservable components might have changed over time. Therefore, to control for selection, we apply two further corrections to equation (6). The first correction follows Kyriazidou (1997) and Charlier *et al.* (2001). The second correction follows Dubin and McFadden (1984) and Bourguignon, Fournier and Gurgand (2007).

⁸ In a simpler version of the model, one in which the effect of receiving remittances is modeled as a change in intercept in the expenditure equation, the two instruments are tested for under-identification, weakness and over-identification. The three instruments are significant at the 1% level in the first stage, the instruments reject the null hypothesis of under-identification, the instruments present a Cragg-Donald F statistic that demonstrates that they are not weak, and the tests do not reject the null of valid instruments.

The first correction represents the second stage in our method. Kyriazidou (1997) and Charlier *et al.* (2001) propose to estimate equation (6) by weighting observations according to a function of the differences between the linear predictions of the selection equations for times t and $t-1$. In our case, this corresponds to obtaining the difference between the linear predictions at time t and time $t-1$, which becomes:

$$F(D_{it}) = F(x'_{it}\beta - u_{it} - x'_{it-1}\beta + u_{it-1}) \quad (7)$$

Note that households for which D_{it} is near zero have a very similar probability of being in their respective branches and consequently similar selection bias, while households for which D_{it} is different from zero differ more in their selection bias over time. Function $F(\cdot)$ is obtained using a Gaussian kernel function. The Gaussian kernel function is selected because it generates weights that assign higher probabilities to events near zero and lower probability to events farther away from zero, in either direction. Therefore, households with smaller selection bias are given a higher weight in the estimation.

The second correction represents the third stage in our method. It is based on a method proposed by Dubin and McFadden (1984) and Bourguignon *et al.* (2007). This is a method which is used in cross-section data and that corrects selection bias when multiple sources of bias are present. Here, we realize that our conditional logit structure generates $k=4$ four potential household types: (1) households that never receive remittances; (2) households that did not receive remittances in 2000, but changed their status to receive remittances in 2007; (3) households that receive remittances in 2000, but change their status to not receiving in 2007; and (4) household that always receive remittances. Since we only need to estimate the equations for either households that never receive remittances or households that always receive remittances we need to express the expected value of v_{it} taking into account the type of household k that we are studying. It can be shown that the expected value of v_{it} conditional on being in the equation of a household of type k' can be represented as a linear combination of the probabilities of being a household of each of the other three types. We use this to express the change in consumption in good s as follows:

$$\Delta C_{rt} = \beta_r \Delta EXP_t + \gamma_r [(EXP_t)(\log EXP_t) - (EXP_{t-1})(\log EXP_{t-1})] + \sum_j (\mu_{rj} \Delta Z_{jt} + \lambda_{rj} [(EXP_t)Z_{jt} - (EXP_{t-1})Z_{jt-1}]) + \sum_{k \neq k'} \rho_{kk'} \pi_k + v_t \quad (8)$$

the polynomial on π_k represents the probability of being a household of type k . Therefore we estimate equation (8) weighting observations using function (7). Equation (8) is obtained using constrained least squares.⁹ The marginal budget share (MBS) for good s (we omit subscript for good s , for simplicity) can be shown to be equal to:

$$MBS_{rt} = \beta_r + \gamma_r (1 + \log EXP_t) + \sum_j \lambda_{rj} (Z_{jt}) \quad (9)$$

Notice that our estimation of the MBS only depends on values of total expenditure at time t and observables Z_{jt} , consequently it depends only on information at time t and therefore we obtain the value for the MBS at time t with remittance status r . For our case, we will obtain the MBS for households that receive remittances in 2007 and households that do not receive remittances in 2007. To obtain the effect of remittances on MBS it would be tempting to compare the MBS for households that receive remittances with the MBS for households that do not receive remittances. However, this comparison would confuse the effect of remittances on MBS with differences in observable characteristics between households that receive remittances and households that do not receive remittances.

⁹ To normalize the changes in expenditure shares over time we follow the following reasoning: all changes in the five expenditure goods should add up to the aggregate change in expenditure observed for each household. Therefore, all changes in expenditure are expressed as a fraction of the total change in expenditure per household. Moreover, we constrained the estimation to guarantee that the sum of the different MBS adds to one.

The average treatment effect on the treated (ATT) that we estimate is based on the difference between predicted MBS and a counterfactual MBS that let us condition on the characteristics of the households that receive remittances, as follows:

$$ATT = MBS_{1t} - MBS_{0t}^{CF} = \beta_1 - \beta_0 + (\gamma_1 - \gamma_0)(1 + \log EXP_t) + \sum_j (\lambda_{1j} - \lambda_{0j})(Z_{jt}) \quad (10)$$

The above ATT can be calculated for two types of households: those that received no remittances in 2000, but receive remittances in 2007; and those that received remittances in both 2000 and 2007. Because both of these groups of households have received remittances, we would expect a different magnitude in the effects of remittances. We will obtain the ATT for these two types of households as well as the overall difference. Notice that the ATT can be understood as comparing the marginal behavior of a household that receives remittances in 2007 with the hypothetical marginal behavior of that household if it did not receive remittances in 2007.

4. Estimating the Econometric Model with Selection Controls

Table 3 shows the results for the first-stage conditional logit on the household probability of receiving international remittances in 2007. It shows that households with more household members below five years old are significantly more likely to receive remittances.

Table 3. Conditional logit model on the household probability of receiving remittances, Indonesia, 2007

Dependent variable: Does household receive international remittances in 2007?		
Variable	Coefficient	Sd
Human Capital		
Number of household members over age 15 with primary education	-0.051	0.147
Number of household members over age 15 with junior secondary education	0.251	0.190
Number of household members over age 15 with high school to university education	-0.001	0.003
Household Characteristics		
Age of household head	-0.268	0.318
Sex of household head (1=male)	0.339	0.196
Number of children below 5 years	0.056*	0.121
Number of children between 6 and 18 years old	-0.001	0.003
Instrumental variables		
Distance from kabupaten (district) to railroad in 1930, adjusted	-0.009**	0.004
Rainfall, 1995-1999	3.43E-06**	1.78E-06
Log likelihood	-146.48	N/A
Likelihood ratio test for model	28.65**	N/A
Chi squared test for rainfall and distance to railroad	5.97**	N/A
N	464	N/A

Notes: Table reports the coefficients of a variable on the probability of household receiving international remittances in 2007. The model also includes a dummy for urban/rural areas, a dummy for whether there is a

financial institution in the village, and dummies for four Indonesia regions. The distance to railroad variable is adjusted in the following manner: for households that never receive remittances the variable is the simple distance to railroad; for households that receive remittances in 2007 but not in 2000, it adds 3 to the distance to railroad variable; for households that receive remittances in 2000 but not in 2007, it adds 2 to the distance to railroad variable; and for households that receive remittances both in 2000 and 2007, it adds 4 to the distance to railroad variable.

**Significant at the 0.05 level., * Significant at the 0.10 level.

In Table 3 both of the instrumental variables are also significant. The instrumental variable, distance from kabupaten (district) to railroad, is negatively related to the receipt of remittances. This suggests that households living further away from a railroad in 1930 are less likely to receive international remittances in 2007. The other instrumental variable, rainfall from 1995 to 1999, is positively related to the receipt of remittances. This means that households living in areas with more rainfall before 2000 have a higher probability of receiving remittances in 2007.

Figure 1 shows the distribution of weights obtained in the second stage equation. The figure shows that the distribution has a mode located near zero, but with a long left tail. Consequently, households with a lower difference in linear predictions between time t and time t-1 receive a larger weight in the estimation.

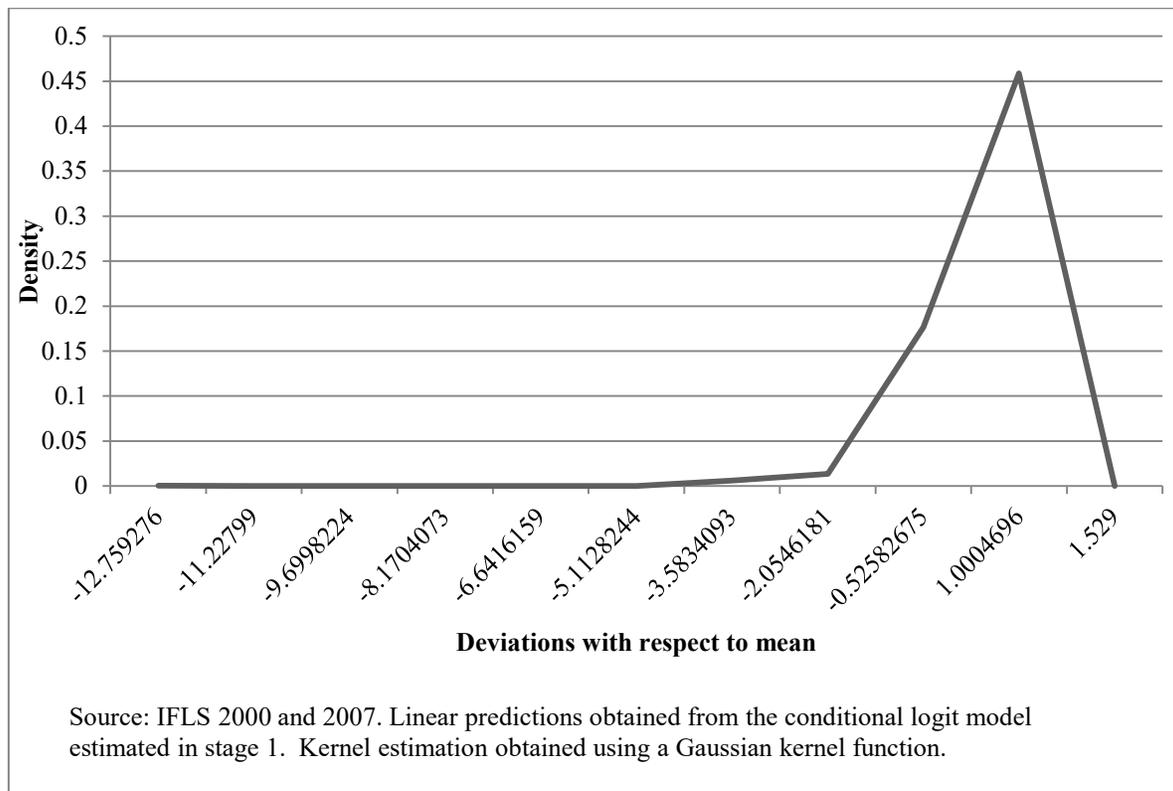


Figure 1. Gaussian Kernel estimations for the distribution of differences in linear predictions in time t and time t-a, Indonesia 2000 and 2007

Tables 4 and 5 show the results of estimating the marginal expenditure behavior of two types of households: (1) households that never receive remittances (Table 4); and (2) households that receive remittances in both 2000 and 2007 (Table 5).

Table 4. Household expenditure estimates (selection corrected, fixed effects) for households that never receive remittances

Variable	Food	Education	Housing	Health	Other
Expenditure	1.867*** (0.281)	0.063 (0.040)	1.451*** (0.120)	1.004*** (0.053)	-4.547*** (0.142)
Expenditure*log(Exp)	-0.164*** (0.013)	-0.005 (0.005)	-0.167*** (0.014)	-0.092*** (0.006)	0.498*** (0.017)
<i>Human Capital</i>					
Number of household members over age 15 with primary education	74.400 (71.963)	64.792*** (8.592)	21.922 (26.088)	-80.391*** (11.489)	-231.826*** (30.846)
Number of household members over age 15 with junior secondary education	171.426** (69.452)	9.208 (9.188)	-169.595*** (27.896)	-63.468*** (12.285)	168.313*** (32.985)
Number of household members over age 15 with senior secondary and above education	131.663*** (19.090)	134.828*** (6.915)	-60.939*** (20.995)	38.260*** (9.246)	-270.871*** (24.824)
<i>Household Characteristics</i>					
Age of household head	1.381 (1.111)	1.823*** (0.602)	-15.061*** (1.827)	-3.635*** (0.805)	10.789*** (2.160)
Sex of household head (1=male)	58.938 (59.028)	-88.122*** (21.086)	261.422*** (64.022)	294.038*** (28.194)	-305.366*** (75.700)
Number of children below age 5	201.893* (102.310)	-102.322*** (12.093)	149.135*** (36.717)	129.105*** (16.170)	-530.135*** (43.415)
Number of children between 6 and 18 years old	-18.753 (66.469)	42.642*** (6.745)	20.220 (20.478)	22.164** (9.018)	-172.904*** (24.214)
Bank in the village (1=yes)	234.656*** (14.286)	-23.092* (13.513)	407.224*** (41.031)	-84.165*** (18.069)	-410.125*** (48.515)
Π_2	10.093 (7.228)	-2.980** (1.470)	-14.485*** (4.464)	-4.007** (1.966)	-0.214 (5.278)
Π_3	-0.004*** (0.001)	3.15E-04 (1.34E-03)	0.001 (0.004)	-0.002 (0.002)	0.003 (0.005)
Π_4	-1243.741 (748.532)	-275.024*** (81.930)	562.058*** (248.761)	-181.255* (109.549)	392.722 (294.137)
Adjusted R ²	.40	.29	.39	.29	.97
Test of joint significance (F)	17.8***	4.9***	5.5***	2.5*	.67
N	5023	5023	5023	5023	5023

Notes: Dependent variable is the change in expenditure in good *i*. All variables shown are introduced as changes, except for selection controls. The equation includes interactions between expenditure and each characteristic. It also includes a dummy for rural areas and four regional dummies. Figures in parentheses are standard errors. Results are weighted estimations using Kyriazidou (1997) weights.

*** Significant at the 0.01 level. ** Significant at the 0.05 level. * Significant at the 0.10 level.

The most important variable in these two tables is the selection term, which is the Π variable. For households that never receive remittances (Table 4) the selection term is significant for all goods, except “other” goods. For households that always receive remittances (Table 5) the selection term is significant only for education and health. These results suggest that selectivity in unobservable components matters for both households with no remittances and households that always receive remittances in Indonesia. In other words, estimations ignoring the selectivity part of the model would be biased.

Table 5. Household expenditure estimates (selection corrected, fixed effects) for households receiving remittances in both 2000 and 2007

Variable	Food	Education	Housing	Health	Other
Expenditure	14.512*** (4.275)	-3.330*** (0.797)	0.307 (1.188)	-5.821*** (1.872)	-9.522*** (2.953)
Expenditure*log(Exp)	-2.762*** (0.596)	0.462*** (0.111)	-0.063 (0.166)	0.374 (0.261)	1.700*** (0.412)
<i>Human Capital</i>					
Number of household members over age 15 with primary education	105.660 (139.251)	-29.901 (25.957)	-39.890 (38.692)	39.952 (60.970)	47.482 (96.190)
Number of household members over age 15 with junior secondary education	-163.576 (341.692)	30.241 (63.692)	-171.048 (94.940)	204.288 (149.607)	-62.299 (236.029)
Number of household members over age 15 with senior secondary and above education	-149.483 (159.269)	6.634 (29.688)	129.933*** (44.253)	-51.023 (69.735)	-221.086* (110.018)
<i>Household Characteristics</i>					
Age of household head	-77.196*** (12.694)	2.585 (2.366)	3.214 (3.527)	-4.583 (5.558)	14.941 (8.769)
Sex of household head (1=male)	49.762 (288.855)	68.490 (53.843)	44.001 (80.259)	-311.166** (126.473)	261.648 (199.531)
Number of children below age 5	25.838 (183.944)	-33.445 (34.288)	-0.436 (51.110)	-128.189 (80.539)	-266.412** (127.063)
Number of children between 6 and 18 years old	-37.295 (66.697)	-25.491* (12.433)	-10.725 (18.532)	-70.840** (29.203)	-66.556 (46.072)
Bank in the village (1=yes)	-1100.919*** (357.532)	65.376 (66.645)	216.300** (99.342)	319.420** (156.543)	909.155*** (246.971)
Π_1	740.723 (619.293)	-282.737** (115.438)	-159.661 (172.073)	-577.261** (271.152)	644.574 (427.787)
Π_3	-550.407 (476.676)	29.194 (88.854)	99.572 (132.446)	-57.496 (208.709)	-154.419 (329.272)
Π_4	36.069 (37.622)	2.251 (7.013)	-9.931 (10.453)	10.216 (16.473)	13.899 (25.988)
Adjusted R ²	.98	.98	.92	.95	.96
Test of joint significance (F)	.62	4.5**	.46	32.41***	.93
N	47	47	47	47	47

Notes: Dependent variable is the change in expenditure in good i . All variables shown are introduced as changes, except for selection controls. The equation includes interactions between expenditure and each

characteristic. It also includes a dummy for rural areas and four regional dummies. Figures in parentheses are standard errors. Results are weighted estimations using Kyriazidou (1997) weights.

*** Significant at the 0.01 level. ** Significant at the 0.05 level. * Significant at the 0.10 level.

5. Remittances and Marginal Budget Shares

Table 6 takes the coefficients from Tables 4 and 5 and calculates the predicted and counterfactual marginal budget shares for the five categories of expenditure for each type of household. This table also shows the overall Average Treatment Effects on the Treated (ATT), which averages the ATT for all households receiving remittances in 2007 and compares it to the counterfactual of what would have happened if these households did not receive remittances in 2007.¹⁰

Table 6. Marginal budget shares on expenditure and average treatment effects (ATT) for non-remittance and remittance-receiving households, Indonesia, 2000 and 2007

	No remittances in 2000, no remittances in 2007	Remittances in 2000, no remittances in 2007	No remittances in 2000, remittances in 2007		Percent Difference	Remittances in 2000, remittances in 2007		Percent Difference	ATT Overall % Difference
	Predicted (1)	Predicted (2)	Predicted (3)	Counterfactual (4)	(3) vs. (4)	Predicted (5)	Counterfactual (6)	(5) vs. (6)	(7)
Food	0.328	0.323	0.385	0.361	6.72% (3.7)***	0.355	0.343	3.37% (3.8)***	5.87% (4.4)***
Housing	0.261	0.258	0.218	0.225	-2.99% (-26.7)***	0.208	0.217	-4.02% (-16.3)***	-3.25% (-31.4)***
Education	0.010	0.014	0.050	0.010	382.27% (4.4)***	0.028	0.010	182.52% (2.0)**	332.51% (4.8)***
Health	0.107	0.105	0.045	0.098	-54.46% (-2.4)**	0.098	0.108	-9.82% (-.58)	-41.88% (-2.4)**
Others	0.293	0.301	0.302	0.306	-1.31% (-1.4)	0.312	0.322	-3.11% (-.55)	-1.80% (-1.53)
	1.000	1.000	1.000	1.000		1.000	1.000		

Notes: Column (7) shows the Average Treatment Effects (ATT) of remittances on indicator i . It is calculated as the weighted average of two ATT that are calculated subtracting column (4) from (3) and column (6) from (5). T-statistics shown in parenthesis, T-tests conducted using clustered standard errors and weighting observations. A conditional logit is used to calculate probabilities and Kyriazidou (1997) weights, regression with selection correction.

*** Significant at the 0.01 level. ** Significant at the 0.05 level. * Significant at the 0.10 level.

¹⁰ The ATT's reported in this section average out the effect of remittances for the two types of counterfactual experiments that we perform. We obtain a weighted average in which each type of household involved in the comparison is weighted according to their importance in the population studied. Standard errors reported in this section also adjust for these weights.

Two of the ATT results in Table 6 (column 7) are noteworthy. First, compared to a counterfactual situation in which they did not receive international remittances in 2007, households receiving remittances in 2007 spend more at the margin on one key consumption good: food. Households receiving remittances in 2007 spend 5.9 percent more at the margin on food than what they would have spent on this good without the receipt of remittances. Second, compared to a counterfactual situation in which they did not receive international remittances in 2007, households receiving remittances in 2007 spend more at the margin on education. Households receiving remittances in 2007 spend 332 percent more at the margin on education than what they would have spent on this good without the receipt of remittances. This result is important because it shows that households can use remittances to invest in human capital.

6. A Model for Estimating the Impact of Remittances on Poverty

To analyze the effect of remittances on poverty, it would be tempting to use a probability model to calculate the marginal effect of receiving remittances on the probability of receiving remittances. However, since the discrete variable -- receiving remittances or not -- is correlated with unobservable characteristics, this kind of approach would be biased. To overcome this problem, we follow the approach of Carrasco (2001), who uses a bivariate probit model with random effects to analyze the effect of an endogenous discrete variable on another discrete variable.

In our case, we assume that such a bivariate probit model is based on the following decision tree: households choose whether or not to receive remittances and then conditional on that decision, households make other decisions that combined with the play of nature lead to the result that they are poor or not. The econometrician, however, cannot observe the whole decision tree and can only see whether or not a household is poor. Let y_{it} be a random variable that will be one if the household is poor and zero in every other case. Because the choice of receiving remittances influences the set of choices that the household makes, the best way to represent this random variable follows the approach proposed by Carrasco (2001):

$$y_{it} = \begin{cases} y_{it1} = I(\gamma_{1t} + B_1x_{it} + \omega_{it1} \geq 0) \text{ iff } d_{it} = 1 \\ y_{it0} = I(\gamma_{0t} + B_0x_{it} + \omega_{it0} \geq 0) \text{ iff } d_{it} = 0 \end{cases} \quad (11)$$

$$\omega_{itj} = \varphi_i + v_{itj} \quad j = 0,1 \quad (12)$$

Where x_{it} represents the characteristics of the household that influence the probability of being poor and ω_{itj} represents the errors in the choice equation that depend on a random effect φ_i and the random variable v_{itj} . Let the variable d_{it} be a random variable that takes the value of 1 if the household receives remittances and the value of 0 in any other case:

$$d_{it} = I(\delta_0 + \delta_1x_{it} + \varepsilon_{it} \geq 0) \quad (13)$$

Unlike Carrasco (2001), we lack instruments that enter into the remittance equation, but do not enter in the poverty equation.¹¹ For this reason, the identification of our model is based entirely on the assumption of the bivariate probit model. Once we have estimated such model, we obtain the effect of remittances on poverty for households that receive remittances in 2007 as the difference in the probability of being poor and receive remittances in 2007 P_{11}^{2007} and the probability of not being poor and receive remittances in 2007 P_{01}^{2007} :

¹¹ In the bivariate probit we attempted to use as instruments our two variables – distance to railroad stations in 1930 and rainfall in 1995 to 1999 – but found that these variables are part of the entire bivariate probit model.

$$ATT = P_{11}^{2007} - P_{01}^{2007} \quad (14)$$

7. Estimating the Probit Model for Poverty

Table 7 presents the results for the estimation of the bivariate probit model with random effects. The table shows results for both the household probability of being poor (poverty equation) and the household probability of receiving remittances (remittances equation). In the table poverty is defined using poverty lines calculated by the World Bank as follows: for 2000, 1,099,584 rupiah/person/year at 2000 prices for urban households and 883,776 rupiah/person/year at 2000 prices for rural households; for 2007, 308,000 rupiah/person/year at 2000 prices for urban households and 235,500 rupiah/person/year at 2000 prices for rural households. For 2000, 14.3% of the households are poor and in 2007 7.3% of the households are poor. As expected, the poverty equations in Table 7 shows that households with more educated members are significantly less likely to be poor. Also, households living in villages with banks and households living farther away from railroad stations in 1930 are less likely to be poor. Finally, as might be expected, households living in villages with more rain between 1995 and 1999 are less likely to be poor.

Table 7. Bivariate probit results (random effects) for the household probability of being poor and receiving remittances in Indonesia, 2000-2007

	Equation: Poverty		Equation: Remittances	
Variabe	Coefficient	sd	Coefficient	Sd
<i>Human Capital</i>				
Number of household members over age 15 with primary education	0.135***	0.029	0.042	0.062
Number of household members over age 15 with junior secondary education	-0.077*	0.043	-0.082	0.156
Number of household members over age 15 with high school to university education	-0.265***	0.042	-0.189**	0.076
<i>Household Characteristics</i>				
Age of household head	1.31E-04	6.73E-04	-2.23E-04	1.02E-03
Sex of household head (1=male)	0.113	0.087	-0.365**	0.149
Number of children below 5 years	0.415***	0.049	0.376**	0.188
Number of children between 6 and 18 years old	0.208***	0.028	0.074	0.083
Bank in the village (1=yes)	-0.176*	0.093	-0.170	0.168
Distance from kabupaten (district) to railroad in 1930, adjusted	-4.59E-03***	3.77E-04	0.011***	0.002
Rainfall, 1995-1999	-2.89E-04***	9.50E-05	6.00E-05	1.75E-04
Log likelihood test for Rho=0	258.31***	N/A	N/A	N/A
Log likelihood for model	-927	N/A	N/A	N/A
Wald test for model	1022***	N/A	N/A	N/A
N	5460	N/A	N/A	N/A

Notes: Table reports the coefficients of a variable on the probability of household receiving international remittances and being poor. The years included in the estimation are 2000 and 2007. The model also includes a dummy for urban/rural areas and dummies for four Indonesia regions. The distance to railroad variable is

adjusted in the following manner: for households that never receive remittances the variable is the simple distance to railroad; for households that receive remittances in 2007 but not in 2000, it adds 3 to the distance to railroad variable; for households that receive remittances in 2000 but not in 2007, it adds 2 to the distance to railroad variable; and for households that receive remittances both in 2000 and 2007, it adds 4 to the distance to railroad variable. Poverty is defined using poverty lines calculated by the World Bank as follows: for 2000, 1,099,584 rupiah/person/year at 2000 prices for urban households and 883,776 rupiah/person/year at 2000 prices for rural households; for 2007, 308,000 rupiah/person/year at 2000 prices for urban households and 235,500 rupiah/person/year at 2000 prices for rural households.

*** Significant at the 0.01 level, ** Significant at the 0.05 level, * Significant at the 0.10 level.

In Table 7 the remittance equation shows that households with more educated members are significantly less likely to receive remittances. The table also shows that distance to railroad station in 1930 is positively related to the probability of receiving remittances, and that rainfall between 1995 and 1999 is not statistically related to the receipt of remittances. These two latter results are different from those of our conditional logit model, and may suggest that the results of the conditional logit are affected by the unobserved wealth of households. In the conditional logit we do not control for the effect of wealth while in the bivariate probit we are able to condition on the poverty status of households and so control for the effect that wealth has on the receipt of remittances.

Table 8 takes the coefficients from Table 7 and calculates the average treatment effects (ATT) of the receipt of remittances on the probability of being poor. Specifically, this table shows the probability of being poor and receiving remittances in 2007, P_{11}^{2007} , and the probability of not being poor and receiving remittances in 2007, P_{01}^{2007} . The table includes all households receiving remittances in 2007, that is, households receiving remittances in 2007 but not in 2000 and households receiving remittances in both 2000 and 2007.

Table 8. Average Treatment Effects (ATT) of the receipt of remittances on the household probability of being poor, Indonesia, 2007

	Households with remittances in 2007 and in 2000	Households with remittances in 2007 and not in 2000	All Households receiving remittances in 2007
Probability of being poor and receiving remittances	0.17	0.26	0.24
Probability of being non-poor and receiving remittances	0.24	0.36	0.33
ATT (Percent difference)	-29.17% (-1.4)	-27.78%*** (-3.1)	-27.27%*** (-3.4)

Notes: T statistics in parenthesis. T-tests conducted using clustered standard errors and weighting observations. Probabilities estimated using a random effects bivariate probit model based on Carrasco (2001). See Table 7 for definition of poverty line in 2000 and 2007.

*** Significant at the 0.01 level.

Table 8 shows that the receipt of remittances clearly reduces the probability of a household being poor. For households receiving remittances in both 2000 and 2007 the probability of being poor falls by 29.2 percent. For households receiving remittances in 2007 but not in 2000 the probability of being poor falls by a statistically significant 27.8 percent.

8. Conclusion

This paper has used data from a large, panel household survey in Indonesia to analyze the impact of international remittances on household investment and poverty. The paper has three key findings, and one of these findings merits comment.

First, when we compare households receiving remittances in 2007 with a counterfactual situation in which they did not receive remittances in 2007, we find that households receiving remittances increase their marginal expenditures on one key consumption good – food – by 5.9 percent.

Second, when we compare households receiving international remittances in 2007 with a counterfactual situation in which they did not receive remittances in 2007, we find that households receiving remittances increase their marginal expenditures on one important investment good – education – by a very large, 332.5 percent.

Third, we find that the receipt of remittances reduces the probability of a household being poor. For households receiving remittances in 2007 but not in 2000 the probability of being poor falls by a statistically significant 27.8 percent.

The second and third findings of this paper are important because they are identical to the results of similar work on remittances, investment and poverty in other developing countries. For example, both Adams Jr. and Cuecuecha in Guatemala (2010) and Yang (2008) in the Philippines find that households receiving remittances tend to spend them on investment goods, like education. Since remittances are a transitory (and possibly uncertain) type of income it is possible that households receiving remittances tend to spend them more on investment goods (like education) than on other types of goods. These results are important because they suggest that households receiving remittances can use them to build human capital in remittance-receiving countries.

Similarly, with respect to remittances and poverty, the finding of this paper that remittances reduce the likelihood of a household being poor is consistent with results in other studies. For instance, Adams Jr. and Page (2005), Acosta *et al.* (2006), Yang and Martinez (2006) and Lokshin *et al.* (2010) all find that remittances reduce poverty in developing countries.

However, the first finding of this paper is unexpected and is at odds with earlier work in this area. Specifically, the finding that households receiving remittances in Indonesia spend more at the margin on one key consumption good – food – is at odds with both the results of Adams Jr. and Cuecuecha (2010) in Guatemala and the permanent income hypothesis that suggests that the marginal propensity to invest in consumption goods (like food) should be less – not more – with the receipt of transitory income (like remittances).

One possible explanation for this unexpected result is as follows. In Guatemala households receiving international remittances receive much more in annual per capita terms from remittances than those in Indonesia (US \$365 vs. US \$30 per year). As a result, mean annual per capita expenditure levels for remittance-receiving households in Guatemala are much higher than those in Indonesia.¹² Remittance-receiving households in Guatemala thus have more income and are able to devote more of their marginal expenditures to investment in both human and physical capital: education and housing. By contrast, households receiving international remittances in Indonesia are much poorer and thus are anxious to improve their consumption situation first (by spending more on food) and are able to devote only a portion of remittances to investment (by spending more on education). In the future, as remittance-receiving households in Indonesia continue to raise their average per capita expenditures through the receipt of international remittances, it is likely that they

¹² Mean annual per capita expenditures for households receiving international remittances in Guatemala (in 2000) were 47.3 percent higher than those for households receiving international remittances in Indonesia (in 2007): US \$1127 in Guatemala vs. US \$765 in Indonesia (nominal terms)

will reduce their marginal expenditures on consumption (food) and devote more of their marginal expenditures to investment in other types of investment goods (like housing).

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