

LABOR SUPPLY, SCHOOL ATTENDANCE, AND REMITTANCES FROM INTERNATIONAL MIGRATION: THE CASE OF EL SALVADOR

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The objective of this paper is to present microeconomic evidence on the economic effects of international remittances on households' spending decisions. Remittances can increase the household budget and reduce liquidity constraint problems, allowing more consumption and investment. In particular, remittances can afford investing in children's human capital, a key outcome for the discussion of the perspective of growth in a developing country. Robust estimates that take into account both selection and endogeneity problems in estimating an average impact of remittances are substantially different from least squares (OLS) estimates presented in previous studies, indicating the importance of dealing with these methodological concerns. After controlling for household wealth and using selection correction techniques such as propensity score matching as well as village and household networks as instruments for remittances receipts, average estimates suggest that girls and young boys (less than 14 years old) from recipient households seem to be more likely to be enrolled at school than those from non-recipient households. Remittances are also negatively related to child labor and adult female labor supply, while adult male labor force participation remains unaffected on average. The results signaling that the additional income derived from migration increases girls' education and reduces women's labor supply, with no major impact on activity choice for males 14 years or older, suggest the presence of gender differences in the use of remittances across (and possibly, within) households.

JEL classification codes: O15, D31, J24, R23, F22

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I. Introduction

Remittances' flows have become enormously important as a source of income in several developing countries. The increase in worldwide migration, together with technological advances and competition among financial institutions that lead to a reduction in money transfer costs without the need of physical mobility of migrants, have surely contributed to this fact. Flows of workers' remittances to developing countries are estimated to have reached \$160 billion in 2004, with approximately \$40 billion going to Latin American, the highest recipient region (Acosta et al., 2006). Moreover, they constitute the second most important source of external funding in developing countries, following FDI (Adams and Page, 2005).

This paper presents evidence on how recipient households in El Salvador decide to spend this extra income. Remittances can contribute to reduce liquidity constraint problems, which are typically present in developing countries.. In particular, conditional on the same amount of non-remittances income, it can be expected that recipient families expand their leisure consumption and their investment in children's human capital. Empirical findings along these outcomes would add to the discussion of the costs and benefits of this type of aid in dependent economies. If labor supply decreases in recipient households, these families may continue to depend on external transfers in order to meet their needs. This strong dependence on foreign aid would not be expected to decline in the future (as pointed out by Kritz et al, 1981, "do remittances help the development process or, like drug dependency, does their existence primarily feed the need of further (more) remittances in the future?"). On the other hand, remittances can contribute to

economic growth if they are channeled into productive investment, such as the acquisition of human capital by future generations.

A methodological concern regarding the impact of remittances on household outcomes is that the pool of migrants and remittance senders is not a random sample. As pointed out by Hoddinott (1994), migration can be modeled as the outcome of a joint utility maximization made by the prospective migrant and other household members. The presumption that migrant families are systematically different from non-migrants in observable (wealth, education) and non-observable characteristics (ability, income shocks) complicates the identification of the effect of remittances using standard OLS techniques. Sample selection as an omitted variable problem may be present under this context. As an example for the case of school attendance, if migration requires incurring substantial travel costs, in a context of capital market imperfections presumably only wealthy families can afford both migration and children's schooling. Without proper controls for household wealth, the coefficient on remittances in a school attendance equation could be biased. Selection correction methods need to be considered in order to avoid imputing wrong causality effects to remittance receipts.

Even after accounting for sample selection, it must be kept in mind that remittance receipts can be correlated with unobserved determinants of the outcome of interest. For instance, if remittances constitute the return on an investment, where the asset is the family member residing abroad, the household head's decision of sending a member abroad and working at home may be simultaneously determined. Similarly, unobserved (for the econometrician) income shocks can both stimulate higher remittance flows and at the same time have a direct impact on schooling and working decisions. Indeed, previous

studies have stressed the role of remittances as an insurance mechanism in volatile environments (Yang and Choi, 2005). One way to address the endogeneity problem regarding remittances is by using IV techniques.

This paper uses data from household surveys from El Salvador in order to evaluate the impact of transfers from abroad. The results show that remittances have mixed effects at destination in terms of investment in human capital. Using migration networks at the village level and household migration history as instruments and exclusion restrictions for selection into recipient, robust estimates suggest that girls (11-17 years old) and young boys (11-14 years old) are more likely to stay at school than those from non-recipient households. The positive effect does not seem to apply to the case of older boys (15-17 years old). Remittances are also negatively related to child wage labor (working for a wage) and adult female labor supply, while average adult male labor participation remains unaffected. The last gender difference on the impact of remittances on labor supply could be associated with a gain in relative power of women after migration, especially if they are more likely to be the recipient person in the household.

The rest of the paper is organized as follows: Section II reviews the previous literature on the uses of remittances. Section III presents the data used in the study. Section IV introduces the case of El Salvador in terms of migration and remittances behavior. Section V shows the main results of the paper. The paper concludes in Section VI with suggestions for future research.

II. Uses of Remittances and Previous Literature

Previous literature on remittances can be divided into two areas: motivation to remit, and uses of remittances. While the first topic has been extensively studied over the past two decades, an increasing number of recent papers have become interested in analyzing the uses of remittance receipts at the micro level.¹ Due to data limitations (in particular, senders' characteristics), the present paper will not present additional evidence on motivation to remit. In contrast, this study will add to the literature on uses of remittances at destination by focusing on the impact of remittances on household labor supply and investment in children's education.

As mentioned in the introduction, remittances can boost consumption, increase savings, or stimulate investment in economies with predominance of liquidity constraints. One of the first studies that addressed the economic consequences of remittances at destination is Funkhouser (1992), who finds that remittances increase self-employment in men and reduce labor supply in females in Nicaragua. The increase in self-employment can be interpreted as remittances channeled into entrepreneurial investment activities.

There is a large recent literature on how remittances may affect enterprise development. Adams (1998) shows no effect of external remittance receipts on non-farm asset accumulation in rural Pakistan. Woodruff and Zenteno (2004) show that investment in small enterprises (mostly self-employment) is higher in states with higher migration rates and higher remittances receipts in Mexico. The authors associate the findings with

¹ For a recent literature survey on motivations to remit, see Docquier and Rapoport (2005). Other papers addressing the topic are Lucas and Stark (1985); Funkhouser (1994); Hoddinott (1994); Yang (2004); and Halliday (2006).

the presence of wealth and capital constraints in enterprise development. Yang (2004) shows that favorable exchange rate shocks at international migrant destination lead to greater entry into relatively capital-intensive enterprises by migrants' origin households, interpreting the causal effect as indication of a higher purchasing power of the amount remitted.

Remittances can not only increase physical investment, they can also expand human capital accumulation, such as health or education. This paper draws heavily on Cox-Edwards and Ureta (2003), who present evidence that remittances reduce school dropout hazard rates in El Salvador using the 1997 wave of the household surveys analyzed here. One of the concerns is that the study does not address potential sample selectivity issues and endogeneity of remittances. Therefore, the validity of their findings could be tested using alternative econometric techniques.

Indeed, other recent papers employ a reduced-form approach to estimate the effect of remittances on children's schooling and health. Hanson and Woodruff (2003) use a reduced-form specification relating child education to having a family member living abroad for the case of Mexico. They find a positive relationship between the two variables and argue that the channel that drives this result is remittances. They control for potential endogeneity of having a migrant family member by using historical state migration rates interacted with household characteristics.

Yang (2004) also presents evidence on how an appreciation of the currency at the origin country increases children's schooling and lowers children's labor supply at destination (Philippines), once again attributing the causal relationship to the role of remittances. Lopez Cordova (2005) for the Mexican case provides evidence that

remittances can increase children's school attendance, decrease infant mortality and reduce child illiteracy. These results are robust to IV techniques that use historical migration rates and distance to the US border as instruments. Finally, Hildebrandt and McKenzie (2005) and McKenzie (2005 a) show a positive effect of migration on child health (reducing infant mortality and increasing birth weight) in Mexico, also using historic migration networks as instruments for current migration.

III. Data

The data come from a cross-sectional household survey (Encuesta de Hogares de Propósitos Múltiples) for 1998 in El Salvador.² The national survey (of urban and rural areas) contain detailed information on demographic characteristics (including education and health measures), current and previous employment status, earnings and expenditure (food, health, education, housing), the number of family members residing abroad, cash transfers received from abroad (remittances) and how this money was spent (food, health, education, housing). The survey's questions are at the household level but they include information on every member of the household. Each survey contains information on approximately 12,000 households. Cox-Edwards and Ureta (2003) use the 1997 wave in their paper.

Although household surveys are available for the period 1992-2000, the data coverage is not homogenous. Only the sub-sample 1998-2000 refers to the same

² The household surveys are part of the program "Programa para el mejoramiento de las encuestas y la medición de las condiciones de vida en América Latina y el Caribe" (MECOVI), a joint project between the Inter-American Development Bank (IADB) and the Economic Commission for Latin America and the Caribbean (ECLAC, UN).

municipal areas (in short hand, named as “villages” in the rest of the analysis). The paper uses the 1998 wave because it is the only period for which detailed information on household migration is available (previous migration spells and area of birth of actual household members). The 1998 wave contains a total of 11,953 households belonging to 111 different “villages” in the country, with all regions nearly equally represented (3,740 households from the Metropolitan region; 2,903 from the Western; 2,780 from the Central; and 2,952 from the Eastern).

A panel structure would be ideal so as to solve the potential selection problem by including households’ fixed effects and in that way exploit the variability of remittances within a household across time. Unfortunately this is not possible as each survey does not follow the same group of households. The data are also incomplete in information of the sender: only the number of migrant family members is known (the question refers to the “number of members from this household living abroad”).

Concerning remittances, the survey questions include whether the household receive transfers from abroad, the amount and their frequency. Information on the items (food, housing, health, education, savings) the family decides to spend from the amount remitted is also available. However, as pointed out in Cox-Edwards and Ureta (2003), it may be easy to doubt the reliability of such information as people will tend to pool remittances and earned income when expenditure decisions are made. Recall bias may also be an important source of measurement error in such questions.

IV. Migration and Remittances in El Salvador

El Salvador has a long history of external migration to neighbor countries and to the US. Starting in the 1970's, armed conflicts displaced a great proportion of the population to other areas in the country (internal migration) and abroad (external migration). Funkhouser (1997) notes that approximately 15% of the population emigrated between 1979 and 1989, mostly due to political reasons.³ According to the 2000 US Census, 817,000 Salvadorans live in the US, 60% of them entering the country before 1990. Official Salvadoran migrants in OECD countries reached 12% of total population by 2000 (Acosta et al., 2006).

Early migrants constituted a social network at destination that helped subsequent emigration during the nineties.⁴ Even after achieving peace in the 1990s, migration flows have remained high during the last 15 years. Menjivar (2000) finds evidence of the existence of large social networks among Salvadorans in California, as 80% report having received help from US relatives and friends for the trip. Additionally, the majority of migrants seem to be permanent: household survey data for 1997 show that among the households with a family member abroad, 67% think that their migrant relatives will not come back to live permanently at the home country.

Table 1 presents evidence on the pattern of external migration by region in El Salvador. According to the 1992 Salvadoran Census, 5.9% of the population migrated abroad. Column (2) shows the proportion of people living abroad with respect to the total

³ Starting in the late 70s, El Salvador experienced a civil war that intensified during the 80s. An agreement ending hostilities by all parties was reached in February 1992. See Funkhouser (1997) for a description of the conflict period.

⁴ See Munshi (2003) and McKenzie (2005 a) for the role of social networks in migration dynamics.

population in the state where they lived before emigrating according to the 1992 census. Column (3) shows the proportion of households with family members residing abroad in the 1998 household survey. Not only there are differences among regions in the proportion of emigrants, but also both measures seem to suggest that there are certain regions that systematically send more people abroad than others. The states of San Miguel, Morazan and La Union, in the Eastern region, have the highest emigration rates.

Migrant remittances' flows have gained importance as a source of income only in the last decades. For instance, official flows represented 0.3% of GDP in 1980, but their share increased to 7.4% of GDP by 1990, 12.9% in 1998, and 16.1% in 2003.⁵ Official data estimate total remittances in 2003 at \$2.11 billion in El Salvador.⁶ The importance of remittances as a source of income is among the largest compared to other developing countries, only below Haiti (41.2% of GDP) and Jamaica (17.7%) among Latin American and Caribbean countries, and Tonga (45.3%), Moldova (23.9%), Lesotho (23.8%), Jordan (22.3%) and Lebanon (20.2%) in the rest of the world (data for 2003). Indeed, Funkhouser (1995) mentioned that labor constitutes the largest export of the country. Household survey data used in this paper reflects that nearly 20% of the households in the country receive remittances from abroad.

Remittances flows closely follow external migration patterns. Column (4) in Table 1 shows the proportion of households that receive remittances in 1998.⁷ Note that the four states that have relatively higher emigration rates (Eastern region) are also the ones that

⁵ International Monetary Fund (IMF), Balance of Payments Statistics Yearbook.

⁶ These figures represent lower bounds for the true amount transferred in form of remittances, as only a portion of total income receipts flow through official channels. Unofficial channels (not through courier agencies or financial institutions) include various mechanisms of hand-carried cash by the migrant during visits or upon repatriation by friends. Russell (1986) accounts that in some developing countries like Sudan only 24% of migrants reported using banks.

⁷ Throughout the analysis, only money transfers (not in kind) will be considered as remittances.

have a higher proportion of remittance recipients. In fact, remittances are substantially related to having a family member abroad in 1998 (correlation coefficient of 0.695). It is also worthwhile to remark that those eastern states that have higher emigrants and remittances, together with central-eastern states (Chaletanango, Cabanas, and San Vicente) were the states where the political conflict of the 1980s was more intense (Funkhouser, 1997).

As seen in Table 1, the importance of remittances as a source of household income differs geographically. Figure 1 shows the evolution of remittances in the 1990s by region. Throughout this period, the proportion of recipient households increased substantially, from 14% in 1992 to 20% in 2000 (sample data from household surveys). The increase in the proportion of households that are recipient of remittances applies to all regions. Moreover, the ranking of regions ordered by the importance of remittances is virtually the same for all years considered, with the eastern states standing out from the rest of the country (with 30% of recipient families in 2000) and the central states doubling the number of recipients by the end of the decade.

A plausible explanation for the increase in the number of recipients of remittances is the decrease in transfer costs for sending money back home, due to technological advances and more competition among financial institutions. Household survey data for 1997 show that 74% of households received money transfers through courier agencies (i.e., Western Union), 9% through banks and other financial institutions, and only 17% in hand through relatives and friends (unofficial channels).

It would be interesting to characterize household recipient families and compare them to non-recipients. Table 2 shows average characteristics categorized by recipient

status. It is important to note that it is not possible to distinguish among causes or consequences of receiving remittances, or between remittances and just selection into migration (having a family member abroad). Indeed, some differences can be related to the decision to migrate and remit, or related to the consequences and uses of remittances.

The data suggest that household recipients are equally larger in terms of adult equivalent members with respect to non-recipient (although migrant members are not observed), and have similar per capita expenditure levels.⁸ However, recipient families seem to be better educated, comparing the maximum educational level of the household. Besides, household heads of recipient families are on average 7 years older than non-recipient heads. Recipient households also have a higher proportion of female heads (not married or with husbands not currently present at home) compared to non-recipients. Household heads in remittances' recipient families are more likely to be employed in the agricultural activities. Finally, as expected, a much higher proportion of recipient households have family members abroad, although nearly 30% receive remittances from outside their close relative circle.

Other differences are associated with life quality: a higher proportion of recipients have access to electricity, water, sanitary, and telephone services. Besides, the number of rooms per adult equivalent is larger for recipients, and a greater proportion of them have a refrigerator. Regarding the outcome variables of interest in the paper, recipient households seem to have fewer children, a higher proportion of children that stay at school, and a lower proportion of them who work for a wage. Finally, concerning labor

⁸ Deaton (1997) suggest computing adult equivalents using the formula $AE = (A + \alpha K)^\theta$, where A represents the number of adults, K the number of children (in this case, 0-9 years old), α is the cost of a child relative to that of an adult, and θ is a parameter related to the extent of economies of scale. Many studies computing adult equivalents assume $\alpha = 0.5$ and $\theta = 1$. These values are used here.

supply, the evidence seems to suggest that both adult men and women in the household are less likely to work if they receive remittances.

It seems that recipients and non-recipients differ substantially along certain demographic and socio-economic characteristics. Some of these differences can be attributed to selection into migration and selection into remitting. For instance, a key selection dimension that could bias any OLS econometric estimation of the impact of remittances in household spending decision is per capita income, expenditure or wealth. If the evidence supports the idea that remittances' recipients come from clear segments of the income/expenditure/wealth distribution shape in the country, it would be necessary to use sample selection correction techniques in order to take into account that families are not randomly assigned into being a recipient.

It is necessary to look at the income, expenditure or wealth distribution in order to identify segment locations for migrant families. An important question is whether to look at per capita pre-remittances income, non-durable consumption expenditure or household wealth. Deaton (1997) mentions the advantages of using expenditure as opposed to income for measuring long-run well being, in particular if households can smooth consumption and avoid the volatility of current economic conditions. Moreover, in the absence of perfect capital markets as in rural developing areas, expenditure is easier to measure as certain market activities are replaced by home production. A further problem with the use of non-remittances income given this particular dataset is that income is not observed for migrants. If migrant's income is ignored, it would be equivalent to compute a potential income equal to zero for migrants had they stayed at home, which is far from a

reasonable assumption. In the event of detailed characteristics of the migrant, absent in the data used in the paper, this counterfactual home income could have been computed.

In contrast, the use of per capita expenditure would require the underlying assumption that the migrant in question would have consumed the average current household basket had he stayed at home, a much less restrictive assumption given the above mentioned problems with income. However, expenditure levels are not so helpful for looking at selection into remittances' recipients, as it is likely to be affected by remittances flows. An alternative option is to look at ownership status of different household assets, whose acquisition is less likely to be affected by current remittance flows and more likely to reflect past savings (in particular in poorly developed credit markets as the Salvadoran). The assets and housing characteristics available in the data that could be considered are the following: number of rooms per adult equivalent, home ownership and cement floor (housing); water, electrical, sanitary and telephone services (access to utilities); refrigerator, automobile, TV, VCR, sewing and washing machine (durable assets).

With these asset holdings, the idea is to construct a linear index using a particular set of weights. Equal weights are not appealing since equality of importance is an arbitrary assumption. In the absence of prices, dates of purchase or current values for these assets, a reasonable assumption is to construct the index using First Principal Component statistical procedure. The underlying assumption is that household long-run wealth explains the maximum variance in the asset variables. Filmer and Pritchett (2001) shows that such index can provide reasonable estimates of wealth effects and long-run economic

status in the absence of specific information on wealth levels and weight.⁹ The asset index for household j is defined as

$$A_j = \sum_k f_k \frac{(a_{jk} - \bar{a}_k)}{s_k} \quad (1)$$

where a_{jk} is the presence of asset k in household j , $\bar{a}_k$ is the sample mean and s_k is the sample standard deviation for asset k across households, and f_k is the weight assigned to asset k . The method assigns the weights so that the index provides the maximum discrimination possible between households, with the assets which vary most across households getting larger weights. For instance, an asset which all households own will be given zero weight, as it explains none of the variation across households. See Filmer and Pritchett (2001) and McKenzie (2005 b) for further details on the application of First Principal Component techniques in the construction of asset indexes, and its advantage in approximating wealth levels. The asset index constructed has a decent correlation with per capita non-durable expenditure levels (0.444).

The first panel in Table 3 presents evidence concerning selection into migration and remittance receipts: how recipient families range according to this asset index distribution. The pattern suggests that the proportion of recipient families and the likelihood of having a migrant family member are much higher for richer and better educated families. For instance, 7.9% of the households at the lowest decile receive

⁹ Recent studies that use First Principal Component based indexes on assets ownership as a control for economic status and living standards are McKenzie (2005 b) on inequality, Mora and Taylor (2005) on migration destination, and Tarozzi (2005) on child nutrition.

remittances and 7.2% have a family member abroad, while these figures are 18.7 and 17% respectively for the whole population. The proportion of migrants and remittance recipients increases almost monotonically with asset holdings. Similarly, per capita consumption of non-durable goods closely follows the ordinal classification of asset holdings. The evidence found can be rationalized by the hypothesis that poor families are more liquidity constrained and unable to finance the migration trip, if migration costs are high for Salvadorans.

Of course, recipient families can be using money transfers in order to acquire some of the household assets used in the index, which will then not be properly reflecting the situation prior to migration. Ideally, we would like to have household wealth prior to migration, in order to properly assess their economic situation at the time of migration decision. Recognizing that this is an important concern, the presence of a negative relationship between household wealth and per capita amount remitted as a share of total income (including remittances) in the last column gives more credibility to the positive selection pattern suggested. In effect, even though families at the lowest deciles in the distribution are less likely to receive remittances, at this level the contribution of the aid is higher compared to average recipient families. Docquier and Rapoport (2005) argued that an altruistic motive can rationalized this behavior, as the marginal dollar value of the money sent home increases for poor households. Finally, the second panel describes the proportion of recipient families in terms of maximum household educational levels. Again, a higher proportion of families are remittances' recipients among more educated households.

In other words, Tables 2 and 3 suggest that recipient households are not a random group: selection into migration is an important issue to be taken into account. The question of whether migrants are truly positive selected or not, cannot be properly addressed with the data in hand in the absence of migrants' characteristics. But the evidence indeed suggests that migrant families are not randomly selected from the pool of non-migrant counterparts. This means that for an accurate econometric estimation of the impact of remittances on household decisions, it is necessary to control for characteristics that influences the decision to remit and migrate. Of course, even after controlling for observable dimensions, it always remains the possibility that senders and recipients differ in unobservable characteristics correlated with the decision to remit. Senders' income and entrepreneurial spirits are, for instance, variables not properly observed in the data that could potentially pose identification problems.

V. Results

V.a. Decision to Remit and Migrate

Before analyzing the impact of remittances on household leisure consumption and investment in children's human capital, it would be worthwhile to look at the family home characteristics that motivate the decision to remit. As argued before, remittances can not be seen solely as an income shock that expand the household budget constraint, but should be as the result of an intertemporal common strategy among household members located at different points in space.

In the absence of information about the sender, it is difficult to interpret the estimates as a test for different motives to remit. For instance, if there is a positive relationship between family wealth or expenditure and the decision to remit to that family, it may be tempting to conclude that the evidence suggests a self-interest motive (by a bequest reason, for instance). However, two important omitted variables that may be correlated with family income are sender's income and education. Hence, not controlling for those variables can result in an upward bias in the coefficient on home income/expenditure. In any case, the following results should be taken with caution and they are presented with the sole purpose of identifying variables that can explain selection into migration/remittances.

The likelihood of being a recipient family is represented by a reduced form equation influenced by both household level and village level characteristics. As mentioned before, sender characteristics are also likely to influence the decision to remit, therefore several crucial variables are omitted which complicates the causal interpretation of the results. A probit specification is used, with the dependent variable taking the value of 1 if the household is a recipient and 0 otherwise.

Table 4 shows the results (marginal effects) for the likelihood of being a household recipient. Column (1) controls for geographic (province/state), demographic and socio-economic characteristics of the recipient household, including per capita expenditure. Conditional on other characteristics of the family, richer households in terms of per capita expenditure seem to be more likely to receive remittances. Remittances also seem to go predominantly to female (16% higher probability) and married household heads (4% more). This fact seems reasonable if one thinks that usually the family member that

migrates is the husband. Unfortunately, the data only indicate whether a family member migrates and remits, but not the type of relationship with the home family. Families with a higher number of children are also more likely to receive remittances. A U-shaped relationship is found between household head's age and remittances (both youngest and oldest heads are more likely to receive remittances). Finally, transfers are more common in rural areas, suggesting a potential role of remittances as an insurance mechanism in highly volatile environments with incomplete credit markets (Yang and Choi, 2005).

The above estimates control for per capita expenditure as a proxy for household wealth. However, current per capita expenditure is not probably the best control for wealth, as it is likely to be affected by remittances flows. An alternative is once again to look at different household assets, whose acquisition is less likely to be caused by current remittance flows. In effect, the importance of remittances as a source of income declines for higher asset holdings (Table 3). The assets and durable goods considered are the same as in Table 3, and the regression includes the First Principal Component index derived from them. This method for approximating household wealth in a migration decision equation is also used in Mora and Taylor (2005). Controlling for an asset holding index in Column (2) highly improves the fit of the model. The index proves to be highly positive correlated with whether a family receives remittances or not.

Column (3) adds controls related to migration at the village level and to migration history of actual household members. The number of return international migrants that have spent at least the last two years at home is included. Few households have return international migrants (2.7%). Of the cases with return international migrants, the household head was one of them in 20% of the cases, in 14% the spouse, in 45% a son or

daughter, in 11% a grandson or a granddaughter of the household head, and in the 10% rest other familiar living in the household at the time of the survey. Similarly, a variable related to the size of the migration network at the village level is introduced. The “network” variable is constructed by looking at the proportion of families within the village that currently have an international migrant member. This way, one can identify household that belongs to traditionally sender villages, whose social networks abroad can potentially help in the migration process. As seen in Table 2, villages in the Central and Eastern regions are traditionally migrant communities compared to the Metropolitan area. The additional controls prove to have a significant influence on the likelihood of being a recipient family. For instance, village migration networks have a clear positive impact on receiving remittances. Similarly, a household is more likely to receive remittances if current family members lived abroad in the past (2.2 percentage points more for each member).

For comparison purposes, the same analysis was performed for a dependent variable related to whether the household has a current family member abroad (Column 4). The results are remarkably similar to the regressions explaining the likelihood of receiving remittances, and this should not be a surprise as both dependent variables are highly correlated (0.695). In fact, 78% of the households that have a family member abroad receive remittances (although it cannot be determined if the household actually receive remittances from those family members), and 72% of the families that are recipients of remittances have a family member abroad.

Summing up, Table 4 suggests that the probability of receiving remittances is not randomly assigned among households, but depends clearly on a set of observable

characteristics of the family home. It is also likely that it will depend on unobservable characteristics of the household that are not captured in these specifications. With a panel structure, selection into remittances could be solved by adding households' fixed effects and exploit the variation in time for within households. Unfortunately, data are available only at the cross sectional level, so there needs to be some control for sample selection using alternative techniques.

V.b. The impact of remittances on household behavior

This section presents estimates for the impact of remittances on recipient households spending behavior, in order to determine whether remittances are changing intra-household consumption and investment decision or if instead, remittances are just associated with unobserved recipients' characteristics and have no causal effect on household budget decisions. The outcomes that will be analyzed are related to consumption and investment spending decisions of the families, such as investment in children human capital and household (adults) labor supply. The fact that 19% of the household receive money transfers from abroad indicates that the data contain enough variation so as to identify an impact of remittances on the selected outcome variables.

In what follows, the variable associated with the impact of remittances is whether the family receives transfers from abroad, instead of the amount remitted. The justification is that recall bias maybe substantially important for families that decide to pool their income regardless of their source. Families are presumably more likely to remember whether they receive financial aid from abroad or not, but not exactly the amount. As

other income sources, remittances traditionally tend to be underreported in household survey data when compared to macroeconomic balance of payments figures (Freund and Spatafora, 2005; Acosta et al., 2006). For instance, in the 1998 nationally representative household survey used here, the calculated remittances over non-remittances income ratio is 5.9%, much lower than the 12.9% of remittances over GDP ratio reported in the IMF's Balance of Payment Statistics. Measurement errors in the reported amount received as remittances would introduce a downward bias in the coefficient of the impact of remittances on children's and parent's outcomes. Therefore, even though the present survey asks the total amount received within the year and it uses, it is preferred not to use them in the regression analysis.

In their general version, the equation of interest is a “treatment effect” of remittances on several outcomes. For instance, let a latent outcome Y_{ij}^* representing the acquisition of a particular good for individual i in household j be modeled as a linear reduced form spending decision:

$$Y_{ij}^* = X_{ij}'\alpha + W_j'\beta + R_j'\gamma + \mu_{ij} \quad (2)$$

where Y_{ij}^* is related to a set of demographic characteristics (X_{ij}) for individual i in household j , a set of household characteristics (W_j), the variable of interest related to remittances receipts (R_j), and a term associated with unobserved heterogeneity for the individual (μ_{ij}). The decision function is unobservable, although the dichotomous variable Y_{ij} ($Y_{ij} = 1$ if $Y_{ij}^* > 0$, and $Y_{ij} = 0$ otherwise) is not. The binary nature of the dependent variable calls for an estimation strategy of a probit model, where

$$\Pr(Y_{ij} = 1 / X_{ij}, W_j, R_j) = \phi(X_{ij}'\alpha + W_j'\beta + R_j'\gamma + \mu_{ij}) \quad (3)$$

As mentioned before, two fundamental problems arise when trying to evaluate the impact of remittances on a particular household spending outcome. First, remittance receipts may not constitute an exogenous shock. For example, imagine that R_j depends on a set of household characteristics Z_j (that may include some of the characteristics in W_j but it is not a subset of W_j). In other words,

$$R_{ij} = 1 \text{ if } Z_{ij}'\theta + \varepsilon_{ij} > 0 \quad (4)$$

If so,

$$E(Y_{ij} = 1 / X_{ij}, W_j, R_j = 1) = X_{ij}'\alpha + W_j'\beta + \gamma + \rho E(\mu_{ij} / \varepsilon_j > -Z_j'\theta) \quad (5)$$

where $\rho = \text{corr}(\mu_{ij}, \varepsilon_j)$. If the last term is not zero, failure to control for it could generate biased estimates. An omitted variable problem in the form of sample selection would be present. The evidence seems to point in this direction. In fact, several observable characteristics (Table 4) matter in determining which households receive these money transfers from abroad, as documented in the previous subsection.

The second potential problem is that remittances may be correlated with unobserved determinants of household outcomes, i.e., R_j correlated with μ_{ij} . For instance, if school

attendance responds to unobserved shocks to household income, and if remittances flow in part to compensate this variability in income, remittances would be correlated with the error term in a school attendance equation. Therefore, using appropriate instruments for implementing an IV strategy will better reveal the true impact of remittances flows.

V.c. Remittances and Children's School Attendance

Table 5 presents estimates for the impact of remittances on school attendance. The dependent variable is whether a school-age child is currently enrolled at school. The children analyzed belong to the 11-17 years old cohort, as outside opportunities such as working are available for this group. The set of controls, besides remittances, include household demographic and socio-economic characteristics, geographic location of the household, child age and gender, number of children and adults in the household, and whether the child in question is the oldest children in the household.

The first column only considers the impact of remittances, while the second and third add controls for child and household characteristics. Robust to heteroskedasticity Huber-White standard errors are reported. The result of interest in Column (1) shows that remittances increase the likelihood of staying at school. This result is in line with Cox Edwards and Ureta (2003) positive impact of receiving remittances on school attendance. Other studies that find similar results are Funkhouser (1992), Hanson and Woodruff (2003), Yang (2004) and Lopez Cordova (2005). The marginal effect of receiving remittances suggests that recipient households are able to keep children at school 7.1% more than non-recipients.

Column (2) adds children and family characteristics. The positive effect of remittances remains, although the point estimate is much lower (4.6%) than in Column (1), reflecting that part of the positive impact was just capturing other effects related to both schooling and remittances, such as household education. Indeed, conditional on the age and gender of the children, better educated families (in terms of maximum household education) are more able to invest in children's human capital. Children from households with middle age and married heads are also more likely to stay at school.

In contrast, there are no significant disadvantages for children from female household heads. Similarly, families in rural areas have less children studying, presumably capturing an effect associated with distance to school. Children also seem to differ in their chances to attend school according to the number of siblings they have. If they have little brothers and sisters (0-5 years old), they are less likely to attend school, presumably because they have to help in their care. On the other hand, if they have more siblings at school age, they are more likely to go to school, maybe reflecting the existence of economies of scale in sending children to school.

However, one important missing control is household wealth. Wealth is probably positively correlated with both schooling and remittances, in particular if as suggested in Table 3 and 4, migrant members seem to come from relative richer families. If so, a portion of the explanation of the positive impact of being a recipient on school enrollment could be attributed to higher wealth levels. In effect, the estimated effect of remittances (γ^*) would be given by $\gamma^* = \gamma + \beta * Cov(R_j, \mu_j)$, where γ is the true impact of remittances, β is the effect of household wealth (μ_j) on schooling, and $Cov(R_j, \mu_j)$ is the covariance between remittances and wealth. If the impact of wealth on schooling is positive, and the

relationship among wealth and remittances is also positive, the estimated effect of remittances on schooling would be upward biased.

In order to investigate whether the estimated effect of remittances is capturing wealth effects, Column (3) starts by including per first principal component household assets index as a control. The assets considered in the index are the same durable goods considered in Table 4: rooms per person; home ownership; cement floor; access to water, electricity, sanitary and telephone services; automobile, TV, VCR, refrigerator, sewing, and washing machine. As expected, “wealthier” families are more likely to have children enrolled in school. The impact of remittances is attenuated (1.8%) once families are distinguished according to their asset holdings level, reduced to less than a half compared to Column (2). Moreover, it is no longer statistically significant.

In essence, this implies that estimates that fail to properly control for wealth are incurring in a selection bias, similar to an omitted variable problem, as shown in equation (5). After controlling for a wealth indicator, the true direct impact of remittances on investment in children human capital is much lower and no longer significant. It is worth to mention that the drop in the size of the coefficient is not likely to be due to the presence of multicollinearity (different proxies measuring the same phenomenon), as the correlation coefficient between household wealth index and remittances’ indicator is low (0.133).

A recent paper by Lubotsky and Wittenberg (2005) suggests the use of the full set of proxy variables instead to the more common practice of creating a summary measure (index) when controlling for an unobserved explanatory variable. They suggest that the First Principal Component procedure may confound differences in wealth with

differences in tastes. Therefore, Column (4) performs the same analysis, but this time including the full set of household assets holdings, as opposed of an integrating index. None of these asset holdings' indicators are strongly related to the remittances indicator (maximum correlation coefficient is 0.148, for presence of a refrigerator), therefore potential multicollinearity with the variable associated to remittances should be less of a concern. This time, the size of the remittances' coefficient is further reduced to 1.1%, and once again is statistically insignificant.

In other words, after correcting for selection in terms of household wealth, the results show that school enrollment rates do not significantly improve with remittances. However, selection can be present in other dimensions aside from household wealth. For instance, sender's income is not observed in the dataset but clearly influences the decision to remit. At the same time, it can be positively correlated with unobserved determinants of children school attendance (i.e., through children's ability). Equation (5) shows that a positive correlation among the error terms would generate an upward bias in the estimation of the remittances coefficient.

Several ways to correct for this sample selection problem can be posed. One alternative is to perform propensity score matching (PSM), as defined in Rosenbaum and Rubin (1983). The idea is to find children from recipient and non-recipient households with similar propensity scores, and non-parametrically estimate the effect of remittances on school attendance.¹⁰ Treated and untreated observations are compared after matching

¹⁰ See Ham, Li and Reagan (2004) for an application of propensity score matching methods to the effect of migration on wage growth.

based on a like probability to be treated. Provided that selection comes from observable characteristics, this method consistently estimates treatment effects in a non-experimental context. An interesting feature of PSM is that it does not require separability of outcome or choice equations, exogeneity of conditioning variables, exclusion restrictions, or adoption of specific functional forms of outcome equations (Heckman, Ichimura and Todd, 1997).

The PSM method has a conditional independence assumption: given a set of observed characteristics Z_{ij} , the counterfactual distribution of the outcome Y_{ij} for recipients of remittances is the same at the observed distribution of Y_{ij} for non-recipients. One of the problems with this method is the presence of selection on unobservables; matching models assumes that conditional on Z_{ij} , there is no unobserved heterogeneity left that affects both the likelihood of being a recipient and the outcome variable. Rosenbaum and Rubin (1983) labeled this assumption as “ignorable treatment assignment” (ITA):

$$(Y_0, Y_1) \perp D \parallel (X, W) \quad (6)$$

It states that conditional on a set of observable characteristics X and W , the treatment outcome is independent of the actual treatment status (D , receiving remittances). Since the goal is to estimate the average treatment effect on the treated, condition (6) can be weakened to a mean independence assumption involving only Y_0 :

$$E(Y_0 \parallel X, W, D) = E(Y_0 \parallel X, W) \quad (7)$$

Matching on all the variables in X and W is impractical when the number of variables is sufficiently high, as in here where controls at the child and household level are available. Rosenbaum and Rubin (1983) propose to match an index function $P(X, W)$, i.e., the propensity score (probability of receiving remittances conditional on child and household characteristics), where:

$$0 < P(X, W) = \Pr(D=1 \parallel X, W) < 1 \quad (8)$$

The condition that the propensity is bounded between 0 and 1 holds whenever the mean treatment parameters are defined for all values of X and W (in other words, for each X and W , it's possible to observe in the data both Y_1 and Y_0 cases) It can be shown that if the ITA assumption holds given X and W , it can also hold conditional on $P(X, W)$. Among the different matching methods, one-to-one matching with replacement ("single nearest-neighbor") is chosen. This matching method is particularly recommended when the non-treated observations are far more common than the treated, as in this case. The method operates in the following way:

- a) If several non-recipient individuals matched a given recipient, then one is chosen randomly;
- b) On the other hand, if a given non-recipient individual is the best match for more than one recipient, it is used in all cases;

c) If a non-recipient individual is not a best match for any recipient, it is dropped from the analysis (lack of common support).¹¹

For the propensity score calculation, all covariates used in the schooling equation (Table 5, Column 3) were included. The method requires testing for the “balancing condition” of the conditioning variables: differences among treated and control groups should be reduced at maximum after matching on observable characteristics. As suggested by Imai and Van Dyk (2004), the balancing condition can be tested by regressing each variable on the propensity score and on treatment (recipient of remittances). If the coefficient on the treatment variable is not statistically significant, the covariate is balanced. All conditioning variables were found to be balanced.

The semi-parametric estimate for the matched sample of the effect of receiving remittances on school attendance is reported in Table 5, Column (5). The estimate represents the difference in the outcome of interest when comparing a recipient with a non-recipient child with similar observable characteristics. The effect of remittances in the matched sample indicates that the likelihood that a recipient child attends school is 1.8 percentage points higher than a non-recipient counterpart, and that the difference is not statistically significant (standard error of the difference calculated by bootstrap techniques with 500 replications). The point estimate is much lower compared to the 7.1 percentage points in the unmatched sample in Column (1).

¹¹ This method is called matching with replacement, and according to Michalopoulos et al. (2003), result in less precision than matching without replacement because of the reduced sample size produced by using some non-recipient children more than once. The gain of doing so, however, is a better potential match and thus less bias. In this case, the difference between the two approaches is small.

However, as mentioned before, propensity score matching methods only tackle the problem of selection of remittances according to observable characteristics. They rely on the ITA assumption (equation 6), and assume out selection on the basis of unobservable differences. Other less restrictive alternatives could be explored in order to confirm the previous result. Recall that the potential sample selection bias concern arises primarily because one may think that families with migrant members are systematically different from non-migrant counterparts. This presumption can be of help if one thinks that the selection mechanism comes from the decision to migrate. Table 4 shows that the observed variables that influence whether to have a family member abroad are equally likely to matter in a decision to remit equation. Similarly, one can assume that both decisions are also equally related to the same unobserved determinants.

If this seems reasonable, a way to get rid of the selection problem is to look only at households who have a family member abroad, and exploit the fact that 22% of them do not receive remittances. Column (6) replicates Column (4), but this time restricting the observations to children from households with one or more family members abroad. Most of the results remain, including the coefficient on remittances that still reveals insignificant. This is not the result of a merely increase in the standard errors due to a reduction of the sample size: the point estimates also decreases to 0.9%.

The other candidate problem, besides selection, is that current remittance receipts could be positive related to contemporaneous unobserved determinants of staying at school. For instance, a potential link is through income shocks: negative income shocks (say, agricultural shortages) could prevent children from attending school, and at the same time induce transfers from abroad to partially mitigate the shortfall. If so,

remittances could be correlated with variables that have a negative impact on children school enrollment, resulting in a downward bias on the estimated coefficient. Instrumental Variables (IV) techniques can overcome both this potential endogeneity problem and also the selection bias mentioned before. IV requires a set of instruments correlated with the likelihood of being a recipient household but uncorrelated with children's school attendance. The instruments proposed are the village migrant networks and the number of international migrants that returned two or more years ago.

In effect, friends, family members and social networks abroad may explain why a person who lived in another country but has returned to the family home may receive remittances. In contrast to “having a current family member abroad”, this variable is presumably less controversial as an instrument for remittances, as an on-going migrant family member may be part of a current strategy of the household for diversifying income shocks. The feature that the family member has returned is more attractive as, if any, the strategy of sending a family member was in the past. Of course, the concern is whether there are still family members left behind in the foreign country. This does not seem to be the general case: only 29% of the families with a person that lived abroad in the past (and has returned) have at present family members living abroad. A similar variable for approximating household-level network in a migration decision equation is used in Mora and Taylor (2005).

The second instrument is the migration propensity of the county/village of residence, i.e., the proportion of households that currently have a family member abroad in the area of reference. Certain states are traditionally migrant senders, as seen in Table 1, and probably those regions are more accustomed to be recipients of remittances for other

reasons than an income diversification strategy. For instance, states with more migrants abroad (San Miguel, Morazan and La Union) were the states with more political conflicts in the 70s and 80s. Migration for political reasons in most of the cases is not chosen by the family, hence it may be expected that the underlying factors that motivate migration in the area of question may be different from more developed and less conflict-affected regions. At the same time, there seems to be no direct relationship between village migration rates and schooling, with low correlations between migration rates and village-level per capita income, distance to school, or school enrollment rates for 6-17 years old children (-0.112, -0.007 and 0.064 respectively). Historical migration rates by state have been used as instruments for remittances receipts in Hanson and Woodruff (2003), Woodruff and Zenteno (2004), Hildebrandt and McKenzie (2005), Lopez Cordova (2005), and McKenzie (2005 a).¹²

As pointed out in Newey (1987), the use of 2SLS in a context of a binary outcome (schooling) and a binary endogenous variable can result in inconsistent estimates. Although Angrist (1991) provides certain conditions under which 2SLS can perform well with binary endogenous variables, they are strong to hold all in practice. Newey (1987) suggests the use of maximum-likelihood Amemiya's Generalized Least Squares estimator, also known in statistical packages as "IV Probit".

Amemiya's GLS estimates using the above described instruments are presented in Columns (7). Although not reported, estimates of the impact of remittances using 2SLS shield similar results. First stage results closely resemble Column (3) in Table 4, with a

¹² Alternative instruments considered are village-level migration rates interacted with household head characteristics (age, education and marital status). The results using these instruments are qualitative similar to those reported.

strong predictable power of both village and household level networks on the likelihood of receiving remittances. Both instruments are individually significant at 1% level in the first stage regression. Sargan's test for over-identification of the instruments (for the 2SLS version) does not reject the null hypothesis that both instruments are exogenous to the main equation ($p\text{-value} = 0.930$). The coefficient of interest, i.e., the impact of remittances on school attendance, is higher compared to OLS results in Column (4), 3.5%, although it is still statistically insignificant.

OLS estimates that do not properly control for household wealth had suggested that transfers from abroad help to substantially reduce drop out rates; however, the claim is not entirely valid after accounting for wealth. Even after considering several alternatives that take into account potential sample selection on observable and unobservable characteristics, and endogeneity of remittances receipts, the evidence signals that remittances do not seem to significantly enhance investment in children's human capital, at least on the average children. Section IV.f presents results for different demographic groups, discriminating by age and gender, to see whether this claim is valid across all children.

V.d. Remittances and Child Labor Supply

In many developing countries, children work instead of or at the same time while attending school. Typical activities are family businesses and other informal part-time jobs. These activities, while beneficial in the short run for families in order to obtain higher income streams, certainly disrupts the acquisition of human capital of future

generations. It would be interesting to see whether remittances can prevent children from working. Table 6 presents probit specifications for the likelihood of working for children between 11 and 17 years old. The dependent variable is whether the child works for a wage (in activities other than family farms or businesses). Once again, Columns (1) to (3) present OLS estimates, and the main result is that remittances indeed keep children out of work.

Column (1) indicates that children from recipient families have 2.8 percentage points less chances of working. The impact is lower in absolute value once children and family controls are included. Columns (2) and (3) control for household wealth, first using principal component household asset index, and then by incorporating the full set of asset holdings in order to prevent spurious estimates of the true direct impact of remittances. Contrary to the schooling case, household wealth could be positively related to remittances receipts but this time negatively related to child labor. Failure to properly control for wealth can assign a negative predictable power to remittances that could be just reflecting selection in terms of parents' income generation. Indeed, the point estimate reduces to -1.3% and -1.2% respectively, although it remains significant, suggesting a "per se" reduction in child wage labor rates for recipient families.

Other findings indicate that older children and boys are more likely to work. Similarly, children from richer (in terms of asset holdings), better educated households, from male, married and medium-aged heads, and with a higher number of adult males in the household are less likely to work. On the other hand, children from rural regions are less likely to be involved in remunerated labor activities (presumably reflecting lack of off-farm labor opportunities).

Robustness checks for the true effect of remittances start in Column (4). Propensity score matching methods are first considered. Once again, the idea is to find children from recipient and non-recipient households with similar propensity scores, and estimate non-parametrically the effect of remittances on child labor. In this case, the point estimate is still large (-1.3%) although not significant this time. Selection could also be present on unobservable characteristics. Column (5) restricts the analysis to the case of children belonging to families with members abroad, in order to capture all selectivity coming through migration. The main result remains, with remittance effect still negative and significant. In other words, selection other than household wealth is rejected, similarly to the case of children's schooling.

Finally, Column (6) explores endogeneity issues using village and family networks as instrument for access to remittances. IV Probit estimate (Amemiya's GLS) for remittances is large (-6.7%) and statistical significant (overidentification test do not reject exogeneity of the instruments with a p-value of 0.121). In other words, robust to endogeneity estimates suggest that remittances significantly contribute to prevent average kids from working. Apparently, remittances substitute child labor in the household budget.

V.e. Remittances and Adult Labor Supply

It is commonly argued by detractors of unconditioned money transfers to less developed countries that they may have the perverse effect of disincentive in the labor supply. In fact, if leisure is a normal good, it is expected that an exogenous increase in

income will increase leisure consumption. However, a fall in labor supply in recipient families should not necessarily be viewed as a negative side effect of remittances in a development perspective. For instance, women from remittances-recipient households may now afford parenting and home production activities. Or even recipient households could be spending the extra income in hiring outside labor (therefore, creating a positive externality of remittances in neighbor families), or they could be just substituting labor by capital or increments in productivity levels.

Tables 7 and 8 present evidence on the effect of remittances on adults' (between 22 and 65 years old) labor supply, for males and females respectively. OLS estimates suggest a negative impact of remittances on labor supply: men and women in recipient households tend to remain outside the labor market. Marginal disincentive effects are virtually the same for males (-6.6%) and females (-6.7%) in Column (1). This negative impact is robust to the inclusion of certain individual and household characteristics, such as household head indicator, age, education, marital status, household education, number of children, number of adults, area of residence, as well as a control for household assets in Column (2). Similarly for women, controls for pregnancy and for mothers of young children (0-2 years old) are included.

Other interesting results are that being a household head increases the likelihood of working for men and women. The number of children uniformly increases the probability of working for men, but this is not true for women. For women, pregnancy and having young children (0-2 years old) significantly decreases the chances of labor market participation. Similarly, the presence of adult males decreases female labor force participation, but the availability of other adult women in the household increases it.

Middle aged adults are more likely to work. Similarly, education increases labor market participation in both males and females. Concerning differences by gender, urbanization increases participation only for females, and married women are less likely to remain in the labor market, as opposed to males (for whom marriage increases participation).

Sample selection can be present if families decide to reallocate the labor activities of their members in different countries. In that sense, it could be expected that some families strategically send family members to work abroad instead of doing it in the domestic labor market. If so, remittances' recipients could be systematically different than non-recipients in their decision to participate in the labor market. Once again, several sample selection correction can be explored to determine the robustness of the previous results.

Results seem to change after selection correction on observables (Propensity score matching samples, Columns 3). Propensity score matching indicates that "treated" females tend to work substantially less than "untreated" counterpart, other observable characteristics equal. For the case of males, the negative impact of remittances on labor supply disappears: "treated" males do not work less than "untreated" individuals.

Indeed, further exploration related the robustness of the results led to different conclusions for male and females. The analysis restricted to families with members currently residing abroad also give different result in terms of the negative and significant impact of receiving remittances on male and female labor supply. Once again, while recipient females still tend to work less, this is not true for males: once selection into migration is taken into account, "treated" males in terms of remittances do not differ from "untreated" in terms of labor market participation.

Finally, Column (5) presents IV results in order to correct for potential endogeneity of remittances, as well as sample selection. The same instruments as for children school attendance and child labor were considered. For the case of males (Table 7), the IV approach confirms the result found for the migrant household sample: remittances have no significant impact on labor supply. Moreover, the sign is even positive in this specification. However, this is not true for females: IV estimates suggest that remittances still have a negative and significant impact by reducing female's labor supply. Even the size of the coefficient is substantially large for females, indicating that OLS estimates are upward biased in this case. Maybe women with higher entrepreneurial and work spirit ask for remittances in order to start new business or a self-employment activity, and the OLS coefficient on remittances is capturing this unobserved propensity to work. The result for males is consistent with Yang (2004) findings for the Philippines, although he also finds an insignificant impact on females' labor supply.

The differential impact of remittances on labor supply by gender could be indicating a gain in intra-household relative power of women after migration, especially if they are more likely to be the recipient person in the household. Unfortunately, the data does not indicate which person in the household is the recipient, but the fact that a higher proportion of recipient families are female-headed (Table 4) is consistent with this assumption.

V.f. Differences by Demographic Groups

The above average results for the impact of remittances on schooling and labor do not discriminate by demographic groups. It could be the case that remittances help girls to stay in school and avoid working but not for boys. Or remittance can allow children to finish primary education but not secondary school. Similarly for the case of adults, remittances can allow middle aged individuals to be engaged in entrepreneurial activities (i.e., self-employment), elderly to retire earlier, and younger women to consider maternity options as opposed to work. In any case, remittances can have a different impact in certain demographic groups.

Table 9 presents Amemiya's GLS estimates ("IV Probit") interacting remittances with gender and different age groups. For each case, the set of instruments include village networks interacted with the demographic group of interest, as well as family level instrument (number of migrants that returned home two or more years ago). For the case of children, the evidence suggests that girls indeed benefit from remittances in terms of school enrollment, while boys remain unaffected. Remittances seem to be channeled in part into female human capital accumulation. In contrast, there is no gender differential in terms of wage labor: both boys and girls from recipient households are less equally likely to work for a wage.

For the case of age groups, 11-14 years old children from recipient households are more likely to be enrolled in school compared to non-recipient counterparts, although there is no significant impact for older children (15-17 years old). In other words, remittances seem to help children to finish primary education although this does not seem

to be true for secondary school. In the case of child labor, there is no different by age group in the impact of remittances: children from all ages in recipient families are less likely to work.

Remittances also seem to affect differentially adult labor supply. For the case of middle-aged (26-59 years old) males, remittances receipts seem to be positive associated with labor force participation. Presumably, remittances are helping self-employment and therefore generating new labor opportunities for males in typical work ages. In contrast, remittances are not associated with labor participation for younger adults (22-25 years old) or males in retirement ages (60-65 years old). In contrast, for the case of women, remittances reduce labor for participation at all ages, with higher negative impact at younger ages (presumably allowing maternity options or home-based activities).

The results signaling that the additional income derived from migration increases girls' education and reduces women's labor supply, with no major impact on activity choice for males 14 years or older, suggest the presence of gender differences in the use of remittances across households. Unfortunately, the data does not allow testing for intra-household gender differences in the use of remittances. All that can be said is that across households, remittances do not have the same impact across gender and age groups.

VI. Conclusions

Remittances can affect household labor supply and investment in children's human capital, key outcomes for the promotion of growth in a developing country. The paper finds that robust estimates that take into account both selection and endogeneity problems

in estimating the average impact of remittances are substantially different from estimates presented in previous studies.

Previous literature results (i.e., Cox Edwards and Ureta, 2003) suggest a significant impact of remittances on children's school attendance across all ages and gender. However, methodological problems arise as they do not consider the potential sample selection and endogeneity of remittances receipts. Moreover, when distinguishing by demographic subgroups, the evidence in the present study suggests that while girls and young boys (11-14 years old) seem to benefit from remittances in terms of higher enrollment rates, the positive impact does not apply to older (15-17 years old) boys. A further positive side of remittances is that these transfers seem to be used as a substitute for child labor (outside family businesses or farms), a practice usually associated with higher school drop out rates.

Concerning adult labor supply, the theory implies that income effects will increase leisure consumption in these foreign-income dependent economies. This presumption is corroborated in this paper, at least for females. The fall in labor supply for recipient adult females could also be associated to higher rates of parental and home production activities. Robust results (after accounting for sample selection and endogeneity of remittances) show that indeed females' labor supply is lower for remittances' recipients. However, this is not so true for males: OLS negative impact disappears in matched samples, when the analysis is restricted to migrant households, and when IV techniques are considered. Moreover, the relationship between remittances transfers and labor participation seems to be positive for middle aged males, suggesting that remittances could be creating employment opportunities for self-employment.

Further research is needed, in particular due to data limitations on sender characteristics. Panel data would also allow the inclusion of households' fixed effects and exploit the variability across time in remittance receipts for a given household. Moreover, other development impacts of remittances could be analyzed so as to clarify the long-term consequences for an economy that relies heavily on income transfers from abroad.

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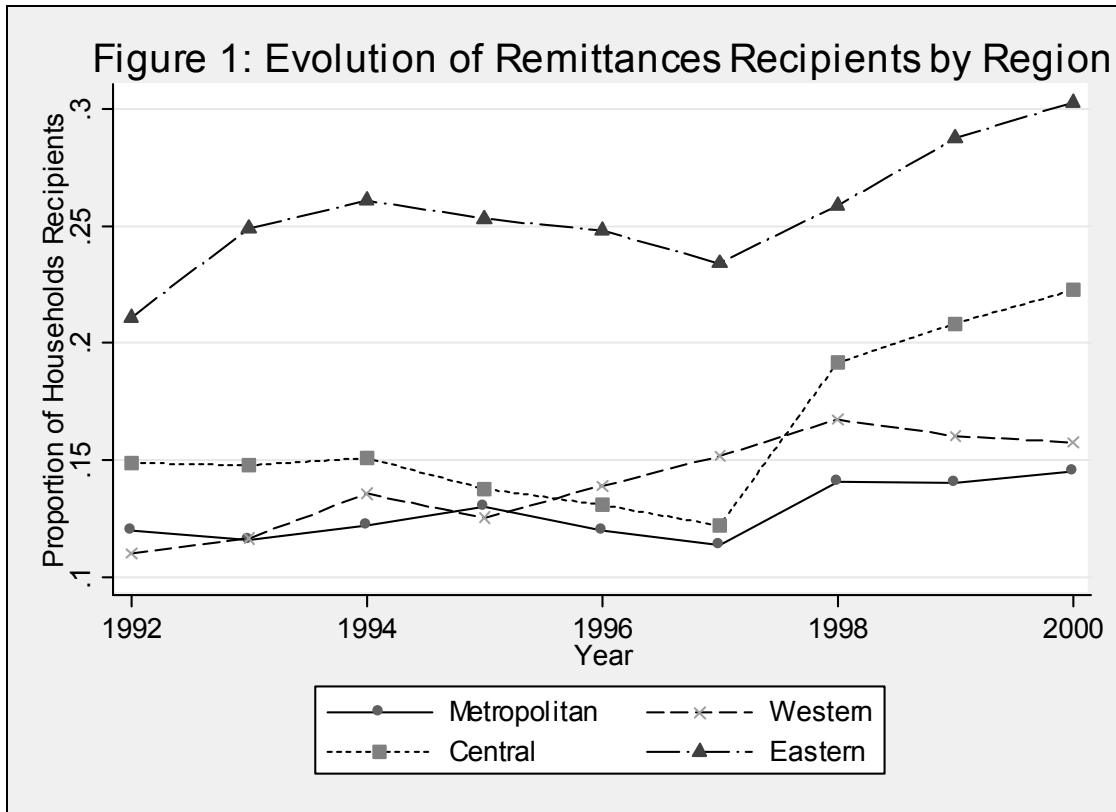


Table 1 – El Salvador: Measures of External Migration

Region	Department	Population Census 1992 (1)	External Migration		Receiving Remittances 1998 ³ (4)
			1992 Census ¹ (2)	1998 ² (3)	
Metropolitan	San Salvador La Libertad	2,024,991	0.059	0.141	0.136
Western	Sonsonate Ahuachapan Santa Ana	1,079,958	0.046	0.170	0.156
Central	Cuscatlan Chalatenango San Vicente La Paz Cabanias	883,166	0.052	0.193	0.179
Eastern	Usulután San Miguel Morazan La Union	1,129,484	0.079	0.229	0.261
El Salvador		5,118,599	0.059	0.173	0.188

Data Sources: 1992 Population Census (Columns 1 and 2), EHPM (Columns 3 and 4).

Notes: ¹ Previous residence in the state of reference and living abroad in 1992 as a percentage of people living in the state in 1992.

² Percentage of HHs with a family member abroad.

³ Percentage of HHs that receive remittances from abroad.

Table 2: El Salvador: Descriptive Statistics – Household Level

Variables	Remittances	
	Non Recipients	Recipients
Households	9,704	2,249
Members (Adult Equivalents) ¹	4.123 (0.021)	4.169 (0.045)
Female Head	0.228*** (0.004)	0.426*** (0.010)
Age of Household Head (Years)	45.356*** (0.158)	52.297*** (0.356)
Max. Household Education (Years)	7.898*** (0.047)	8.225*** (0.096)
Number of Children (17 or less years old)	2.139** (0.019)	2.042** (0.039)
Children at School (11-17 years old)	0.723*** (0.005)	0.794*** (0.009)
Children Working for Wage (11-17 years old)	0.089*** (0.003)	0.062*** (0.005)
Head Employed in Agriculture	0.309*** (0.005)	0.352*** (0.013)
Adult (22-65 years old) Males in Labor Force	0.911*** (0.003)	0.845*** (0.009)
Adult (22-65 years old) Females in Labor Force	0.519*** (0.005)	0.452*** (0.010)
Rural Area	0.382 (0.005)	0.386 (0.010)
Expenditure per Adult Equivalent (Dollars per month)	56.136 (2.677)	59.562 (5.028)
Access to Electricity	0.779*** (0.004)	0.873*** (0.007)
Access to Running Water	0.481*** (0.005)	0.568*** (0.010)
In-House Sanitary Service	0.317*** (0.005)	0.381*** (0.010)
Telephone Service	0.145*** (0.004)	0.194*** (0.008)
Number of Rooms per Adult Equivalent	0.648*** (0.006)	0.792*** (0.014)
Refrigerator	0.387*** (0.005)	0.570*** (0.010)
Family Member Abroad	0.046*** (0.002)	0.719*** (0.009)

Notes: * Significant Difference at 10% level. ** Significant Difference at 5% level. *** Significant Difference at 1% level.

¹ Adult Equivalence: Children 0-9 years old are counted as 0.5 of an adult.

Table 3: Migration, Remittances, Assets and Education – El Salvador, 1998

Panel A: Asset Index Deciles

Asset Index Deciles	Max. HH Education	Migrant Member	Remittances Recipients	Remittances / Total Income ¹
1	4.008	0.078	0.088	0.384
2	4.242	0.096	0.119	0.377
3	5.466	0.125	0.147	0.370
4	6.482	0.119	0.145	0.392
5	7.583	0.172	0.183	0.308
6	8.148	0.198	0.229	0.338
7	9.110	0.218	0.239	0.331
8	10.177	0.223	0.236	0.279
9	11.351	0.259	0.264	0.273
10	13.064	0.242	0.233	0.232
Total	7.960	0.173	0.188	0.316

Panel B: Remittances and Education

Max Years of Education in HH	Migrant Member	Remittances Recipients	Remittances / Total Income ¹
0.000	0.163	0.176	0.489
1-4	0.153	0.167	0.436
5-7	0.160	0.182	0.346
8-11	0.169	0.196	0.326
12-14	0.210	0.214	0.214
14+	0.184	0.181	0.127

Note: ¹ Average over households receiving remittances

Table 4 - El Salvador: Determinants of Remittances Receipts and Migration - Household Level - 1998

Variables	Receive Remittances			International Migrant Family Member
	(1)	(2)	(3)	(4)
Age (HH Head)	-0.003*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)	0.000 (0.001)
Age Squared x 100 (HH head)	0.006*** (0.001)	0.007*** (0.001)	0.009*** (0.001)	0.003*** (0.001)
Female (HH head)	0.156*** (0.010)	0.152*** (0.010)	0.141*** (0.010)	0.141*** (0.010)
Married (HH head)	0.038*** (0.008)	0.020*** (0.008)	0.018** (0.008)	0.019*** (0.007)
Max. HH Education	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
Number of Children 0-5 Years Old	-0.005 (0.004)	-0.003 (0.004)	-0.003 (0.004)	-0.006 (0.004)
Number of Boys 6-17 Years Old	0.011*** (0.004)	0.014*** (0.004)	0.014*** (0.004)	0.012*** (0.004)
Number of Girls 6-17 Years Old	0.017*** (0.004)	0.019*** (0.004)	0.018*** (0.004)	0.019** (0.008)
Rural Area	0.027*** (0.009)	0.066*** (0.009)	0.067*** (0.010)	0.062*** (0.010)
Log of Per Capita Expenditure (In colones)	0.038*** (0.004)			
Household Asset Index		0.039*** (0.002)	0.035*** (0.002)	0.035*** (0.002)
Village Networks (% of HH with Migrants)			0.722*** (0.057)	0.744*** (0.053)
Number of Return Int. Migrants (2 + years ago)			0.022** (0.011)	0.025** (0.010)
Province (Department) Indicators	Yes	Yes	Yes	Yes
Pseudo R2	0.091	0.111	0.125	0.142
Observations	11,953	11,953	11,953	11,953

Notes: * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level. Marginal Effects Reported.

Table 5: El Salvador - Determinants of Children School Attendance (Children between 11 and 17 years old) – 1998

Method	Probit				Prop. Score Matching	Probit	IV Probit
Sample Households	All				All	Migrant HH	All
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)
HH Receive Remittances	0.071*** (0.011)	0.046*** (0.011)	0.018 (0.012)	0.011 (0.012)	0.018 (0.018)	0.009 (0.024)	0.035 (0.079)
Age		-0.085*** (0.003)	-0.084*** (0.003)	-0.085*** (0.003)		-0.071*** (0.005)	-0.084*** (0.003)
Female		-0.008 (0.011)	-0.009 (0.011)	-0.010 (0.011)		-0.022 (0.020)	-0.009 (0.011)
Oldest Child		0.034*** (0.012)	0.032*** (0.012)	0.033*** (0.012)		-0.004 (0.023)	0.032*** (0.012)
Number of Children 0-5 Years Old		-0.030*** (0.005)	-0.027*** (0.005)	-0.026*** (0.005)		-0.021** (0.009)	-0.027*** (0.005)
Number of Boys 6-17 Years Old		0.014*** (0.005)	0.018*** (0.005)	0.017*** (0.005)		0.005 (0.009)	0.018*** (0.005)
Number of Girls 6-17 Years Old		0.009* (0.005)	0.014*** (0.005)	0.013*** (0.005)		0.024*** (0.008)	0.013*** (0.005)
Number of Males 18-65 Years Old		-0.034*** (0.006)	-0.030*** (0.006)	-0.030*** (0.006)		-0.015 (0.010)	-0.030*** (0.005)
Number of Females 18-65 Years Old		0.009 (0.006)	0.011* (0.006)	0.008 (0.006)		0.007 (0.011)	0.011* (0.006)
Female (HH head)		-0.020 (0.012)	-0.016 (0.012)	-0.015 (0.012)		0.025 (0.020)	-0.021 (0.020)
Age (HH head)		0.012*** (0.002)	0.010*** (0.002)	0.010*** (0.002)		0.002 (0.003)	0.010*** (0.002)
Age Squared x 100 (HH head)		-0.012*** (0.002)	-0.010*** (0.002)	-0.009*** (0.002)		-0.002 (0.003)	-0.010*** (0.002)
Max. HH Education		0.049*** (0.002)	0.040*** (0.002)	0.039*** (0.002)		0.030*** (0.003)	0.040*** (0.002)
Married (HH head)		0.017* (0.010)	0.009 (0.010)	0.008 (0.010)		0.021 (0.018)	0.008 (0.010)
Rural Areas		-0.047*** (0.011)	-0.006 (0.011)	-0.010 (0.011)		0.011 (0.021)	-0.008 (0.013)
Household Asset Index ⁺			0.037*** (0.003)			0.026*** (0.006)	0.036*** (0.005)
Household Assets Indicators ⁺	No	No	No	Yes		No	No
State Indicators	No	Yes	Yes	Yes		Yes	Yes
Observations	9,194	9,194	9,194	9,194	9,194	1,715	9,194
Mean of Dependent Variable	0.738	0.738	0.738	0.738	0.738	0.795	0.738
R-Squared	0.004	0.253	0.266	0.273	-	0.254	-
Sargan's Test for Over-identification (p-value)	-	-	-	-	-	-	0.930

Notes: * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level. Robust to Heteroskedasticity Standard Errors reported. Column (5) performs a Propensity Score Matching estimation, using all variables in Column (3). Column (7) implements Amemiya's Generalized Least Squared method, using as instruments village migrant networks and the number of return international migrants (2+ years ago). Household Assets included: number of rooms per adult equivalent, home ownership, and cement floor; water, electrical, sanitary and telephone services; refrigerator, automobile, TV, VCR, sewing and washing machine.

Table 6: El Salvador - Determinants of Child Wage labor (Children between 11 and 17 years old) – 1998

Method	Probit			Prop. Score Matching	Probit	IV Probit
Sample Households	All			All	Migrant HH	All
Model	(1)	(2)	(3)	(4)	(5)	(6)
HH Receive Remittances	-0.028*** (0.006)	-0.013** (0.005)	-0.012** (0.005)	-0.013 (0.012)	-0.032*** (0.014)	-0.067*** (0.017)
Age		0.024*** (0.001)	0.025*** (0.001)		0.020*** (0.003)	0.025*** (0.001)
Female		-0.049*** (0.005)	-0.048*** (0.005)		-0.030*** (0.009)	-0.047*** (0.006)
Oldest Child		0.009 (0.005)	0.009 (0.005)		-0.009 (0.010)	0.008 (0.006)
Number of Children 0-5 Years Old		0.002 (0.002)	0.001 (0.002)		0.003 (0.004)	0.001 (0.002)
Number of Boys 6-17 Years Old		0.001 (0.002)	0.000 (0.002)		0.006* (0.003)	0.003 (0.002)
Number of Girls 6-17 Years Old		0.002 (0.002)	0.002 (0.002)		0.000 (0.003)	0.004* (0.002)
Number of Males 18-65 Years Old		-0.005** (0.003)	-0.006** (0.003)		-0.009** (0.004)	-0.006** (0.003)
Number of Females 18-65 Years Old		-0.004 (0.003)	-0.004 (0.003)		-0.003 (0.004)	-0.004 (0.003)
Female (HH head)		0.022*** (0.006)	0.021*** (0.006)		-0.009 (0.008)	0.043*** (0.012)
Age (HH head)		-0.001* (0.001)	-0.001 (0.001)		0.001 (0.001)	-0.002** (0.001)
Age Squared x 100 (HH head)		0.001 (0.001)	0.001 (0.001)		-0.001 (0.001)	0.002** (0.001)
Max. HH Education		-0.005*** (0.001)	-0.005*** (0.005)		-0.003** (0.001)	-0.005*** (0.001)
Married (HH head)		-0.009** (0.004)	-0.008* (0.004)		-0.005 (0.007)	-0.007 (0.005)
Rural Areas		-0.016*** (0.005)	-0.013** (0.005)		-0.026*** (0.008)	-0.010* (0.006)
Household Assets Index ⁺		-0.010*** (0.002)			-0.008*** (0.002)	-0.006** (0.002)
Household Assets Indicators ⁺	No	No	Yes		No	No
Province (Department) Indicators	No	Yes	Yes		Yes	Yes
Observations	9,194	9,194	9,194	9,194	1,715	9,194
Mean of Dependent Variable	0.083	0.083	0.083	0.083	0.067	0.083
R-Squared	0.003	0.184	0.191	-	0.223	-
Sargan's Test for Over-identification (p-value)	-	-	-	-	-	0.121

Notes: * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level. Robust to Heteroskedasticity Standard Errors reported. Column (5) performs a Propensity Score Matching estimation, using all variables in Column (2). Column (6) implements Amemiya's Generalized Least Squared method, using as Instruments village migrant networks and the number of return international migrants (2+ years ago). Household Assets included: number of rooms per adult equivalent, home ownership and cement floor; water, electrical, sanitary and telephone services; refrigerator, automobile, TV, VCR, sewing and washing machine.

Table 7: El Salvador - Determinants of Male Labor Supply (Adults, 22- 65 years old) – 1998

Method	Probit		Prop. Score Matching	Probit	IV Probit
Sample Households	All		All	Migrant HH	All
Model	(1)	(2)	(3)	(4)	(5)
HH Receive Remittances	-0.066*** (0.010)	-0.020*** (0.008)	-0.013 (0.016)	-0.004 (0.022)	0.022 (0.056)
Household Head		0.136*** (0.011)		0.152*** (0.031)	0.144*** (0.018)
Age		0.008*** (0.001)		0.012** (0.005)	0.009*** (0.002)
Age Squared / 100		-0.014*** (0.002)		-0.020*** (0.006)	-0.015*** (0.002)
Education (Years)		0.003*** (0.001)		0.010*** (0.003)	0.003*** (0.001)
Married		0.027*** (0.006)		0.047*** (0.022)	0.027*** (0.006)
Max. HH Education		-0.002** (0.001)		-0.006* (0.003)	-0.002** (0.001)
Number of Children 0-5 Years Old		0.007** (0.003)		0.022** (0.011)	0.007*** (0.003)
Number of Boys 6-17 Years Old		0.010*** (0.003)		0.018* (0.011)	0.010*** (0.003)
Number of Girls 6-17 Years Old		0.004 (0.003)		-0.009 (0.010)	0.010*** (0.003)
Number of Males 18-65 Years Old		-0.005 (0.003)		-0.009 (0.010)	0.003 (0.003)
Number of Females 18-65 Years Old		0.001 (0.003)		0.015 (0.011)	0.004 (0.003)
Rural Area		0.009 (0.007)		0.003 (0.024)	-0.004 (0.003)
Household Assets Index		-0.005*** (0.002)		-0.012** (0.006)	-0.007** (0.003)
Province (Department) Indicators	No	Yes		Yes	Yes
Observations	10,641	10,641	10,641	1,478	10,641
Mean of Dependent Variable	0.901	0.901	0.901	0.829	0.901
R-Squared	0.009	0.121	-	0.093	-
Sargan's Test for Overidentification (p-value)	-	-	-	-	0.382

Notes: * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level. Standard Errors clustered at the household level. Column (3) performs a Propensity Score Matching estimation, using all variables in Column (2). Column (5) implements Amemiya's Generalized Least Squared method, using as instruments village migrant networks and the number of return international migrants (2+ years ago).

Table 8: El Salvador - Determinants of Female Labor Supply (Adults, 22- 65 years old) -1998

Method	Probit		Prop. Score Matching	Probit	IV Probit
Sample Households	All		All	Migrant HH	All
Model	(1)	(2)	(3)	(4)	(5)
HH Receive Remittances	-0.067*** (0.011)	-0.086*** (0.012)	-0.081*** (0.018)	-0.067** (0.026)	-0.592*** (0.050)
Household Head		0.175*** (0.013)		0.020 (0.027)	0.241*** (0.018)
Age		0.036*** (0.003)		0.042*** (0.007)	0.021*** (0.004)
Age Squared / 100		-0.050*** (0.004)		-0.051*** (0.008)	-0.031*** (0.005)
Education (Years)		0.016*** (0.002)		0.021*** (0.003)	0.014*** (0.002)
Married		-0.064*** (0.010)		-0.060** (0.024)	-0.060*** (0.011)
Own Baby (0-2 Years Old)		-0.104*** (0.014)		-0.063 (0.039)	-0.121*** (0.016)
Pregnant		-0.120*** (0.025)		-0.089 (0.084)	-0.161*** (0.028)
Max. HH Education		-0.001 (0.002)		0.003 (0.004)	0.001 (0.002)
Number of Children 0-5 Years Old		0.007 (0.005)		-0.001 (0.013)	-0.008 (0.006)
Number of Boys 6-17 Years Old		0.006 (0.005)		0.015 (0.012)	0.017*** (0.006)
Number of Girls 6-17 Years Old		0.010* (0.005)		-0.009 (0.012)	0.027*** (0.006)
Number of Males 18-65 Years Old		-0.033*** (0.006)		-0.025* (0.013)	-0.052*** (0.007)
Number of Females 18-65 Years Old		0.025*** (0.006)		0.007 (0.013)	0.049*** (0.007)
Rural Area		-0.136*** (0.012)		-0.156*** (0.028)	-0.090*** (0.016)
Household Assets Index		0.012*** (0.003)		-0.001 (0.007)	0.041*** (0.006)
Province (Department) Indicators	No	Yes		Yes	Yes
Observations	12,939	12,939	12,939	2,316	12,939
Mean of Dependent Variable	0.506	0.506	0.506	0.462	0.506
Pseudo R-Squared	0.002	0.115	-	0.111	-
Sargan's Test for Overidentification (p-value)	-	-	-	-	0.295

Notes: * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level. Standard Errors clustered at the household level. Column (3) performs a Propensity Score Matching estimation, using all variables in Column (2). Column (5) implements Amemiya's Generalized Least Squared method, using as instruments village migrant networks and the number of return international migrants (2+ years ago).

Table 9: El Salvador - Impact of Remittances on Selected Cases - IV Probit

Coefficient	Children		Males ³	Females ⁴
	Schooling ¹	Wage labor ²	Labor Supply	
HH Receive Remittances	-0.062 (0.108)	-0.063** (0.020)		
HH Receive Remittances*Female	0.147** (0.052)	-0.021 (0.034)		
HH Receive Remittances	-0.039 (0.101)	-0.068** (0.019)		
HH Receive Remittances * Age 11-14	0.112** (0.043)	0.003 (0.033)		
HH Receive Remittances			-0.115 (0.117)	-0.361** (0.126)
HH Receive Remittances * Age 22-25			0.063 (0.022)	-0.369*** (0.091)
HH Receive Remittances * Age 26-49			0.084** (0.014)	-0.435*** (0.088)
HH Receive Remittances * Age 50-59			0.064** (0.015)	-0.180* (0.094)

Notes: * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.

¹ Other controls are detailed in Table 5. Base categories are constituted by males and children aged 15-17 years old respectively.

² Other controls are detailed in Table 6. Base categories are constituted by males and children aged 15-17 years old respectively.

³ Other controls are detailed in Table 7. Base category is constituted by males aged 60-65 years old.

⁴ Other controls are detailed in Table 8. Base category is constituted by females aged 60-65 years old.