Public Disclosure Authorized

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WPS3903

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

Pablo Acosta*

University of Illinois at Urbana-Champaign

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 enable investing in the human capital of children, a key outcome from 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. 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 remittance receipts, average estimates suggest that girls and young boys (under 15 years old) from recipient households are more likely to be enrolled in school than those from non-recipient households. Remittances are also negatively related to child labor and adult female labor supply, while on average adult male labor force participation remains unaffected. That additional income derived from migration increases girls' education and reduces women's labor supply, with no major impact on activity choice for males 15 years or older, suggests the presence of gender differences in the use of remittances across (and possibly within) households.

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

Key words: migration, transfers, human capital, labor supply.

World Bank Policy Research Working Paper 3903, April 2006

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* Department of Economics, University of Illinois at Urbana-Champaign. E-mail: pacosta@uiuc.edu. I am grateful for helpful comments from Maurice Schiff, Richard Adams, Jose Lopez Cordova, Kevin Hallock, Darren Lubotsky, Todd Elder, Richard Akresh, and Aparajita Zutshi, as well as seminar participants at the Latin American and Caribbean Economic Association Meeting (Paris, France) and at the University of Illinois at Urbana-Champaign.

I. Introduction

Remittance 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 for physical mobility of migrants, have contributed to this fact. Flows of workers' remittances to developing countries were estimated to be $160 billion in 2004, with approximately $40 billion going to Latin America, the highest recipient region (Acosta et al., 2006). Moreover, such remittances constitute the second most important source of external funding in developing countries, following Foreign Direct Investment (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 reducing liquidity problems that are often present in developing countries. In particular, conditional on the same amount of non-remittance income, it can be expected that recipient families will expand their consumption of leisure and their investment in the human capital of their children. Empirical findings on such outcomes would add to our understanding 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 to meet their needs. This strong dependence on foreign aid would not be expected to decline in the future. In this regard, Kritz et al. (1981) asks, "Do remittances help the development process or, like drug dependency, does their existence primarily feed the need of further (more) remittances in the future?". Remittances can contribute to economic growth,

however, 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 (ability, income shocks) characteristics complicates the identification of the effect of remittances using standard OLS techniques. In such a context, sample selection as an omitted variable problem may be present. As an example, in 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 for remittances in a school attendance equation could be biased. For certain outcomes, selection correction methods need to be considered in order to avoid inferring the wrong effects of remittance receipts.

Even after accounting for sample selection, we must be careful because remittances can be correlated with unobserved determinants of the outcome of interest. For instance, if remittances constitute the return on an investment, for which the asset is the family member residing abroad, the household head's decision to send a member abroad or make that individual work at home would 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 to use instrumental variables (IV).

This paper uses data from household surveys from El Salvador in order to evaluate the impacts 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, robust estimates suggest that girls (11-17 years old) and young boys (11-14 years old) are more likely to stay at school than are those from non-recipient households. The positive effect does not appear 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, whereas average adult male labor participation remains unaffected. The last gender difference on the impact of remittances on labor supply could be suggesting a gain in the relative power of women after migration, especially if they are more likely to be the recipient person within the household.

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

II. Uses of Remittances and Previous Literature

The 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 been focused on 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 above, remittances can boost consumption, increase savings, or stimulate investment in economies with liquidity constraints. One of the first studies that addressed the economic consequences of remittances at destination is Funkhouser (1992), who finds that, in Nicaragua, remittances increase self-employment in men and reduce labor supply in women. 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) finds no effect of external remittance receipts on non-farm asset accumulation in rural Pakistan. Woodruff and Zenteno (2004) show that, in Mexico, investment in small enterprises (mostly self-employment) is higher in states with higher migration rates and higher remittance receipts. The authors associate the findings with the

[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).

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

Remittances can not only increase physical investment, they also can 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 herein. One of the concerns is that the Cox-Edwards and Ureta study does not address potential sample selectivity issues and endogeneity of remittances. Therefore, 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) relate 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 variable that drives this result is remittances. They control for potential endogeneity of having a migrant family member by using historical state migration rates and household characteristics.

Yang (2004) also presents evidence of 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), in the case of Mexico, 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 (2005a) 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 used in this paper come from a 1998 cross-sectional household survey, "Encuesta de Hogares de Propositos Multiples" (EHPM) in El Salvador.[2] The national survey (of urban and rural areas) contains detailed information on demographic characteristics (including education and health measures), current and previous employment status, earnings, and expenditures (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 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.[3]

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

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

[3] Cox-Edwards and Ureta (2003) use the 1997 wave of the EHPM in their paper. The OLS results of this paper are similar when using 1997 instead of 1998 data.

to the same municipal areas ("villages"). The paper uses the 1998 wave because this is the only year for which detailed information on household migration (previous migration spells and area of birth of actual household members) was asked in the EHPM. Such information will be useful in the construction of instrumental variables for the analysis that follows. The 1998 wave contains a total of 11,953 households belonging to 111 "villages" in the country, with all regions nearly equally represented (3,740 households from the Metropolitan region, 2,903 from the Western region, 2,780 from the Central region, and 2,952 from the Eastern region).

A panel structure would be ideal to help solve the potential selection problem by including households' fixed effects and, in this 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 that, for 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 receives transfers from abroad, as well as their amount and the frequency. Information on the items (food, housing, health, education, savings) the family decides to spend money on, from the amount remitted, is also available. However, as pointed out by Cox-Edwards and Ureta (2003), it is easy to doubt the reliability of such information, as people tend to pool remittances and earned income when expenditure decisions are made. Recall bias also may 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 neighboring countries and to the US. Starting in the 1970s, 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 for political reasons.[4] According to the 2000 US Census, 817,000 Salvadorans live in the US, with 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 1990s.[5] Even after achieving peace in the 1990s, migration flows remained high during the last 15 years. Menjivar (2000) finds evidence of the existence of large social networks among Salvadorans in California, with 80% reporting that they received help from US relatives and friends for the trip. Additionally, the majority of migrants appear to be permanent: household survey data for 1997 show that, among the households with a family member abroad, 67% believe that their migrant relatives will not come back to live permanently in the home country.

Table 1 presents evidence of 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

[4] Starting in the late 1970s, El Salvador experienced a civil war that intensified during the 1980s. An agreement ending hostilities by all parties was reached in February 1992. See Funkhouser (1997) for a description of the conflict period.

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

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

Migrant remittance flows have gained importance as a source of income only in the last two 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.[6] Official data estimate total remittances in 2003 at $2.11 billion in El Salvador. [7] As a source of income in El Salvador, remittances are among the largest of 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) states that labor constitutes the largest export of the country. Household survey data used in this paper reflect 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 received remittances in 1998.[8] Note that the four states that have relatively higher emigration rates (Eastern region) are also the ones that

[6] International Monetary Fund (IMF), Balance of Payments Statistics Yearbook.
[7] These figures represent lower bounds for the true amount transferred in the 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 migrants during visits or upon repatriation by friends. Russell (1986) notes that, in some developing countries such as Sudan, only 24% of migrants reported using banks when remitting.
[8] Throughout the analysis, only cash 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 note that the central and eastern states had the highest level of political conflict in the 1980s (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 for 1992-2000 by year for each 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 proportion of households that is the recipient of remittances increased in 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 proportion of recipients in the central states increasing from 15% to 22% 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 between 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 estimated number of adult equivalent members is equal across recipient and non-recipient groups (although migrant members are not observed), who have similar per capita expenditure levels.[9] However, recipient families appear to be better educated. In addition, household heads of recipient families are, on average, seven 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-recipient households. Household heads in remittance recipient families are more likely to be employed in agricultural activities. Finally, as expected, a much higher proportion of recipient households have family members abroad, although nearly 30% receive remittances from outside their circle of close relatives.

Other differences are associated with life quality; a higher proportion of recipients has access to electricity, water, sanitary, and telephone services. Additionally, the number of rooms per adult equivalent is larger for recipients, and a greater proportion of them has a refrigerator. Regarding the outcome variables of interest in the paper, recipient households appear to have fewer children, a higher proportion of children that stays at school, and a lower proportion who works for a wage. Finally, concerning labor supply, the evidence seems to suggest that both adult men and women in the household are less likely to work if they receive remittances.

[9] Deaton (1997) suggests 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.

It appears that recipients and non-recipients differ substantially in terms of 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 estimate of the impact of remittances in household spending decision is per capita income, expenditure, or wealth. If the evidence supports the idea that remittance recipients come from clear segments of the income/expenditure/wealth distribution shape in the country, it is then necessary to use some sample selection correction technique in order to control for the fact that families are not randomly assigned into being a recipient.

It is also necessary to examine the income, expenditure, or wealth distribution in order to identify segment locations for migrant families. An important concern is whether to investigate per capita pre-remittance 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 because certain market activities are replaced by home production. A further problem with the use of non-remittance income, given this particular dataset, is that income is not observed for migrants. If migrant's income is ignored, it is equivalent to computing 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 or she stayed at home, a much less restrictive assumption given the above mentioned problems with income. However, expenditure levels are not very helpful for looking at selection into remittance recipients, as they are likely to be affected by remittances flows. An alternative is to examine 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 such as that in El Salvador). The assets and housing characteristics available in the data that could be considered include the following: number of rooms per adult equivalent, home ownership and cement floor (housing); water, electrical, sanitary and telephone services (access to utilities); and refrigerator, automobile, TV, VCR, and sewing and washing machines (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 because 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 a 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) show 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.[10] The asset index for household *j* is defined as:

$$A_j = \sum_k f_k \frac{\left(a_{jk} - \bar{a_k} \right)}{s_k} \quad (1)$$

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 that vary most across households getting larger weights. For instance, an asset that all households own will be given zero weight because it explains none of the variation across households. See Filmer and Pritchett (2001) and McKenzie (2005b) for further details on the application of First Principal Component techniques in the construction of asset indexes and their advantage in approximating wealth levels. The asset index constructed has a correlation of 0.444 with per capita non-durable expenditure levels.

The first panel in Table 3 presents evidence concerning selection into migration and remittance receipts—how recipient families vary 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

[10] Recent studies that use First Principal Component based indexes of assets ownership as a control for economic status and living standards are McKenzie (2005b) 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 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, if migration costs are high for Salvadorans, poor families are more liquidity constrained and unable to finance the migration trip.

Of course, recipient families could be using money transfers in order to acquire some of the household assets used in the index, which then would not properly reflect 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 the 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) argue that an altruistic motive can rationalize 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 remittance recipients among more educated households.

In other words, Tables 2 and 3 suggest that recipient households are not a random group, that is, selection into migration is an important issue to be taken into account. The question of whether migrants are truly positive selected cannot be properly addressed with the data at hand in the absence of migrants' characteristics. However, 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 influence the decision to remit and migrate. Of course, even after controlling for observable dimensions, it is possible 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 and investment in the human capital of children, it is worthwhile to examine family characteristics that may motivate the decision to remit. As argued earlier, remittances cannot be seen solely as an income shock that expands household budget, but rather should be seen as the result of an intertemporal common strategy among household members located at different spatial points.

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 (e.g., a bequest). However, two important omitted variables that may be correlated with family income are sender's income and sender's education. Hence, not controlling for these variables can result in an upward bias in the coefficient of home income/expenditure. In any case, these 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 stated earlier, 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 recipient household. Column (1) controls for geographic (province/state), demographic, and socio-economic characteristics of the 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% higher). This fact seems reasonable if one believes that it is more likely that the family member who 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).

These estimates control for per capita expenditure as a proxy for household wealth. However, current per capita expenditure is not likely the best control for wealth, as it is likely to be affected by remittance flows. An alternative is once again to examine 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 by 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 positively correlated with whether a family receives remittances.

Column (3) adds controls related to migration at the village level and to the migration history of actual household members. The number of return international migrants who 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 remaining 10% other family members 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 to take into account the proportion of families within the village that currently have an international migrant member. This way, one can identify whether the household 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 (an additional 2.2 percentage points 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. 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 whether the household actually receives 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 receipt 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 exploiting 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 the spending behavior of recipient households as a means to determine whether remittances are changing intra-household consumption and investment decision or whether, 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 the human capital of children or in household (adults) labor supply. The fact that 19% of the households receive money transfers from abroad indicates that the data contain enough variation to be able to point to the 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 may be substantially important for families who decide to pool their income, regardless of the source. Families are presumably more likely to remember whether they received financial aid from abroad, or from other sources, but not the exact amount. As another source of income, 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-remittance 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 error in the reported amount received in remittance 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 its uses, it is preferred not to use this amount in the regression analysis.

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 (i.e., child enrolled at school) be modeled as a linear reduced form spending decision:

$$Y_{ij}^{*} = X_{ij}^{'}\alpha + W_{j}^{'}\beta + R_{j}^{'}\gamma + \mu_{ij} \qquad (2)$$

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 remittance 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. I estimate a probit model, where

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

As mentioned earlier, 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,

$$R_{ij} = 1 \text{ if } Z_{ij}^{'}\theta + \varepsilon_{ij} > 0 \tag{4}$$

If so,

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

where ρ = corr(μ_{ij}, ε_j). If the last term is not zero, failure to control for it could generate biased estimates of β. The evidence appears to suggest that there could be such a selection problem. 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 in school. The children analyzed are between 11 and 17 years old because outside opportunities such as working are available for this group. In addition to remittances, the set of controls 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 child in the household.

The first column of Table 5 only considers the impact of remittances on school attendance, while the second and third add controls for child and household characteristics. Huber-White standard errors are reported to account for heteroskedasticity. The result of interest in column (1) shows that remittances increase the likelihood of staying in school for the children of recipient households. This result is in line with the Cox-Edwards and Ureta (2003) finding of a 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 7.1% more likely than non-recipients to keep children at school.

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), indicating that part of the positive impact was only 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 the human capital of children. Children from households with middle age and married heads are also more likely to stay at school.

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

However, one important missing control is household wealth. Wealth is most likely positively correlated with both schooling and remittances, in particular if, as suggested in Table 3 and 4, migrant members come from relatively 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 between wealth and remittances is also positive, the estimated effect of remittances on schooling would be upwardly biased.

To investigate whether the estimated effect of remittances is capturing wealth effects, column (3) starts by including the 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, sanitation, and telephone services; automobile, TV, VCR, refrigerator, and sewing and washing machines. As expected, "wealthier" families are more likely to have children enrolled in school. The impact of remittances is attenuated (from 4.6% to 1.8%) once families are distinguished according to their asset holdings level, reduced to less than one half, compared to column (2). Moreover, the remittance effect is no longer statistically significant.

In essence, this implies that estimates that fail to properly control for wealth may be biased, 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 the human capital of children is much lower and no longer significant. It is worth mentioning 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 using of the full set of proxy variables instead of 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) of Table 5 performs the same analysis, but this time including the full set of household assets holdings, as opposed to an integrating index. None of these asset holding 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 with remittances should be less of a concern. This time, the size of the remittance 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's 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 are possible. One alternative is to perform propensity score matching (PSM), as defined by 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.[11] Treated and untreated observations are compared after matching, based on the probability of being 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 as 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):

$$(Y_0, Y_1) \perp D \| (X, W) \tag{6}$$

This equation states that conditional on a set of observable characteristics X and W, the treatment outcome is independent of the actual treatment status (D, receiving

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

remittances). Because 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:

$$E(Y_0 \| X, W, D) = E(Y_0 \| X, W) \tag{7}$$

Matching on all the variables in X and W is impractical when the number of variables is sufficiently high, as in this case whereby 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:

$$0 < P(X, W) = \Pr(D = 1 \| X, W) < 1 \tag{8}$$

The condition that the propensity is bounded between 0 an 1 holds whenever the mean treatment parameters are defined for all values of X and W (i.e., for each X and W, it is possible to observe in the data cases of both Y_1 and Y_0). It can be shown that, if the ITA assumption holds given X and W, it also holds 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) In comparison, 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, that individual is dropped from the analysis (lack of common support).[12]

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 the 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 for 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

[12] This method is called matching with replacement, and according to Michalopoulos et al. (2003), it results 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.

techniques with 500 replications). The point estimate is much lower compared to the 7.1 percentage points in the unmatched sample in column (1).

However, as stated above, 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 away 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. Similarly, one can assume that both decisions are also related to the same unobserved determinants.

If this seems reasonable, a way to get rid of the selection problem is to only examine 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 for remittances that is still insignificant. This is not simply the result of a merely increase in the standard errors due to a reduction of the sample size; the point estimate also decreases to 0.9%.

The other candidate problem, besides selection, is that current remittance receipts could be positively related to contemporaneous unobserved determinants of staying at school. For instance, a potential link is through income shocks. Negative income shocks

(e.g., 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's school enrollment, resulting in a downward bias for the estimated coefficient. Instrumental Variable (IV) techniques can overcome both this potential endogeneity problem and the selection bias noted above. 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 who 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 who 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 ongoing migrant family member may be part of a current strategy of the household for diversifying income shocks. 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 who lived abroad in the past (and has returned) presently has family members living abroad. A similar variable for approximating household-level network in a migration decision equation is used by 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 has a family member abroad in the area of reference. Certain states are traditionally migrant senders, as seen in Table 1, and those regions probably are more accustomed to being recipients of remittances for reasons

other 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 1970s and 1980s. 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 those seen in 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- to 17-year old children (-0.112, -0.007, and 0.064 respectively). Historical migration rates by state have been used as instruments for remittance receipts by Hanson and Woodruff (2003), Woodruff and Zenteno (2004), Hildebrandt and McKenzie (2005), Lopez Cordova (2005), and McKenzie (2005 a).[13]

As pointed out by 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 difficult to hold all in practice. Newey (1987) suggests the use of 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 column (7). Although not reported, estimates of the impact of remittances using 2SLS yield similar results. First stage results closely resemble column (3) in Table 4, with a

[13] Alternative instruments considered are village-level migration rates interacted with household head characteristics (age, education, and marital status), as in Hanson and Woodruff (2003). The results using these instruments are qualitatively 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 the 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 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 have suggested that transfers from abroad help to substantially reduce dropout 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, as well as endogeneity of remittance receipts, the evidence suggests that remittances do not seem to significantly enhance investment in the human capital of children, at least for the average child. 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 as, attending school. Typical work activities include 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 disrupt the acquisition of human capital for future

generations. It would be interesting to see whether remittances can help shield 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. 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 chance 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 the 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 remittance receipts, but this time negatively related to child labor. Failure to properly control for wealth can assign a weight to remittances that could just be reflecting selection in terms of parents' income generation. Indeed, the point estimates reduce to -1.3% and -1.2% respectively, although they remain 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. In comparison, children from rural regions are less likely to be involved in remunerated labor activities (presumably reflecting a 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 non-parametrically estimate the effect of remittances on child labor. In this case, the point estimate is still large (-1.3%), although not significant. Selection also could be present for unobservable characteristics. To capture all selectivity coming through migration, column (5) restricts the analysis to the case of children belonging to families with members abroad. The main result remains, with remittance effects still negative and significant. In other words, no evidence on selection other than household wealth is found, similar to the case of children's schooling.

Finally, column (6) explores endogeneity issues using village and family networks as an instrument for access to remittances. The IV Probit estimate (Amemiya's GLS) for remittances is large (-6.7%) and statistically significant (over-identification tests do not reject exogeneity of the instruments with a p value of 0.121). In other words, remittances significantly contribute to preventing the average child from working. Apparently, remittances substitute for child labor in the household budget.

V.e. Remittances and Adult Labor Supply

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

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

Tables 7 and 8 present evidence of the effect of remittances on the adult (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 a household head indicator, age, education, marital status, household education, number of children, number of adults, and 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 in the domestic labor market. If so, remittance recipients could be systematically different than non-recipients in their decision to participate in the labor market. Once again, several sample selection corrections can be explored to determine the robustness of these results.

Results seem to change after selection correction on observables (propensity score matching samples, column 3). Propensity score matching indicates that "treated" females tend to work substantially less than their "untreated" counterparts, other observable characteristics equal. In 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 indicates that the robustness of the results led to different conclusions for males and females. The analysis restricted to families with members currently residing abroad also yields 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 those used for

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

The differential impact of remittances on labor supply by gender could be indicating a gain in the 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 do not indicate which person in the household is the recipient, but the fact that a higher proportion of recipient families is 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 the same may not be true for boys. Or remittance can allow children to finish primary education, but not secondary school. Similarly, in the case of adults, remittances can allow middle aged individuals to be engaged in entrepreneurial activities (i.e., self-employment), the elderly to retire earlier, and younger women to consider maternity options as opposed to work. In any case, remittances can have different impacts, depending on the demographic group.

Table 9 presents Amemiya's GLS estimates ("IV Probit") for the interaction between remittances and gender, as well as different age groups. For each case, the set of instruments included village networks as interacting with the demographic group of interest, as well as a family level instrument (number of migrants who returned home two or more years ago). In 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 difference in terms of wage labor; both boys are girls from recipient households are less equally likely to work for a wage.

In the case of age groups, 11- to 14-year 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 difference by age group for the impact of remittances; children from all ages in recipient families are less likely to work.

Remittances also appear to differentially affect the adult labor supply. In the case of middle-aged (26-59 years old) males, remittance 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 the typical work ages. In contrast, remittances are not associated with labor participation for younger adults (22-25 years old) or males in the retirement ages (60-65 years old). In contrast, in the case of women, remittances reduce labor for participation at all ages, with a higher negative impact at younger ages (presumably allowing maternity options or home-based activities).

The results indicating 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 do 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 the human capital of children, 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 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 when researchers do not consider the potential sample selection and endogeneity of remittance 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 dropout rates.

Concerning the adult labor supply, the theory implies that income effects will increase consumption of leisure 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 also could be associated with higher rates of parental and home production activities. Robust results (after accounting for sample selection and endogeneity of remittances) show that, indeed, female labor supply is lower for recipients of remittances. However, this is not true for males; the negative OLS impact disappears in matched samples, when the analysis is restricted to migrant households and when IV techniques are considered. Moreover, the relationship between remittance transfers and labor force participation seems to be positive for middle aged males, suggesting that remittances could be creating opportunities for self-employment.

Further research is needed, in particular due to data limitations on sender characteristics. Panel data also would 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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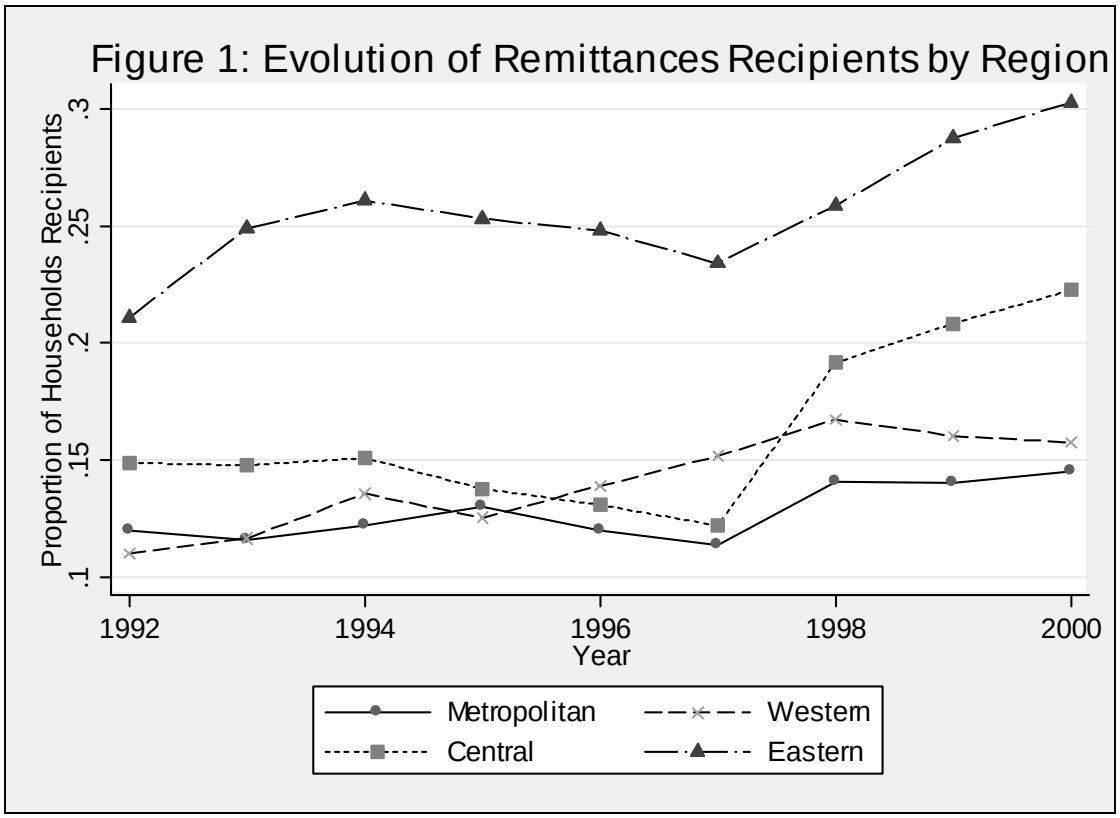
Figure 1: Evolution of Remittances Recipients by Region
Proportion of Households Recipients
.1
.15
.2
.25
.3
1992
1994
1996
1998
2000
Year
Metropolitan
Western
Central
Eastern

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 Cabanas	883,166	0.052	0.193	0.179
Eastern	Usulutan 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	4.169
	(0.021)	(0.045)
Female Head	0.228***	0.426***
	(0.004)	(0.010)
Age of Household Head (Years)	45.356***	52.297***
	(0.158)	(0.356)
Max. Household Education (Years)	7.898***	8.225***
	(0.047)	(0.096)
Number of Children (17 or less years old)	2.139**	2.042**
	(0.019)	(0.039)
Children at School (11-17 years old)	0.723***	0.794***
	(0.005)	(0.009)
Children Working for Wage (11-17 years old)	0.089***	0.062***
	(0.003)	(0.005)
Head Employed in Agriculture	0.309***	0.352***
	(0.005)	(0.013)
Adult (22-65 years old) Males in Labor Force	0.911***	0.845***
	(0.003)	(0.009)
Adult (22-65 years old) Females in Labor Force	0.519***	0.452***
	(0.005)	(0.010)
Rural Area	0.382	0.386
	(0.005)	(0.010)
Expenditure per Adult Equivalent (Dollars per month)	56.136	59.562
	(2.677)	(5.028)
Access to Electricity	0.779***	0.873***
	(0.004)	(0.007)
Access to Running Water	0.481***	0.568***
	(0.005)	(0.010)
In-House Sanitary Service	0.317***	0.381***
	(0.005)	(0.010)
Telephone Service	0.145***	0.194***
	(0.004)	(0.008)
Number of Rooms per Adult Equivalent	0.648***	0.792***
	(0.006)	(0.014)
Refrigerator	0.387***	0.570***
	(0.005)	(0.010)
Family Member Abroad	0.046***	0.719***
	(0.002)	(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	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 Remittance receipts and Migration - Household Level - 1998

Variables	Receive Remittances			International Migrant Family Member
	(1)	(2)	(3)	(4)
Age (HH Head)	-0.003***	-0.004***	-0.004***	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Age Squared x 100 (HH head)	0.006***	0.007***	0.009***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Female (HH head)	0.156***	0.152***	0.141***	0.141***
	(0.010)	(0.010)	(0.010)	(0.010)
Married (HH head)	0.038***	0.020***	0.018**	0.019***
	(0.008)	(0.008)	(0.008)	(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	-0.003	-0.003	-0.006
	(0.004)	(0.004)	(0.004)	(0.004)
Number of Boys 6-17 Years Old	0.011***	0.014***	0.014***	0.012***
	(0.004)	(0.004)	(0.004)	(0.004)
Number of Girls 6-17 Years Old	0.017***	0.019***	0.018***	0.019**
	(0.004)	(0.004)	(0.004)	(0.008)
Rural Area	0.027***	0.066***	0.067***	0.062***
	(0.009)	(0.009)	(0.010)	(0.010)
Log of Per Capita Expenditure (In colones)	0.038***			
	(0.004)			
Household Asset Index		0.039***	0.035***	0.035***
		(0.002)	(0.002)	(0.002)
Village Networks (% of HH with Migrants)			0.722***	0.744***
			(0.057)	(0.053)
Number of Return Int. Migrants (2 + years ago)			0.022**	0.025**
			(0.011)	(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's 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***	0.046***	0.018	0.011	0.018	0.009	0.035
	(0.011)	(0.011)	(0.012)	(0.012)	(0.018)	(0.024)	(0.079)
Age		-0.085***	-0.084***	-0.085***		-0.071***	-0.084***
		(0.003)	(0.003)	(0.003)		(0.005)	(0.003)
Female		-0.008	-0.009	-0.010		-0.022	-0.009
		(0.011)	(0.011)	(0.011)		(0.020)	(0.011)
Oldest Child		0.034***	0.032***	0.033***		-0.004	0.032***
		(0.012)	(0.012)	(0.012)		(0.023)	(0.012)
Number of Children 0-5 Years Old		-0.030***	-0.027***	-0.026***		-0.021**	-0.027***
		(0.005)	(0.005)	(0.005)		(0.009)	(0.005)
Number of Boys 6-17 Years Old		0.014***	0.018***	0.017***		0.005	0.018***
		(0.005)	(0.005)	(0.005)		(0.009)	(0.005)
Number of Girls 6-17 Years Old		0.009*	0.014***	0.013***		0.024***	0.013***
		(0.005)	(0.005)	(0.005)		(0.008)	(0.005)
Number of Males 18-65 Years Old		-0.034***	-0.030***	-0.030***		-0.015	-0.030***
		(0.006)	(0.006)	(0.006)		(0.010)	(0.005)
Number of Females 18-65 Years Old		0.009	0.011*	0.008		0.007	0.011*
		(0.006)	(0.006)	(0.006)		(0.011)	(0.006)
Female (HH head)		-0.020	-0.016	-0.015		0.025	-0.021
		(0.012)	(0.012)	(0.012)		(0.020)	(0.020)
Age (HH head)		0.012***	0.010***	0.010***		0.002	0.010***
		(0.002)	(0.002)	(0.002)		(0.003)	(0.002)
Age Squared x 100 (HH head)		-0.012***	-0.010***	-0.009***		-0.002	-0.010***
		-(0.002)	-(0.002)	-(0.002)		(0.003)	(0.002)
Max. HH Education		0.049***	0.040***	0.039***		0.030***	0.040***
		(0.002)	(0.002)	(0.002)		(0.003)	(0.002)
Married (HH head)		0.017*	0.009	0.008		0.021	0.008
		(0.010)	(0.010)	(0.010)		(0.018)	(0.010)
Rural Areas		-0.047***	-0.006	-0.010		0.011	-0.008
		(0.011)	(0.011)	(0.011)		(0.021)	(0.013)
Household Asset Index [+]			0.037***			0.026***	0.036***
			(0.003)			(0.006)	(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***	-0.013**	-0.012**	-0.013	-0.032***	-0.067***
	(0.006)	(0.005)	(0.005)	(0.012)	(0.014)	(0.017)
Age		0.024***	0.025***		0.020***	0.025***
		(0.001)	(0.001)		(0.003)	(0.001)
Female		-0.049***	-0.048***		-0.030***	-0.047***
		(0.005)	(0.005)		(0.009)	(0.006)
Oldest Child		0.009	0.009		-0.009	0.008
		(0.005)	(0.005)		(0.010)	(0.006)
Number of Children 0-5 Years Old		0.002	0.001		0.003	0.001
		(0.002)	(0.002)		(0.004)	(0.002)
Number of Boys 6-17 Years Old		0.001	0.000		0.006*	0.003
		(0.002)	(0.002)		(0.003)	(0.002)
Number of Girls 6-17 Years Old		0.002	0.002		0.000	0.004*
		(0.002)	(0.002)		(0.003)	(0.002)
Number of Males 18-65 Years Old		-0.005**	-0.006**		-0.009**	-0.006**
		(0.003)	(0.003)		(0.004)	(0.003)
Number of Females 18-65 Years Old		-0.004	-0.004		-0.003	-0.004
		(0.003)	(0.003)		(0.004)	(0.003)
Female (HH head)		0.022***	0.021***		-0.009	0.043***
		(0.006)	(0.006)		(0.008)	(0.012)
Age (HH head)		-0.001*	-0.001		0.001	-0.002**
		(0.001)	(0.001)		(0.001)	(0.001)
Age Squared x 100 (HH head)		0.001	0.001		-0.001	0.002**
		(0.001)	(0.001)		(0.001)	(0.001)
Max. HH Education		-0.005***	-0.005***		-0.003**	-0.005***
		(0.001)	(0.005)		(0.001)	(0.001)
Married (HH head)		-0.009**	-0.008*		-0.005	-0.007
		(0.004)	(0.004)		(0.007)	(0.005)
Rural Areas		-0.016***	-0.013**		-0.026***	-0.010*
		(0.005)	(0.005)		(0.008)	(0.006)
Household Assets Index [+]		-0.010***			-0.008***	-0.006**
		(0.002)			(0.002)	(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***	-0.020***	-0.013	-0.004	0.022
	(0.010)	(0.008)	(0.016)	(0.022)	(0.056)
Household Head		0.136***		0.152***	0.144***
		(0.011)		(0.031)	(0.018)
Age		0.008***		0.012**	0.009***
		(0.001)		(0.005)	(0.002)
Age Squared / 100		-0.014***		-0.020***	-0.015***
		(0.002)		(0.006)	(0.002)
Education (Years)		0.003***		0.010***	0.003***
		(0.001)		(0.003)	(0.001)
Married		0.027***		0.047***	0.027***
		(0.006)		(0.022)	(0.006)
Max. HH Education		-0.002**		-0.006*	-0.002**
		(0.001)		(0.003)	(0.001)
Number of Children 0-5 Years Old		0.007**		0.022**	0.007***
		(0.003)		(0.011)	(0.003)
Number of Boys 6-17 Years Old		0.010***		0.018*	0.010***
		(0.003)		(0.011)	(0.003)
Number of Girls 6-17 Years Old		0.004		-0.009	0.010***
		(0.003)		(0.010)	(0.003)
Number of Males 18-65 Years Old		-0.005		-0.009	0.003
		(0.003)		(0.010)	(0.003)
Number of Females 18-65 Years Old		0.001		0.015	0.004
		(0.003)		(0.011)	(0.003)
Rural Area		0.009		0.003	-0.004
		(0.007)		(0.024)	(0.003)
Household Assets Index		-0.005***		-0.012**	-0.007**
		(0.002)		(0.006)	(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***	-0.086***	-0.081***	-0.067**	-0.592***
	(0.011)	(0.012)	(0.018)	(0.026)	(0.050)
Household Head		0.175***		0.020	0.241***
		(0.013)		(0.027)	(0.018)
Age		0.036***		0.042***	0.021***
		(0.003)		(0.007)	(0.004)
Age Squared / 100		-0.050***		-0.051***	-0.031***
		(0.004)		(0.008)	(0.005)
Education (Years)		0.016***		0.021***	0.014***
		(0.002)		(0.003)	(0.002)
Married		-0.064***		-0.060**	-0.060***
		(0.010)		(0.024)	(0.011)
Own Baby (0-2 Years Old)		-0.104***		-0.063	-0.121***
		(0.014)		(0.039)	(0.016)
Pregnant		-0.120***		-0.089	-0.161***
		(0.025)		(0.084)	(0.028)
Max. HH Education		-0.001		0.003	0.001
		(0.002)		(0.004)	(0.002)
Number of Children 0-5 Years Old		0.007		-0.001	-0.008
		(0.005)		(0.013)	(0.006)
Number of Boys 6-17 Years Old		0.006		0.015	0.017***
		(0.005)		(0.012)	(0.006)
Number of Girls 6-17 Years Old		0.010*		-0.009	0.027***
		(0.005)		(0.012)	(0.006)
Number of Males 18-65 Years Old		-0.033***		-0.025*	-0.052***
		(0.006)		(0.013)	(0.007)
Number of Females 18-65 Years Old		0.025***		0.007	0.049***
		(0.006)		(0.013)	(0.007)
Rural Area		-0.136***		-0.156***	-0.090***
		(0.012)		(0.028)	(0.016)
Household Assets Index		0.012***		-0.001	0.041***
		(0.003)		(0.007)	(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	-0.063**		
	(0.108)	(0.020)		
HH Receive Remittances*Female	0.147**	-0.021		
	(0.052)	(0.034)		
HH Receive Remittances	-0.039	-0.068**		
	(0.101)	(0.019)		
HH Receive Remittances * Age 11-14	0.112**	0.003		
	(0.043)	(0.033)		
HH Receive Remittances			-0.115	-0.361**
			(0.117)	(0.126)
HH Receive Remittances * Age 22-25			0.063	-0.369***
			(0.022)	(0.091)
HH Receive Remittances * Age 26-49			0.084**	-0.435***
			(0.014)	(0.088)
HH Receive Remittances * Age 50-59			0.064**	-0.180*
			(0.015)	(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.