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# Remittances, school quality, and household education expenditures in Nepal

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## Abstract

A heightened interest in understanding the remitting practices of immigrants and their impact on a variety of economic indicators has emerged as remittances to developing countries have risen substantially over the past decade. If remittances primarily enhance consumption, they may have no lasting impact on economic growth. However, through asset accumulation and human capital investment, remittances may serve as a vehicle for growth. In this paper, we use the 2010 Nepal Living Standards Survey III (NLSS III) to examine how remittances affect household expenditures on human capital investment. Overall, our findings suggest that at the margin, remittances do contribute to human capital investment, but this effect varies substantially by school quality within Nepal. In addition, our results indicate that internal remittances (remittances from household members migrating internally) have a greater impact on education than do external remittances. We posit that this may be due to a higher value placed on Nepali education by internal migrants as compared to the education needed for foreign job opportunities by migrants abroad.

**JEL codes:** J61, I25, F22, F24, H52, O15

**Keywords:** Remittance; Education; Migration

## 1 Introduction

A heightened interest in understanding the remitting practices of immigrants and their impact on a variety of economic indicators has emerged as remittances to developing countries have risen substantially over the past decade, in some cases surpassing development assistance flows to developing countries (Amuedo-Dorantes et al. 2005). In Nepal, for example, the World Bank reports that remittances amounted to \$5.6 billion (US dollars) in 2013, or about 29% of GDP, while official development assistance and aid totaled approximately \$870.6 million (World Bank 2015). Scholars have long been interested in how households use remittance income in developing countries (Lucas 1987). Certainly remittances received by a household relax the budget constraint and may lead to increased consumption. If remittances primarily enhance consumption, they may have no lasting impact on economic growth. However, remittances can foster growth if remittances increase household investment through acquiring more education, starting a small business or financing new agricultural technology (Woodruff, 2007; Nenova et al. 2009; Mendola 2008). Evidence of asset accumulation related to remittances has piqued economists' interest in remittances as a vehicle for economic growth and development.

In this paper, we use the 2010 Nepal Living Standards Survey III (NLSS III) to examine how remittances affect household expenditures on education. As the direction and size of the effect of remittances on human capital investment is unclear *a priori*, we first examine the impact of remittance income on educational expenditures at the household level. We then allow for the possibility that remittance funds are more likely to be channeled to schooling where the return to education is highest. Examining differences in school quality at the Nepali district level (a district is akin to a county in most U.S. states), we find that, at the margin, remittances do positively impact human capital investment, and more interestingly, the marginal impact is an increasing function of school quality. Therefore, the use of remittances to invest in human capital is dependent on the returns to education.

Building on the work of Kandel and Kao (2000), we also examine the impact of the source of the remittance income on the decision to invest in human capital. In their work, they point out that education acquired in Mexico is more highly valued domestically compared to opportunities abroad. If this is also the case in Nepal, we may see a differential impact by the source of remittance income. The NLSS III dataset allows us to identify whether remittance income comes from a migrant within Nepal or from a migrant located in another country. We categorize the former as internal remittances and the latter as external remittances. Our results provide evidence that the impact on education spending is larger for internal remittances and this difference grows with school quality.

## 2 Conceptual Framework and Previous Literature

The household decision to migrate for our purposes may conveniently be thought of in a cost-benefit framework; the costs incurred by the household include travel and search costs as a household member seeks employment in another community or country and the costs of lost home production contributed by the migrating member. The benefits primarily come in the form of increased income as remittances are returned to the household. Migration occurs if the benefits outweigh the costs. For our Nepali sample in the NLSSIII, the net benefit is positive for the vast majority of households as approximately seventy percent of households have at least one family member absent during the time of the survey.

Migrants reveal that there are a number of reasons for remitting, such as consumption smoothing, target saving, altruism, and insurance purposes (Amuedo-Dorantes et al. 2005). Similarly, there are a number of uses for remittances ranging from consumption on daily living expenses, paying back loans, investing in education, paying for health expenses, funding a new business or building residential and nonresidential structures. In this paper, we focus on the decision to invest remittances into human capital and assess whether this choice is impacted by the quality of schools near the household receiving the remittances and whether the migrant sending the funds resides within Nepal or in another country.

In terms of our research question of interest, the relationship between remittances and spending on education, there are potentially offsetting effects of migration and remittances on human capital investment. On the one hand, increasing income through remittances may increase investment in children's schooling by relaxing household budget and capital constraints. Conversely household absenteeism pressures children to work in the home, reducing time for education.

The impact of remittances on domestic outcomes is important to policy makers as it may have an impact on economic well-being. If the income enhances domestic investment spending on both physical and human capital, it may serve as a vehicle for economic growth. In a macroeconomic growth accounting framework, growth occurs if there are increases in the stock of labor, capital, or an improvement in total factor productivity. If remittance income is invested in education, this may increase the quantity and quality of workers, increasing total factor productivity and enhancing economic growth. However, if remittances enable family members left behind to increase consumption and stop working or labor quality deteriorates through brain drain, remittances may act as a drag on growth. Thus, the net effect of remittances on economic growth is not necessarily positive.

Not surprising, the empirical evidence on the impact of remittances on human capital expenditures is mixed. Adams et al. (2008) find that households in Ghana do not spend disproportionately from remittance income on education, food and other products. Similarly, Robles and Oropesa (2011) find that a higher risk of migration tends to have harmful effects on education for children remaining in the household using Peruvian data. Meanwhile, Edwards and Ureta (2003) find a significant impact of remittances on school retention in El Salvador. For the Philippines, Yang (2008) finds that positive exchange rate shocks affect remittances and lead to greater human capital investments. In a broader study, Acosta et al. (2007) examined 11 Latin American countries and found that the effect of remittances on education is often restricted to specific groups within a population.

Some studies have examined remittance spending for boys and girls separately. The results from these studies also vary widely. Acosta 2006 finds that young girls and boys are more likely to be in school in households receiving remittances in El Salvador. Bansak and Chezum (2009) find that although remittances increase the probability the young are in school, girls benefit relatively less than boys, but suffer less harm from the absenteeism caused by a household member's migration to fund remittances. In more recent work, Antman (2012) finds that parental emigration in Mexico significantly increases educational attainment for girls. Migration of parents, however, lowers the probability of boys completing junior high school and of boys and girls completing high school.

Part of the differences in these findings may be directly related to the country under study and variation in the returns to education domestically and abroad. Understanding differences in local economic conditions for households and how these affect household decisions may shed light on the use of remittance funds. Rational economic agents will spend on those goods that, for a given price, provide the greatest household utility and invest where the rate of return is highest. Empirical evidence that suggests that households receiving remittances invest less may simply be indicating that these households are systematically located in areas with economic conditions that drive a low rate of return on human capital investment.

Along these lines, recent research examines differences in spending patterns by the source of remittance income focusing on differences between internal and external remittances. If migrants return not only remittances but knowledge of new markets and/or technologies, one may reasonably expect changes in spending patterns relative to non-migrants (Mendola 2008). If the knowledge returned home differs systematically

between internal and external migrants, then differences in spending patterns may arise.

Empirical work that tests for different uses by source of funds *generally* finds a wide range of results. Costaldo and Reilly (2007) find that households receiving external remittances spend more at the margin on durable goods and utilities but less on food as compared to households that receive no remittances. Mendola (2008) finds that agricultural households engaging in international migration are more likely to invest in high-yield seed technology as compared to households with internal migrants or no migrants. She argues that high-yield seed, although producing higher average productivity also has a greater variance in output. International migration serves as a more effective insurance mechanism for these households, separating them from households who are not insured and therefore fall back on relatively low-yield, low variance seed. Adams et al. (2008) also look for differences based on the source of remittance income but find no differences in Ghana.

In terms of investments in education specifically, empirical evidence suggests that households are more likely to invest in education when the funds are derived from internal sources. Kandel and Kao (2000) find that the migration of household individuals and families in Mexico positively impacts children's aspirations to someday migrate to the U.S. for work. Aspirations to work in the U.S., in turn, actually negatively impact potential investment in education in Mexico because migrants abroad find that Mexican education is not highly valued in the U.S. Taylor and Mora (2006) also use data from Mexico and find that households who receive internal remittances invest relatively more in education compared to those who receive external remittances.

Thus, for our study of Nepali migration, we might also expect systematic differences in education if remittances are generated internally versus externally. In particular, if Nepali education is valued differentially abroad as compared to domestically, then we should see corresponding differences in education spending across remittance sources. By examining pass rates of the "School Leaving Exam" and receipt of the "School Leaving Certificate" at the district level, we find suggestive evidence that there is a differential in spending remittance income on education based on the source of the remittances. (Nepal's school leaving exam is akin to New York State's Regents Exam, where those high school students passing the exam receive a Regents Degree.)<sup>1</sup>

Table 1 examines the relationship between where remittances come from and the SLC Pass Rate. The top panel gives the top ten districts ranked by frequency of receiving internal remittances in our data. The final column shows the district rank by SLC passing rate. The average rank for these districts was 16.6. The bottom panel shows similar data for the top ten external remittance-receiving districts and their associated rank in SLC pass rate. Here we see an average rank of 37.8, which is affected substantially by one outlier (Gulmi).

These results suggest that internal remittances go to households in districts having higher SLC passing rates or a better (lower) SLC pass rate ranking. Further note that seven of the top ten internal remittance districts share a border with Kathmandu (as indicated by the \* in the table) with only Udayapur being located more than one district away from Kathmandu. Taken together, internal remittances go to households near the country's capital and to districts with higher quality schools as measured by achievement on the SLC exam.

**Table 1** Remittance source and school performance

| District        | Internal remittance rank | SLC pass rate rank |
|-----------------|--------------------------|--------------------|
| Makwanpur*      | 1                        | 32                 |
| Kavrepalanchok* | 2                        | 10                 |
| Dolakha*        | 3                        | 27                 |
| Kathmandu*      | 4                        | 2                  |
| Sindhupalchok*  | 5                        | 11                 |
| Lalitpur*       | 6                        | 4                  |
| Bhaktapur*      | 7                        | 5                  |
| Udayapur        | 8                        | 7                  |
| Chitwan         | 9                        | 18                 |
| Bara            | 10                       | 50                 |
|                 | Average Rank             | 16.6               |
| District        | External Remittance Rank | SLC Pass Rate Rank |
| Syangja         | 1                        | 41                 |
| Gulmi           | 2                        | 1                  |
| Doti            | 3                        | 59                 |
| Morang          | 4                        | 35                 |
| Kailali         | 5                        | 48                 |
| Arghakhanchi    | 6                        | 30                 |
| Mahottari       | 7                        | 61                 |
| Dailekh         | 8                        | 55                 |
| Kaski           | 9                        | 12                 |
| Rupandehi       | 10                       | 36                 |
|                 | Average Rank             | 37.8               |

\*Indicates a border with Kathmandu

For those receiving funds from abroad, shown in the bottom panel of Table 2, we do not observe of similar pattern of funds and SLC rankings. In essence, external funds are not disproportionately going to households in districts in Nepal with relatively higher SLC pass rates. Specifically, no top external remittance receiving districts share a border with Kathmandu, and all have more than three districts to cross in reaching Kathmandu. (Districts are not of uniform size, we offer this only as an approximation to the distance from Kathmandu.) Ultimately, it appears that internal migrants in Nepal are from districts where the SLC pass rate (or returns to education) is relatively high, while external migrants are from districts where the SLC pass rate (or returns to education) is relatively low.

### 3 Methodology

We explore how remittances affect human capital formation, treating the level of remittances first as exogenous and then allowing for the possibility that remittance amounts may be endogenous to the investment decision. Specifically, we estimate the relationship between household human capital expenditures and the level of remittance and report results estimated via ordinary least squares (OLS) and instrumental variables (IV). We control for the quality of the educational infrastructure through the performance of students in the district on the Nepal School Leaving Exam; individuals who pass the exam are awarded a “School Leaving Certificate” (SLC throughout the remainder of the

**Table 2** Tests of difference in means for subsamples

|                      | Remit ( <i>n</i> = 3178)    | Noremit ( <i>n</i> = 2810)  | Difference | Standard error |
|----------------------|-----------------------------|-----------------------------|------------|----------------|
| Education spending   | 14.22                       | 19.53                       | -5.314***  | -1.528         |
| Remittance income    | 104.39                      |                             |            |                |
| SLC pass rate        | 57.96                       | 60.88                       | -2.929***  | -0.397         |
| Number remitters     | 1.62                        |                             |            |                |
| Urban                | 0.279                       | 0.402                       | -0.123***  | -0.0121        |
| Share ages 4-7       | 0.0831                      | 0.0767                      | 0.00642*   | -0.00323       |
| Share ages 8-15      | 0.193                       | 0.183                       | 0.01       | -0.00515       |
| Share ages 16-64     | 0.576                       | 0.61                        | -0.0341*** | -0.00651       |
| Share elderly        | 0.0776                      | 0.0664                      | 0.0113*    | -0.00461       |
| Farm income          | 1.916                       | 2.935                       | -1.019     | -1.236         |
| Business income      | 60.62                       | 80.52                       | -19.89     | -19.54         |
| Wage income          | 36.52                       | 75.90                       | -39.37***  | -4.10          |
| Married couples      | 0.77                        | 1.082                       | -0.312***  | -0.0175        |
| Household production | 5.581                       | 5.086                       | 0.495**    | -0.19          |
|                      | External ( <i>n</i> = 1718) | Internal ( <i>n</i> = 1989) | Difference | Standard Error |
| Education spending   | 14.69                       | 14.07                       | 0.625      | -1.029         |
| Remittance income    | 129.9                       | 54.61                       | 75.26**    | -28.05         |
| SLC pass rate        | 57.8                        | 57.82                       | -0.0191    | -0.471         |
| Number remitters     | 1.732                       | 1.817                       | -0.0853*   | -0.0356        |
| Urban                | 0.274                       | 0.265                       | 0.00862    | -0.0146        |
| Share ages 4-7       | 0.0921                      | 0.0771                      | 0.0150***  | -0.0043        |
| Share ages 8-15      | 0.205                       | 0.182                       | 0.0227***  | -0.00675       |
| Share ages 16-64     | 0.557                       | 0.586                       | -0.0290*** | -0.00842       |
| Share elderly        | 0.0697                      | 0.0844                      | -0.0146*   | -0.00601       |
| Farm income          | 2.984                       | 1.436                       | 1.548      | -2.239         |
| Business income      | 36.17                       | 74.59                       | -38.42     | -28.95         |
| Wage income          | 30.31                       | 39.35                       | -9.04**    | -3.06          |
| Married couples      | 0.692                       | 0.814                       | -0.123***  | -0.0239        |
| Household production | 5.487                       | 5.771                       | -0.285     | -0.25          |
|                      | Noremit ( <i>n</i> = 2810)  | Internal ( <i>n</i> = 1989) | Difference | Standard Error |
| Education spending   | 19.53                       | 14.07                       | 5.460**    | -1.897         |
| Remittance income    |                             |                             |            |                |
| SLC pass rate        | 60.88                       | 57.82                       | 3.062***   | -0.451         |
| Number remitters     | 0                           | 1.817                       | -1.817***  | -0.0209        |
| Urban                | 0.402                       | 0.265                       | 0.137***   | -0.0138        |
| Share ages 4-7       | 0.0767                      | 0.0771                      | -0.000401  | -0.00353       |
| Share ages 8-15      | 0.183                       | 0.182                       | 0.00112    | -0.0057        |
| Share ages 16-64     | 0.61                        | 0.586                       | 0.0238**   | -0.00735       |
| Share elderly        | 0.0664                      | 0.0844                      | -0.0180*** | -0.00534       |
| Farm income          | 2.935                       | 1.436                       | 1.499      | -1.304         |
| Business income      | 80.52                       | 74.59                       | 5.926      | -24.54         |
| Wage income          | 75.89                       | 39.35                       | 36.54***   | -5.02          |
| Married couples      | 1.082                       | 0.814                       | 0.268***   | -0.0195        |
| Household production | 5.086                       | 5.771                       | -0.685**   | -0.223         |

**Table 2** Tests of difference in means for subsamples (*Continued*)

|                      | Noremit ( <i>n</i> = 2810) | External ( <i>n</i> = 1718) | Difference | Standard Error |
|----------------------|----------------------------|-----------------------------|------------|----------------|
| Education spending   | 19.53                      | 14.69                       | 4.835*     | -2.035         |
| Remittance income    |                            |                             |            |                |
| SLC pass rate        | 60.88                      | 57.8                        | 3.081***   | -0.482         |
| Number remitters     | 0                          | 1.732                       | -1.732***  | -0.0198        |
| Urban                | 0.402                      | 0.274                       | 0.129***   | -0.0145        |
| Share ages 4-7       | 0.0767                     | 0.0921                      | -0.0154*** | -0.00383       |
| Share ages 8-15      | 0.183                      | 0.205                       | -0.0216*** | -0.00608       |
| Share ages 16-64     | 0.61                       | 0.557                       | 0.0528***  | -0.00755       |
| Share elderly        | 0.0664                     | 0.0697                      | -0.00339   | -0.00511       |
| Farm income          | 2.935                      | 2.984                       | -0.0487    | -1.613         |
| Business income      | 80.52                      | 36.17                       | 44.35***   | -11.8          |
| Wage income          | 75.89                      | 30.31                       | 45.58***   | -53.284        |
| Married couples      | 1.082                      | 0.692                       | 0.391***   | -0.0203        |
| Household production | 5.086                      | 5.487                       | -0.4       | -0.225         |

\* *p* < 0.05, \*\* *p* < 0.01, \*\*\* *p* < 0.001

paper.) Using this variable we are able to estimate the impact of remittances on education spending and also at the same time show how the impact of remittances are dependent on the returns to education. Our main specification is:

$$\text{Education}_{id} = \beta_0 + \beta_1(\text{Remit}_i) + \beta_2(\text{SLC Pass Rate}_d) + \beta_3(\text{SLC Pass Rate}_d * \text{Remit}_i) + X_i\beta + \varepsilon_i,$$

where the dependent variable measures the spending on *Education* for a given household (in 1000s of rupees); *Remit* measures the total level of remittance income for households that reported receiving any remittances and includes in-kind transfers (in 1000s of rupees); SLC Pass Rate is the district level (denoted by subscript d) passing rate on the school leaving exam for 2006 (in percentages); SLC Pass Rate\*Remit is the interaction between the passing rate and the level of remittances; and finally *X* represents a vector of covariates. In this framework,  $\beta_1$  and  $\beta_3$  are our parameters of interest and allow for the marginal impact of remittances to vary with school quality at the district level.

It is likely the impact of remittances may be biased because of endogeneity and the direction of this bias is uncertain. First, high ability individuals may have better prospects when migrating (either internally or externally). If these high ability individuals are more likely to send their children to school, then we should expect an upward bias in the estimated impact of remittances on education spending. On the other hand, if negative job shocks not accounted for in the model push individuals to migrate, the estimated impact of remittances on human capital choices will be biased downward. A negative job shock likely increases the probability of migrating to remit while at the same time the absenteeism induces more household members into home production and out of school. To account for the potential endogeneity, we estimate the model via instrumental variables methods.

#### 4 Data

Using data from the NLSS III, we construct an initial sample of 5,988 households who responded to the survey. The NLSS III contains information on the extent, nature and determinants of poverty in Nepal, covering different aspects of household welfare including education and remittances. The survey asks each household to provide information on the amount spent on education for each family member currently in school. The variable *Education Spending* is the sum of all local education expenditures identified in the survey. As shown in the top panel of Table 2, education spending averages about 14,200 rupees (or about 140 U.S. dollars) for those who receive remittances. This sample of 3,178 household is our main sample that we use in our regressions and computations of marginal effects, which are later presented in Tables 3 and 4.

For remittances, each household is asked if they have received a remittance from any individual in the last twelve months and the origin of the funds. We define respectively *Remittance*, *Internal Remittance* and *External Remittance Income* as the total of all cash and in-kind remittances from all sources, internal sources and external sources respectively (all stated in 1000s of rupees). In the sample, among 5,988 households, 3,178 (roughly 53%) received some *remittance* income. Of the 3,178 receiving a remittance, 1,989 (47%) received funds from at least one *internal* source, 1,718 (41%) received funds from an *external* (outside Nepal) source and 529 received funds from both an internal and external source.

Remittances have the impact of relaxing household budget constraints, but at the cost of removing a household member and thereby lowering household production. The NLSSIII identifies each individual who provides remittances to a household and allows us to calculate the total number of remitters (*Number Remitters*), which we use as a control for absenteeism. For our sample of remitters, the average number of remitters is 1.62 individuals per household. Additionally, we include the variable *Household Production*, defined as the monetary value of goods produced for home consumption within the household, to control for the importance of home production to the household. The average value produced for households receiving remittances, our primary sample, is just over 5,500 rupees per year.

To estimate the impact of remittance income on education expenditures, we include variables controlling for household income from three sources and household age structure and family structure. For each household we define *Farm Income*, *Business Income* and *Wage Income* as the total family net income from each of the three sources mentioned (each divided by 1,000). Presumably, income proxies for worker productivity in the household and therefore is an indicator of ability. In the NLSSIII, farm income averages 1,900 rupees, business income average 60,600 rupees and wage income generates about 36,500 rupees per year for households in our sample of remittance recipients. Thus, business and wage income are predominant sources of income and dwarf household production.

Age composition of the household is captured through the variables *Share Ages 4–7*, *Share Ages 8–15*, *Share Ages 16–64* and *Share Elderly*. Individuals between 4 and 15 are school aged, with the younger group (ages 4 to 7) attending early education, while those between 8 and 15 are eligible for secondary education in Nepal. Individuals aged



16–64 are of working age, although this group also includes those pursuing tertiary education or an advanced degree. The summary statistics in Table 2 indicate that most members (58%) in remittance-receiving households are between the ages of 16 and 64. For non-recipient households, however, the share of the working age population is even larger (61%), suggesting that absenteeism does result in a larger share of very young and very old members remaining in the household in our main sample of households receiving remittances.

To capture family structure, we include *Married Couples*, defined as the number of married couples in the household. This variable allows for differences in the total number of unique families within the extended household. Finally, we include the variable *Urban*, defined as equal to one if the household is in a district near a major population center (a town with over 100,000 inhabitants) and zero otherwise to account for the possibility that urban centers may generally have better education infrastructure. Just under 30 percent of our sample of recipients resides in urban locations.

Summary statistics in Table 2 are decomposed into four various subsamples for comparison purposes. The top panel of the table breaks the sample between those receiving remittances (our main sample) and those not; the means for each subsample are in the first two columns, the difference is in the third and the standard error of the difference appears in the final column. The second panel shows differences between households receiving external and internal remittances, and the final two panels compare these groups to households that do not receive remittances.

As a first step in our analysis, we begin by comparing the means of the different subgroups. We observe that households not receiving remittances, on average, spend more on education. They are also more likely to reside in urban locations and in districts with significantly higher SLC pass rates. Households receiving remittances, typically, have lower wage incomes, fewer working-age and married couples, and are more reliant on household production (each of these differences are significant at the 5% level or lower).

Restricting our analysis to only those households receiving remittances, as shown in the second panel, we observe that the rupee amount of external remittances is more than twice as large as that for internal remittances. Those who receive remittances from abroad receive the equivalent of approximately 130,000 rupees a year in cash or in-kind transfers compared to 54,600 rupees for those receiving internal remittances. For education spending, the difference in means is not statistically significant. Households receiving external remittances also have more school aged children, fewer working aged members, and have fewer married couples.

In the final 3<sup>rd</sup> and 4<sup>th</sup> panels, we compare the non-recipient households to households receiving internal and external remittances, respectively. For these subgroups, the patterns in observable differences between the household types are qualitatively the same to those in the top panel.

Given the observed differences among these subgroups, we include these variables as controls in our multivariate analysis. These covariates allow us to address observed variation in household composition that may affect the decision to invest in education. However, there may be omitted variables and other unobserved characteristics that are correlated with education spending and remittances. To address these possibilities, we use instrumental variable techniques and alternative samples as robustness tests for our main specification.

Finding instrumental variables to overcome the potential for unobserved differences between the household types is always a challenge in this literature. To account for the potential endogeneity of the remittance decision, we need instruments that are correlated with the level and probability of a remittance, but not education spending. Our chosen instruments are measures of past social unrest and past migration experiences. For the former measure, the instruments are intended to proxy for historic volatility caused by the Nepali civil war in the late 1990's and early 2000's. For the latter, we use a proxy for the possibility that a household may be aware of migration opportunities.

We believe that volatility caused by Nepal's civil war created an exogenous shock at the local level that pushed households to migrate. This enhanced migration pressure generated a long-term effect by introducing households to migration opportunities. During the civil war the Nepalese government classified the degree of insurgent pressure/control from high to low as Class A, Class B, and Class C at the district level. Unclassified districts have little or no insurgent activity, while Class A has the highest degree of insurgent control. Of the households in our sample, 3.65% live in districts categorized as Class A, 12.81% in Class B, and 16.02% in Class C districts. We use these definitions to define our instruments as dummy variables (Hatléback 2007), which reflect the intensity of the civil war within a district.

Following previous literature (Hanson and Woodruff 2003; Acosta et al. 2007), we use the past migration experience of local social groups as a proxy for network effects as an instrument. Networks formed from past migration experiences may lower the costs of finding jobs and result in higher instances and larger volumes of remittances. Using the NLSS II (the 2003 version of this survey), we are able to identify the source location and caste or ethnic group of each individual migrant identified in a household. We then measure the rate of migration by caste for each district using this data. By breaking down migration to a local/social network, we believe the instrument reflects the information available on potential migration networks at the local level. The resulting variable is matched to households by caste of the household head and district. The mean migration/caste rate is 17.7 percent with a standard deviation of 14.4 percent, a minimum of 0 and a maximum of 76.9 percent, indicating a wide variation in the past migration experience at the district and caste level.

## 5 Results

Turning to our multivariate regression analysis, we focus on the impact of remittance income on a family's investment in education spending. Our specifications allow for differential investments by school quality and source of remittances, and we limit our sample to households that receive remittances. Therefore, we do not explicitly model or examine the decision to migrate or the decision to remit. The resulting potential for selection bias may be a cause for concern, and the results presented here may not be generalizable to the entire Nepali population. Nonetheless, it should be noted that approximately 70% of Nepali households have at least one migrant household member, and 53% receive remittance income. This near universality of migration and receipt of remittances implies that our results remain pertinent to an ever-increasing majority of the Nepali households.

Table 3 presents results examining the impact of the level of remittance income on education spending at the household level (Appendix 1). Columns 1 and 2 provide the

**Table 3** Education spending as a function of remittance income and school quality

| Variables         | (1)                   | (2)                   | (3)                   | (4)                 | (5)                   | (6)                 |
|-------------------|-----------------------|-----------------------|-----------------------|---------------------|-----------------------|---------------------|
|                   | OLS                   | IV                    | OLS                   | IV                  | OLS                   | IV                  |
| Remittance income | 0.002<br>(1.52)       | 0.033<br>(1.46)       | 0.002<br>(1.62)       | 0.095***<br>(3.72)  | -0.023<br>(-1.62)     | -0.217<br>(-1.47)   |
| SLC pass rate*    |                       |                       |                       |                     | 0.0005*<br>(1.68)     | 0.004**<br>(1.99)   |
| Remittance        |                       |                       |                       |                     |                       |                     |
| SLC pass rate     |                       |                       | 0.307***<br>(7.78)    | 0.118**<br>(2.51)   | 0.245***<br>(6.01)    | -0.230<br>(-1.11)   |
| Number remitter   | 1.180**<br>(2.27)     | 10.316*<br>(1.83)     | 1.229**<br>(2.37)     | -6.462<br>(-1.20)   | 1.134**<br>(2.31)     | 16.302<br>(1.11)    |
| Urban household   | 18.668***<br>(12.62)  | 17.744***<br>(8.50)   | 15.699***<br>(12.53)  | 10.345***<br>(6.15) | 15.325***<br>(12.36)  | 13.083***<br>(4.91) |
| Share 4 to 7      | 24.555***<br>(7.38)   | 31.943***<br>(5.81)   | 23.785***<br>(7.22)   | 22.401***<br>(3.68) | 24.031***<br>(7.23)   | 35.804***<br>(2.75) |
| Share 8 to 15     | 33.021***<br>(13.84)  | 36.987***<br>(7.20)   | 32.399***<br>(13.63)  | 31.734***<br>(5.24) | 32.922***<br>(13.67)  | 47.420***<br>(3.53) |
| Share 16 to 64    | 25.589***<br>(7.41)   | 27.528***<br>(6.09)   | 23.300***<br>(7.09)   | 20.027***<br>(4.21) | 23.405***<br>(7.08)   | 29.641***<br>(3.22) |
| Share elderly     | 10.937***<br>(4.72)   | 9.324**<br>(2.27)     | 8.891***<br>(3.85)    | 15.279***<br>(3.00) | 9.724***<br>(4.15)    | 17.657**<br>(2.13)  |
| Farm income       | -0.003<br>(-0.84)     | 0.002<br>(0.48)       | -0.003<br>(-0.80)     | 0.000<br>(0.07)     | -0.003<br>(-0.76)     | -0.000<br>(-0.09)   |
| Enterprise income | 0.001<br>(0.83)       | 0.001<br>(0.82)       | 0.001<br>(0.98)       | 0.001<br>(1.55)     | 0.001<br>(0.99)       | 0.001<br>(0.92)     |
| Wage income       | 0.034***<br>(3.84)    | 0.033***<br>(3.12)    | 0.031***<br>(3.52)    | 0.034***<br>(3.40)  | 0.031***<br>(3.56)    | 0.042***<br>(2.67)  |
| Married couples   | 1.053<br>(1.53)       | 0.548<br>(0.60)       | 1.278*<br>(1.88)      | 1.765*<br>(1.72)    | 1.332*<br>(1.92)      | 2.326<br>(1.55)     |
| Home production   | -0.165***<br>(-3.58)  | -0.259***<br>(-3.58)  | -0.150***<br>(-3.48)  | -0.044<br>(-0.54)   | -0.141***<br>(-3.29)  | -0.181<br>(-1.30)   |
| Constant          | -18.245***<br>(-6.08) | -37.442***<br>(-3.41) | -33.764***<br>(-7.64) | -17.168<br>(-1.57)  | -30.846***<br>(-7.42) | -40.488*<br>(-1.90) |
| Observations      | 3,178                 | 3,178                 | 3,178                 | 3,178               | 3,178                 | 3,178               |
| Hansen's J        |                       | 3.043                 |                       | 7.773               |                       | 2.463               |
| p-value           |                       | 0.218                 |                       | 0.0205              |                       | 0.117               |
| First stage F     |                       |                       |                       |                     |                       |                     |
| Remittance income |                       | 4.552                 |                       | 5.920               |                       | 5.920               |
| Number remitter   |                       | 6.085                 |                       | 6.697               |                       | 6.697               |
| SLC*Remittance    |                       |                       |                       |                     |                       | 6.828               |

Robust t-statistics in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ 

base estimates, examining the impact of remittances not controlling for school quality for OLS and IV specifications. While we see a positive impact in both OLS (column 1) and IV (column 2), the results are not statistically significant at conventional levels (Appendix 2). Nonetheless, it should be noted that the IV results indicate a negative

**Table 4** Marginal effect of remittances on education by SLC pass rate percentiles (Based in columns 5 & 6 of Table 3)

| Percentile | SLC pass rate | OLS      | IV*      |
|------------|---------------|----------|----------|
| Minimum    | 18.00         | -0.0140  | -0.1370  |
|            | Jajarkot      | (0.009)  | (0.108)  |
| 10         | 41.79         | -0.0021  | -0.0315  |
|            | Mahottari     | (0.002)  | (0.059)  |
| 25         | 47.49         | 0.0008   | -0.0062  |
|            | Kailali       | (0.000)  | (0.049)  |
| 50         | 55.81         | 0.0049** | 0.0306   |
|            | Dhanusa       | (0.002)  | (0.036)  |
| 75         | 72.32         | 0.0132*  | 0.1039** |
|            | Kavre         | (0.007)  | (0.035)  |
| 90         | 83.71         | 0.0189*  | 0.1544** |
|            | Kathmandu     | (0.011)  | (0.053)  |
| Maximum    | 84.18         | 0.0192*  | 0.1565** |
|            | (Gulmi)       | (0.011)  | (0.053)  |

\*Coefficients in IV are significant at the 5 % level, OLS at the 10 % level

bias. If one interprets these as significant by using a one-tailed test at the 10% level or a two-tailed test at the 15% level, the IV results indicate a marginal effect of a 33 rupee increase in education spending for a 1,000 rupee increase in remittance income. The number of remitters, urban location, and wage income also positively contribute to education spending. Interestingly, the magnitude of the impact of wage income is similar to that of remittance income in the instrumental variables regression. For those who are more reliant on home production, investment in education is lower.

Columns 3 and 4 of Table 3 include the SLC Pass Rate as a proxy for school quality. First we note that the coefficients on both Remittance and SLC Pass Rate are positive and statistically significant in OLS and IV specifications. The results indicate while higher remittances continue to increase education spending, school quality matters. A 1 percentage point increase in school quality is expected to increase education spending by about 307 rupees, while an additional 1,000 rupees in remittances has an insignificant impact on education spending (we note the similarity of coefficients between columns 1 and 3 as well). Under the IV estimates, a 1 percentage point increase in SLC Pass Rate is expected to increase education spending by 118 rupees while an additional 1,000 rupees in remittance income is expected to increase education spending by 95 rupees. The evidence clearly indicates a positive impact of school quality on education spending; it then seems natural to ask if, at the margin, higher school quality encourages spending from remittance income?

Columns 5 and 6 of Table 3 address this question by including the interaction between SLC Pass Rate and Remittances. The results are strikingly different. We first observe that the direct effect of remittances is negative and larger for the IV results (although insignificant in both specifications at conventional levels). In both specifications, the interaction term is positive and significant. Thus, it seems that a greater share of remittance income is spent on education in districts where the quality of education is higher. This is consistent with human capital theory which posits that individuals (or

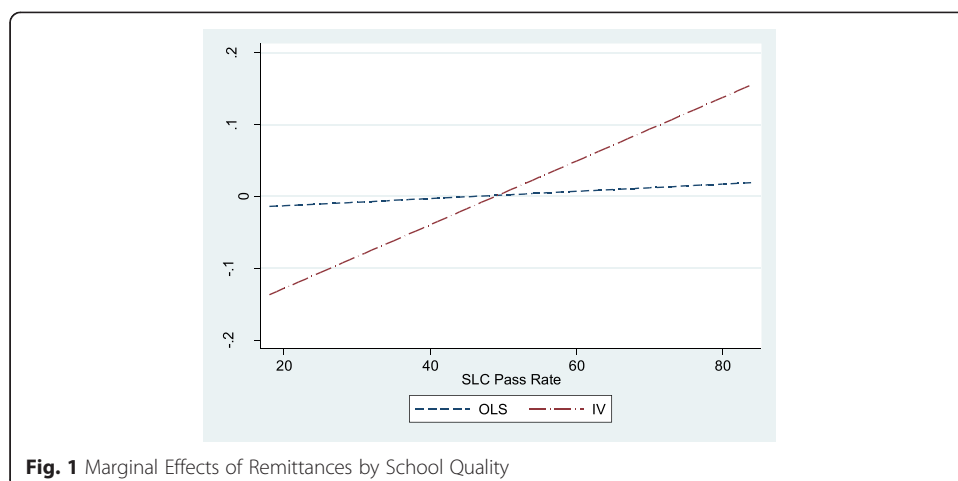
in this case households) will spend on education up to the point that the marginal cost is equal to the marginal reward. In districts where school quality is higher, we expect a higher return at the margin and therefore more spending on education.<sup>2</sup>

Using the results from Table 3, we consider the marginal effect of remittances on education spending given by computing the following:

$$\frac{\partial \text{Education}}{\partial \text{Remittance}} = b_1 + b_3(\text{SLC Pass Rate}).$$

Table 4 evaluates this marginal effect at various percentiles of the SLC Pass Rate, and Fig. 1 graphs the marginal effect over the range of the SLC Pass Rate, where  $b_1, b_3$  are the point estimates of the coefficients of our population regression function outlined above. In Table 4, we see that the marginal effect under IV increases at higher levels of the SLC Pass Rate. Or, in other words, there is a rising effect of remittance income on education spending as the quality of education in a district grows. The marginal effect ranges from -0.014 to 0.019 for the OLS results and -.137 to 0.157 for the IV results, indicating a large and increasing impact of remittances over the range of SLC pass rates. For the IV estimates, an increase of 1000 rupees in remittances results in a 30 to 150 rupee increase in spending on education for schools that are performing at the median or above. There is no significant impact of remittances on education spending for households that reside in districts with schools performing below the median. Fig. 1 displays this relationship in a continuous fashion, where the marginal effect is upward sloping and steeper for the IV estimate compared to the OLS result.

In Tables 5 and 6 we present results estimating separate models for internal and external remittances. As mentioned earlier, we might expect systematic differences in education across remittances generated internally versus those generated externally. In particular, if Nepali education is valued differentially abroad as compared to domestically, then we should see corresponding differences in education spending across remittance sources. As seen in Table 5, the estimates are striking; while both the direct and interaction effects of remittances are statistically significant for internal remittances (presented in columns 1 and 2), external remittances are found to have no statistically significant impact on education spending. The negative sign on the remittance variable



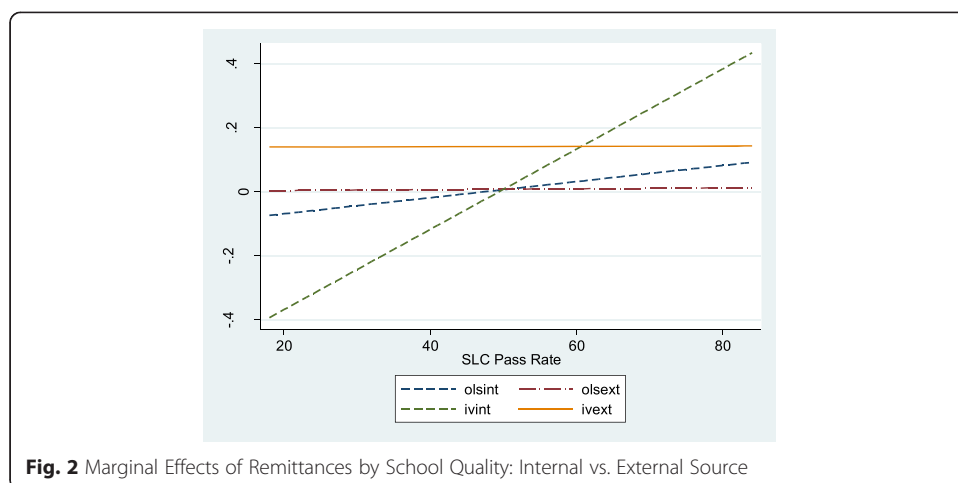
and the positive sign on the interaction give the upward sloping marginal effect as was seen for the pooled results presented in Tables 3 and 4 and Fig. 1. Fig. 2 is a reproduction of the estimates in Fig. 1, where we allow for differences resulting from the source of remittances. Given the positive slopes associated with internal remittances and the near horizontal relationship for external remittances, it appears that the earlier results are driven by internal remittances.

Table 6 presents the marginal effects of remittances on education spending at various percentiles of the SLC Pass Rate similar to the results presented in Table 4. We see comparable results for those receiving internal remittances. The marginal impact is larger in districts with better performing schools. Further, we observe that the marginal effect of internal remittances is systematically higher when compared to external remittances in both OLS and IV results. This is highlighted in Fig. 2, where we have plotted the marginal effect against the SLC Pass Rate. The marginal effects for internal remittances, shown in short dashes, are generally above and steeper than the corresponding estimates for external remittances.

Although other interpretations may exist, the results are consistent with the premise that Nepali education is valued more highly within Nepal than abroad as in Kandel and Kao (2000). If children in a household with adult internal migrants are more likely to “follow in these footsteps,” then these households should invest more heavily in education because of the higher expected return to education for jobs inside Nepal. Meanwhile, for those with household members abroad, they may learn from relatives that a Nepali education is not valued as highly in other countries and may be discouraged from pursuing additional schooling if they plan to move abroad as well and to connect with other household or community members through established migrant networks.

### 6 Conclusions

Overall, we find that remittances are linked to human capital investment in Nepal and that the positive link or marginal impact is greater where the returns to education are higher. The results appear to be driven by differences in the returns on investment in the originating areas and from internal migrants. In other words, Nepali households invest in education, and the strength of the effect is dependent on the quality of schooling near a



**Table 5** Education spending as a function of remittance income and school quality, internal vs. external remittance

|                     | (1)        | (2)        | (3)        | (4)       |
|---------------------|------------|------------|------------|-----------|
| Variables           | OLS        | IV         | OLS        | IV        |
| Internal remittance | -0.119*    | -0.619***  |            |           |
|                     | (-1.95)    | (-3.04)    |            |           |
| SLC pass rate*      | 0.003**    | 0.013***   |            |           |
| Internal remittance | (1.97)     | (2.99)     |            |           |
| External remittance |            |            | 0.002      | 0.139     |
|                     |            |            | (0.09)     | (0.88)    |
| SLC pass rate*      |            |            | 0.0001     | 0.00005   |
| External remittance |            |            | (0.45)     | (0.03)    |
| SLC pass rate       | 0.214***   | -0.231     | 0.292***   | 0.005     |
|                     | (3.81)     | (-1.54)    | (5.27)     | (0.03)    |
| Number remitter     | 1.466**    | 17.838***  | 1.018      | -8.200    |
|                     | (2.51)     | (2.83)     | (1.35)     | (-0.99)   |
| Urban household     | 15.243***  | 11.444***  | 16.691***  | 9.016*    |
|                     | (9.75)     | (4.92)     | (8.53)     | (1.69)    |
| Share 4 to 7        | 27.072***  | 35.276***  | 22.444***  | 26.393**  |
|                     | (5.97)     | (3.97)     | (5.37)     | (2.16)    |
| Share 8 to 15       | 32.390***  | 43.753***  | 33.341***  | 33.816*** |
|                     | (11.21)    | (5.07)     | (9.95)     | (3.21)    |
| Share 16 to 64      | 23.257***  | 23.181***  | 25.114***  | 19.994*   |
|                     | (5.65)     | (3.13)     | (4.71)     | (1.95)    |
| Share elderly       | 9.658***   | 11.659     | 10.309***  | 21.662**  |
|                     | (3.45)     | (1.51)     | (2.97)     | (1.99)    |
| Farm income         | -0.005     | -0.007     | 0.002      | 0.006     |
|                     | (-1.01)    | (-0.95)    | (0.51)     | (0.88)    |
| Enterprise income   | 0.000      | 0.001      | 0.009**    | 0.004     |
|                     | (0.71)     | (0.87)     | (1.97)     | (0.70)    |
| Wage income         | 0.000**    | 0.000***   | 0.000**    | 0.016     |
|                     | (2.07)     | (2.70)     | (2.24)     | (0.92)    |
| Married couples     | 1.752*     | 4.904***   | 1.032      | 1.504     |
|                     | (1.93)     | (2.77)     | (1.06)     | (0.67)    |
| Home production     | -0.126**   | -0.244*    | -0.177***  | 0.014     |
|                     | (-2.39)    | (-1.93)    | (-2.65)    | (0.07)    |
| Constant            | -30.310*** | -42.524*** | -34.292*** | -16.082   |
|                     | (-5.41)    | (-2.97)    | (-5.21)    | (-1.11)   |
| Observations        | 1,989      | 1,989      | 1,718      | 1,718     |
| Hansen's J          |            | 0.216      |            | 0.0101    |
| p-value             |            | 0.642      |            | 0.920     |
| First stage F       |            |            |            |           |
| Remittance income   |            | 0.302      |            | 2.153     |
| Number remitter     |            | 1.054      |            | 2.326     |
| SLC*Remittance      |            | 7.056      |            | 4.339     |

Robust t-statistics in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

**Table 6** Marginal effect of remittances on education by SLC pass rate percentiles

| Percentile | SLC pass rate | Internal  |           | External |         |
|------------|---------------|-----------|-----------|----------|---------|
|            |               | OLS       | IV        | OLS      | IV      |
| Minimum    | 18.00         | -0.073**  | -0.393*** | 0.004    | 0.140   |
|            | Jajarkot      | (0.04)    | (0.13)    | (0.01)   | (0.13)  |
| 10         | 41.79         | -0.014**  | -0.095**  | 0.007    | 0.141   |
|            | Mahottari     | (0.01)    | (0.04)    | (0.01)   | (0.09)  |
| 25         | 47.49         | 0.001**   | -0.023    | 0.008    | 0.141*  |
|            | Kailali       | (0.00007) | (0.03)    | (0.01)   | (0.08)  |
| 50         | 55.81         | 0.022**   | 0.081**   | 0.009**  | 0.142** |
|            | Dhanusa       | (0.01)    | (0.05)    | (0.00)   | (0.07)  |
| 75         | 72.32         | 0.063**   | 0.288***  | 0.011**  | 0.143** |
|            | Kavre         | (0.03)    | (0.11)    | (0.01)   | (0.06)  |
| 90         | 83.71         | 0.092**   | 0.430***  | 0.013    | 0.143** |
|            | Kathmandu     | (0.05)    | (0.15)    | (0.01)   | (0.06)  |
| Maximum    | 84.18         | 0.093**   | 0.436***  | 0.013    | 0.143** |
|            | (Gulmi)       | (0.05)    | (0.16)    | (0.01)   | (0.06)  |

Standard errors in parentheses  
 \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

household. This is reinforced by the finding that internal remittances have a greater impact on education as compared to external remittances. Although we are not able to directly test the proposition, if households who receive remittances from internal migrants are more likely to migrate internally then we should expect a greater investment in education if domestic employers value a Nepali education more than foreign employers.

Our results appear to be most consistent with the findings of Kandel and Kao (2000) and Taylor and Mora (2006), who find that internal remittances have a greater impact on investment in education. However, other studies, for example Adams et al. (2008), Mendola (2008) and Costaldo and Reilly (2007) find either no difference or that external remittances have a greater impact. Acosta et al. (2007) conclude that the findings for any one country may not be generalized outside that country or specific region. These mixed conclusions force researchers to ask what local characteristics cause differences in the use of remittance income. Ultimately, our results show us that a lack of homogeneity in economic conditions both within and across developing countries creates an additional challenge in understanding the role of remittances on household choices and therefore development outcomes.

**Endnotes**

<sup>1</sup>Nepal’s Ministry of Education periodically collect records on the number of individuals who take the exam and the number that pass each year. We obtained 2006 data on the passing rate at the district level. For each district we are able to measure the SLC Pass Rate as the percentage of individuals taking the SLC exam who passed. There is wide variation in performance across the districts. While the mean is roughly 57%, performance ranges from a low 18% to a high of 84%.

<sup>2</sup>Table 3 also presents the first stage F-values for our endogenous variables and other diagnostics such as Hansen’s J and the corresponding p-value.



**Appendix 1**

Table 7 presents results for the specifications presented in Table 2 using the full sample of 5,988 households.

**Table 7** Education spending as a function of remittance income and school quality

|                   | (1)                   | (2)                   | (3)                   | (4)                   | (5)                   | (6)                  |
|-------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------|
| Variables         | OLS                   | IV                    | OLS                   | IV                    | OLS                   | IV                   |
| Remittance income | 0.001<br>(1.33)       | 0.048<br>(1.13)       | 0.001<br>(1.42)       | 0.127***<br>(2.60)    | -0.020<br>(-1.49)     | -0.450***<br>(-2.76) |
| SLC pass rate*    |                       |                       |                       |                       | 0.0004<br>(1.54)      | 0.009***<br>(3.30)   |
| Remittance        |                       |                       |                       |                       |                       |                      |
| SLC pass rate     |                       |                       | 0.406***<br>(6.23)    | 0.226***<br>(4.29)    | 0.381***<br>(5.70)    | -0.093<br>(-0.81)    |
| Number remitter   | 0.902*<br>(1.89)      | 2.809<br>(0.59)       | 1.069**<br>(2.23)     | -19.902***<br>(-3.52) | 0.840*<br>(1.87)      | -3.070<br>(-0.40)    |
| Urban household   | 20.350***<br>(9.99)   | 20.437***<br>(7.46)   | 15.611***<br>(9.81)   | 9.040***<br>(4.39)    | 15.510***<br>(9.74)   | 13.659***<br>(4.77)  |
| Share 4 to 7      | 28.213***<br>(6.11)   | 32.199***<br>(6.29)   | 27.438***<br>(6.00)   | 16.064***<br>(2.88)   | 27.514***<br>(6.01)   | 28.912***<br>(3.02)  |
| Share 8 to 15     | 47.142***<br>(6.08)   | 48.835***<br>(6.33)   | 46.433***<br>(6.07)   | 32.191***<br>(4.46)   | 46.689***<br>(6.11)   | 54.098***<br>(4.71)  |
| Share 16 to 64    | 35.611***<br>(7.08)   | 36.803***<br>(6.98)   | 32.240***<br>(6.98)   | 22.153***<br>(4.47)   | 32.312***<br>(7.00)   | 34.391***<br>(4.28)  |
| Share elderly     | 21.080***<br>(4.72)   | 20.452***<br>(4.20)   | 17.932***<br>(4.34)   | 18.389***<br>(3.10)   | 18.372***<br>(4.46)   | 28.238***<br>(3.39)  |
| Farm income       | -0.014<br>(-1.43)     | -0.010<br>(-1.17)     | -0.012<br>(-1.42)     | -0.004<br>(-0.41)     | -0.012<br>(-1.41)     | -0.014<br>(-1.31)    |
| Enterprise income | 0.007<br>(1.31)       | 0.007<br>(1.21)       | 0.007<br>(1.33)       | 0.009<br>(1.63)       | 0.007<br>(1.33)       | 0.008<br>(1.45)      |
| Wage income       | 0.023**<br>(2.54)     | 0.022**<br>(2.57)     | 0.019**<br>(2.19)     | 0.021**<br>(2.41)     | 0.020**<br>(2.20)     | 0.023**<br>(2.35)    |
| Married couples   | 8.647<br>(1.60)       | 10.540**<br>(2.02)    | 8.776<br>(1.62)       | 0.457<br>(0.10)       | 8.852<br>(1.64)       | 12.208**<br>(2.02)   |
| Home production   | -0.271***<br>(-2.83)  | -0.348***<br>(-3.35)  | -0.213**<br>(-2.36)   | 0.006<br>(0.07)       | -0.212**<br>(-2.35)   | -0.212*<br>(-1.71)   |
| Constant          | -32.949***<br>(-3.65) | -39.680***<br>(-3.66) | -53.410***<br>(-4.53) | -13.469<br>(-1.35)    | -52.171***<br>(-4.41) | -31.640**<br>(-2.44) |
| Observations      | 5,988                 | 5,988                 | 5,988                 | 5,988                 | 5,988                 | 5,988                |
| Hansen's J        |                       | 0.927                 |                       | 7.954                 |                       | 0.799                |
| p-value           |                       | 0.629                 |                       | 0.0187                |                       | 0.371                |
| First stage F:    |                       |                       |                       |                       |                       |                      |
| Remittance income |                       | 7.751                 |                       | 6.741                 |                       | 6.741                |
| Number remitter   |                       | 16.54                 |                       | 20.14                 |                       | 20.14                |
| SLC*Remittance    |                       |                       |                       |                       |                       | 7.028                |

Robust t-statistics in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

**Appendix 2**

Table 8 provides the first stage estimates of the instrumental variable regressions

**Table 8** First stage estimates for IV estimation

|                   | (2)                  | (3)                    | (4)                  |
|-------------------|----------------------|------------------------|----------------------|
| Variables         | Remittance           | SLC Pass Rate * Remit  | IV                   |
| SLC pass rate     | 0.710<br>(0.61)      | 168.156***<br>(2.65)   | -0.002*<br>(-1.82)   |
| Urban household   | 25.933<br>(1.17)     | 1945.060<br>(1.54)     | -0.091**<br>(-1.96)  |
| Share 4 to 7      | -40.249<br>(-0.74)   | -2673.915<br>(-0.66)   | -0.688***<br>(-3.48) |
| Share 8 to 15     | 60.421<br>(0.49)     | 1820.742<br>(0.29)     | -0.532***<br>(-3.16) |
| Share 16 to 64    | 29.739<br>(0.44)     | 1164.112<br>(0.30)     | -0.340***<br>(-2.10) |
| Share elderly     | 82.661<br>(0.47)     | 2436.116<br>(0.28)     | 0.088<br>(0.46)      |
| Farm income       | -0.149<br>(-1.15)    | -7.627<br>(-1.21)      | 0.0003<br>(-1.01)    |
| Enterprise income | 0.002<br>(0.47)      | 0.097<br>(0.38)        | 0.00001<br>(0.25)    |
| Wage income       | 0.213<br>(0.86)      | 10.224<br>(0.83)       | 0.0003<br>(-1.48)    |
| Married couples   | 13.685<br>(0.50)     | 544.111<br>(0.40)      | 0.014<br>(0.50)      |
| Home production   | 1.999<br>(0.88)      | 86.977<br>(0.76)       | 0.009**<br>(1.95)    |
| Class A           | -49.823<br>(-0.83)   | -600.459<br>(-0.21)    | -0.354***<br>(-4.74) |
| Class B           | -65.691**<br>(-1.81) | -3744.811**<br>(-2.13) | -0.074<br>(-1.41)    |
| Class C           | -41.605<br>(-1.40)   | -2338.092<br>(-1.60)   | -0.131***<br>(-2.91) |
| Migration rate    | -83.973<br>(-0.81)   | -4244.088<br>(-0.86)   | -0.036<br>(-0.31)    |
| Constant          | 26.553<br>(0.82)     | -4581.797<br>(-2.04)   | 2.130<br>(11.86)     |
| Observations      | 5,988                | 5,988                  | 5,988                |

Robust t-statistics in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

**Competing interests**

The IZA Journal of Migration is committed to the IZA Guiding Principles of Research Integrity. The authors declare that they have observed these principles.

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