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The Impact of Remittances on Child Education in Pakistan

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Abstract

This study examines the impact of remittances on school enrollment and the level of education attained among children aged 4–15 years in Pakistan. It uses a nationally representative survey, the Pakistan Social and Living Standards Measurement Survey for 2010/11. The migrant network variable at the village level interacting with the number of adults at the household level is used as an instrument for remittances. The results of the IV probit model show that children from remittance-receiving households are more likely to enroll in school. The marginal impact of remittances on school enrollment is larger for girls and for rural households. Hence, remittances help reduce regional and gender disparities in child school enrollment in Pakistan. The IV censored ordered probit model is used to investigate the impact of remittances on children's grade attainment. The estimated impact is negative and significant, except for urban children, lowering the probability that a child will move to a higher grade.

Keywords: Child education, school enrollment, educational attainment, remittances.

JEL classification: I25, O15.

1. Introduction

Globalization has opened up the labor market, enabling workers to move temporarily across boundaries, seeking better opportunities outside their home country. As a consequence, migration has increased rapidly, especially from developing countries in recent years. The substantial inflow of remittances to workers' home countries has proven one of the most important sources of external financing for these countries. At the macro-level, remittances help to maintain a stable balance of payments; at the micro-level (household level), they help raise private consumption, promote business investment, reduce poverty, increase health facilities and

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encourage human capital investment in workers' country of origin (Ahmed, Sugiyarto & Jha, 2010).

According to the International Organization for Migration, in 2013 3.2 percent of the world's total population were migrants. The number of world migrants increased from 154 million in 1991 to 231.5 million in 2013. From 2000 to 2010, the world migration growth rate was 2.2 million annually, which was twice that of the previous decade. Most migrants live in developed countries. Like other developing countries, migration from Pakistan has also increased in recent years. According to the United Nations, in 2013, more than 4 million Pakistanis (2.3 percent of the total population) were outside the country. World remittances have also increased with the rise in international migration. In 2012, world remittances were an estimated US$ 529 billion. The total flow to developing countries was US$ 401 billion in 2012, representing a 5.3 percent growth rate from the previous year. Pakistan was also one of the top ten remittance recipient countries, receiving US$ 14 billion in remittances in 2012 (World Bank, 2013).

The role of remittances has been investigated widely at the macro and micro levels. An important question to consider is how remittances affect children's education in workers' home countries. Studies examining the impact of migrant remittances on child education include Hanson and Woodruff (2003), Edwards and Ureta (2003), Arif (2004), Acosta (2006), Amuedo-Dorantes and Pozo (2010), Sherpa (2011), Chaaban and Mansour (2012), Mara et al. (2012) and Arif and Chaudhry (2015).

The evidence is mixed: it shows that remittances can have either positive or negative impacts on education. On the positive side, migrants who send remittances to their families help ease the household's credit constraint and thus encourage investment in their children's education. Remittances not only help children already enrolled to stay in school longer, but also enable out-of-school children to enroll as a result of the household's lowered credit constraint. Moreover, when there are good migration prospects for highly educated and skilled labor, the returns on education are higher for individuals moving abroad. In this sense, remittances affect child school attainment positively (McKenzie & Rapoport, 2006; Chaaban & Mansour, 2012).

On the negative side, the migration of a family member can also create constraints to education in the following ways. First, when an older member(s) of the household move(s) abroad, children's social and

economic responsibilities may increase in his/her absence. They may have to spend more time on household chores to bridge the labor gap. Migration may also create an income gap, compelling the migrant's children to undertake labor (Hanson & Woodruff, 2003; Mansuri, 2006; McKenzie & Rapoport, 2006). Second, parental absence can have a negative effect on the child's schooling, given the lack of a role model or guardian and the supervision he/she would normally provide. Third, migration might also affect child schooling through the wage effect. When people migrate on a large scale, then the ensuing fall in labor supply may cause labor wages to increase in the home country. As a result, child work may become economically more rewarding, thus decreasing the value of schooling (Elbadawy & Roushdy, 2009; Nasir, Tariq & Rehman, 2011).

A number of studies have investigated the phenomenon of migration and the impact of migration and remittances on child education in Pakistan (see, for example: Arif, 2004; Mansuri, 2006; Nasir et al., 2011; Hassan, Mehmood & Hassan, 2013; Arif & Chaudhry, 2015). However, the evidence from these studies is not uniform: some report a positive impact on child schooling while others document a negative effect. The main focus of these studies is child school enrollment. Some have a limited scope in terms of time span, sample size or region (being confined to rural areas or to a specific locality in a rural area). Other constraints include econometric issues or the empirical models used.

Keeping in view these gaps, the main objective of this study is to examine the impact of remittances on child education in Pakistan through two channels: child school enrollment and educational attainment. We use the latter (along with school enrollment) in order to isolate the impact of remittances on child school progression. Children may be enrolled in school at a particular level, but might not complete that level if they drop out. In Pakistan, the school dropout rate is very high, both at the primary and secondary levels. According to Farooq (2013), the primary dropout rate is about 31 percent.

We also test for the exogeneity of remittances and account for censored child attainment for currently enrolled children. Previous studies on Pakistan have tended to overlook this issue, treating the educational attainment of those children who are still in school identically to those who have completed their schooling. Not accounting for censoring usually yields biased regression estimates (see Zhao & Glewwe, 2010). Therefore, the data needs to be censored for children currently attending school.

The study uses nationally representative data from the Pakistan Social and Living Standards Measurement Survey (PSLMS) for 2010/11, which covers both rural and urban areas of Pakistan. We analyze the overall sample as well as separately for both gender and region, which provides a clearer insight into the gender and regional disparity in child education between remittance recipient and nonrecipient households.

The study is organized as follows. The literature on remittances, migration and child education is outlined in Section 2. The data and methodology are described in Sections 3 and 4, followed by the study's empirical results in Section 5. Section 6 concludes the study and discusses policy implications based on our findings.

2. Literature Review

This section reviews the literature on the impact of remittances on child education. This includes empirical work on remittances and child education, other important correlates of child schooling, and methodological issues in modelling and identifying school attainment.

Numerous studies have investigated the effect of remittances on child education in developing countries. Hanson and Woodruff (2003) report that children in remittance-receiving households in Mexico complete more years of schooling. The estimated effect is positive and significant only for those girls with uneducated mothers. The authors argue that remittances ease the otherwise binding credit constraint on these households, which encourages investment in child education. In another study on Mexico, Borraz (2005) finds that remittances have a positive and significant impact only for children whose maternal level of education is low and who live in small cities.

Chaaban and Mansour (2012) examine the impact of migrant remittances on education for three countries – Jordan, Lebanon and Syria – dividing their sample into two age groups, 15–17 and 18–24. Their findings show that remittances have a significant, positive impact on school attendance for the 15–17-year age group in Syria. The impact is larger for men than women in Syria and Jordan, but smaller in Lebanon for the 18–24-year age group. Their results for school attainment are the same. In Egypt, Elbadawy and Roushdy (2009) find a strong, positive impact for migration and remittances on school attendance. Lu and Treiman (2007) examine the impact of remittances on children's education among blacks in South Africa.

Remittances also help reduce the gender gap in education (see Morooka, 2004). Sherpa (2011) concludes that the positive impact of remittances is larger for girls, which decreases the gender disparity in primary enrolment in Nepal. Similarly, Calero, Bedi and Sparrow (2009) suggest that remittances enhance education outcomes in Ecuador, especially for girls, in turn reducing the gender gap in education.

The negative impact of migration/remittances arises in a number of studies. When a family member moves abroad, this may affect child education adversely (Lucas, 2005). The negative impact can take the form of a social effect (parental absence) and a labor market effect. Parental absence may be detrimental to a child's schooling, given the lack of a role model or guardian to provide supervision. The absence of a working adult in the household may also increase the need for children to bridge the short-term gap in labor demand and supply (Booth & Tamura, 2009). Lucas (2005) indicates that remittances increase parental support for children's education, but also have a negative impact in terms of parental absence. Acosta, Fajnzylber, and Lopez (2008) examines the impact of remittances, using data for Latin America, and finds they have a negative effect on child school attainment for some countries.

Methodological issues, such as the problem of endogeneity, have also been the focus of many studies on remittances. The explanatory variable (remittances) may be correlated with the error term for two reasons: (i) unobserved omitted variables and (ii) the joint determination of remittances and schooling. Different instruments are used for remittances in order to tackle the problem of endogeneity. Acosta (2006) and Elbadawy and Roushdy (2009) use village-level migrant networks as an instrument for remittances. In the case of Pakistan, Mansuri (2006) uses the proportion of migrant households at the village level interacted with the number of male adults in each household. Sherpa (2011) uses migrant networks and the age of the migrant as an instrument for remittances. Historical migration rates at the state level interacting with household variables are used as an instrument for current migration by McKenzie and Rapoport (2006), Hanson and Woodruff (2003) for Mexico, and Arif and Chaudhry (2015) for Pakistan.

While it is important to isolate the impact of remittances on child education, it is also necessary to identify suitable controls for other key influences in the regression analysis. These controls include individual characteristics (age, gender), household characteristics (household structure, socioeconomic background), labor market conditions and

structure, state policies, and the availability and quality of schools (Wolfe & Behrman, 1984; Holmes, 2003; Sherpa, 2011).

Parental education is one of the main determinants of child education: educated parents are more likely to place a higher value on their children's education (Tansel, 2002; Holmes, 2003; Emerson & Souza, 2007; Chaaban & Mansour, 2012). Glick and Sahn (2000) suggest that the father's education has a positive impact on children's education, but the impact is greater for girls. The mother's education has a significant, positive impact, but only for girls. Household wealth and income also have a significant effect on child schooling. Glick and Sahn (2000) find that the household's permanent income level increases school attendance and grade attainment among girls and lowers their probability of leaving school early. Holmes (2003) and Sánchez and Sbrana (2009) also suggest that wealth and high per capita income increase the likelihood of attending school for girls in the case of Pakistan and Yemen, respectively.

Other variables – the number of siblings, household size, the gender of the household head, the age and gender of the individual, and the quality of education – also determine schooling outcomes (see Wolfe & Behrman, 1984; Deolalikar, 1997; De Serf, 2002; Curran, Chung, Cadge & Varangrat, 2003; Sherpa, 2011). Ersado (2005) finds that younger siblings (under five years of age) have no impact on children's schooling in rural Nepal and Peru and in urban Zimbabwe, but report a significantly negative impact on schooling for urban Peru.

Arif (2004) uses data from the Pakistan Socioeconomic Survey for 2001 to analyze the impact of migration on household consumption, education, health and labor supply in Pakistan. Households with at least one member abroad are considered migrant households. Using the logistic regression technique, he finds that migration has a positive impact on child enrollment. However, the author uses school enrollment as a binary variable and does not consider school attainment. Similarly, he does not test for the possible endogeneity of the migration variable.

Mansuri (2006) examines the impact of migration on school attainment and child labor in Pakistan, using data from the Pakistan Rural Household Survey for 2001/02. She uses the instrumental variable (IV) technique to gauge the impact of migration on child education and child labor. The migration network at the village level interacting with the number of adult males in the household is used as an instrument to isolate the impact of migration on child schooling. Her findings show that

temporary migration has a positive and significant impact on child education. Children from migrant households have a better chance of attending school, a lower dropout rate, higher grade attainment and reduced labor market activities. This impact is higher for girls, decreasing the gender disparity in school enrollment. However, Mansuri ignores the censoring of data for currently enrolled children: educational attainment is measured as a categorical variable for the level of education completed by an individual child. Those children who are currently enrolled at a particular level of schooling and those who have completed a specific level but are not currently enrolled are treated identically.

Arif and Chaudhry (2015) examine the impact of migration on school enrollment, accumulated years of schooling and dropout rates in Punjab, Pakistan. The study uses a probit model and ordinary least squares. It accounts for the problem of endogeneity by using the IV technique and the historical migration rate as an instrument for migration. The results suggest that migration has a positive effect on child school enrollment. Children from migrant households accumulate more years of schooling and have a lower dropout rate. However, the study is limited to Punjab, and treats currently school-going children and currently out-of-school children identically. Not accounting for censoring may bias the regression estimates (Zhao & Glewwe, 2010).

The reviewed literature shows that remittances can have both a positive and negative effect on child education. If the income effect of remittances is greater than the other effects of migration (parental absence), then the overall impact will be positive and vice versa. In the case of Pakistan, the studies reviewed are either based on old data or small samples. Most of them have focused on the impact of migration and remittances on child school enrollment, while ignoring child grade attainment. Barring Mansuri (2006) and Arif and Chaudhry (2015), these studies have also overlooked the problem of endogeneity. Finally, none of them have considered censoring the data for currently enrolled children. This study tries to rectify these issues, using a recent, nationally representative dataset from Pakistan.

3. Data

This study uses data from the PSLMS for 2010/11 to investigate the impact of remittances on child education in Pakistan. The survey dataset consists of 76,546 households (50,128 rural and 27,360 urban households), spread across 5,413 primary sampling units (PSUs) in the four provinces

and the capital. The PSLMS is a multidimensional district-level survey that provides detailed information on individual and household characteristics, including household expenditure, assets, income sources, employment, demographics, health and education. In this study, we focus on children aged 4–15 years, which shrinks the sample size to 31,392 children from 10,750 households.

According to the PSLMS data, out of 10,750 households, 288 reported receiving remittances (about 3 percent of the total sample). Of these, 204 households were rural, constituting 70 percent of the total recipients. Table 1 gives descriptive statistics for the overall sample as well as for remittance recipient and nonrecipient households. For those families receiving remittances, the mean value of remittances is PRs 160,485.53 and the per capita amount received by each household is PRs 16,596.85.

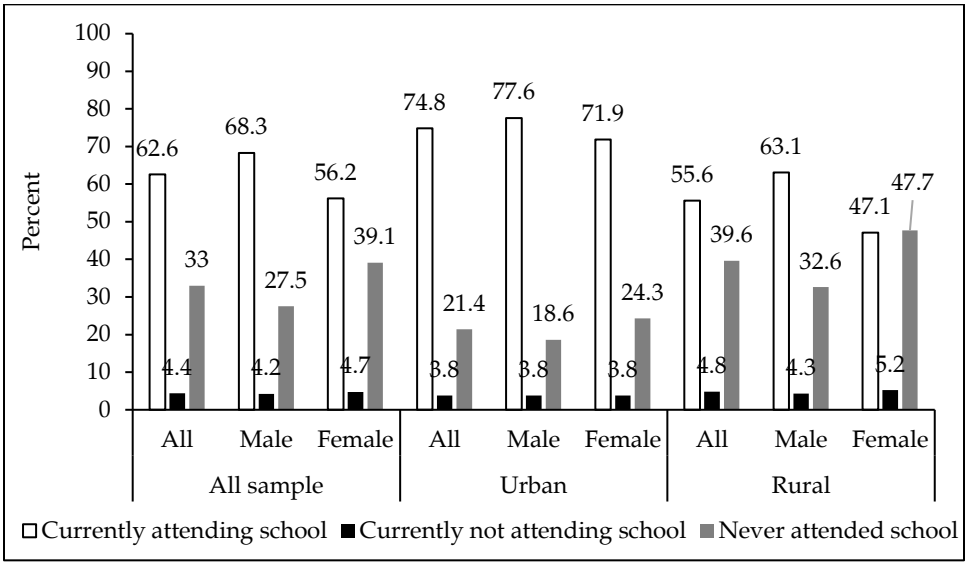
Table 1: Descriptive statistics

	Overall		Remittance recipient households		Nonrecipient households	
Variable	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Household characteristics						
Remittances received by household	4,352.74	32,452.84	160,485.53	115,832.740	–	–
Per capita remittances	497.54	3,823.48	16,596.85	13,790.090	–	–
Remittances (binary) (= 1 if household reports remittances)	0.03	0.16	1.00	0.000	–	–
Proportion of households receiving remittances at the village level	0.05	0.09	–	–	–	–
Per capita expenditure	26,917.12	19,794.45	29,221.19	18,024.260	24,297.52	16,453.120
Father's education	1.65	1.82	1.70	1.806	1.58	1.794
Mother's education	0.69	1.36	0.85	1.460	0.57	1.241
Household head's education	2.09	1.60	2.33	1.367	2.06	1.569
Family size	7.61	2.95	11.07	4.662	8.48	3.384
Child characteristics						
Child's age	9.18	3.39	9.56	3.409	9.17	3.389
Child's gender (= 1 for male)	0.53	0.45	0.54	0.499	0.53	0.499
Enrollment: children aged 4–15 (= 1 if enrolled)	0.63	0.48	0.74	0.439	0.62	0.484
Years of schooling: children aged 4–15	2.00	2.95	2.38	2.883	2.00	2.955
Enrollment: boys aged 4–15 (= 1 if enrolled)	0.68	0.46	0.81	0.396	0.68	0.466
Enrollment: girls aged 4–15 (= 1 if enrolled)	0.56	0.49	0.66	0.470	0.56	0.496
Years of schooling: boys aged 4–15	2.17	2.98	2.70	3.133	2.16	2.980
Years of schooling: girls aged 4–15	1.82	2.91	2.01	2.510	1.81	2.917
Region (= 1 for urban)	0.36	0.48	0.32	0.465	0.37	0.482
Sample size	31,392		738		30,654	

Source: Authors' calculations.

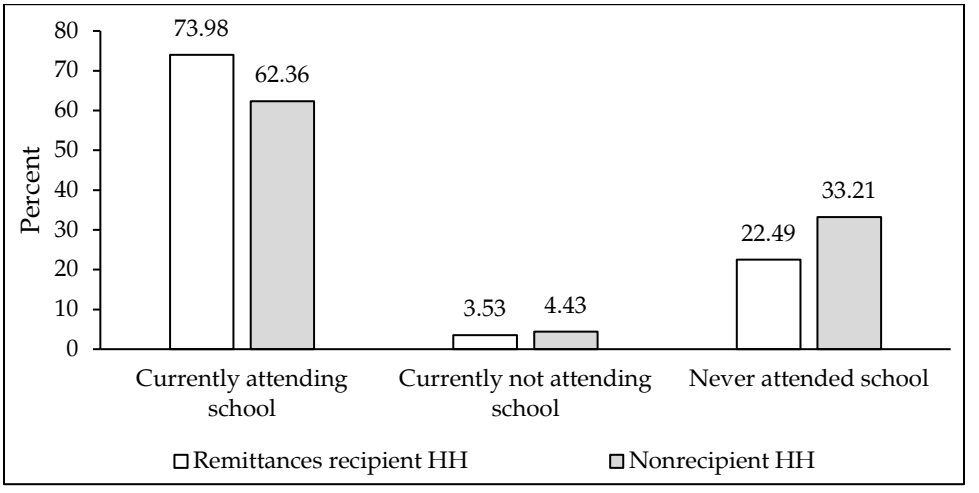
We have data on 31,392 school-going children aged 4–15, of which 738 children belong to remittance-receiving households. The PSLMS 2010/11 provides information on education variables such as enrollment, current level of education and dropout rates. Figure 1 illustrates school enrollment disaggregated by gender and region. Overall, 62.4 percent of children are currently enrolled. The enrollment rate is higher in urban regions and among boys. The dropout rate for girls is 4.7 percent, which is higher than that for boys.

Figure 1: Child enrollment by region and gender



There is also a large variation in school enrollment across remittance recipient and nonrecipient households (Figure 2). Among remittance-receiving households, the enrollment rate is about 74 percent, which is about 12 percentage points higher than for children from nonrecipient households. Similarly, the dropout rate is 10 percent higher for nonrecipient households.

Figure 2: Child enrollment across households



4. Methodology

In order to isolate the impact of remittances on child education, we develop two different econometric models: one for child enrollment and the second for child grade attainment.

4.1. Model for Child Enrollment

The probit model for child enrollment is given as:

$$Y_{ih} = \alpha_0 + \alpha_1 R_{ih} + \alpha_2 C_{ih} + \alpha_3 H_h + \alpha_4 U_{ih} + \varepsilon_{ih} \quad (1)$$

In equation (1), Y_{ih} is the dependent variable, which shows the schooling outcome of child i in household h. R_{ih} indicates whether the household receives remittances. C_{ih} is a vector of child characteristics (age, age-squared and gender). H_h is a vector of household characteristics (age and gender of the household head, the mother's education level, the father's education level, the number of school-going children, the number of earners in the household and total monthly household expenditure). U_{ih} is a dummy variable used to capture regional disparities, equal to 1 for urban households and 0 otherwise; ε_{ih} is the error term (see Section 4.3).

Child enrollment is a binary variable equal to 1 if the child is currently enrolled in any educational institution and 0 otherwise. Hence, we use a probit model to estimate equation (1) (see Holmes, 2003; Mansuri, 2006; Sherpa, 2011; Chaaban & Mansour, 2012).

$$P\left(Y_{ih}=1/R_{ih}, C_{ih}, H_h, U_{ih}\right)= \phi(\alpha_0 + \alpha_1 R_{ih} + \alpha_2 C_{ih} + \alpha_3 H_h + \alpha_4 U_{ih} + \varepsilon_{ih}) \quad (2)$$

ϕ is the cumulative standard normal distribution function.

Econometric problems such as endogeneity can arise when estimating equation (2) above. Excluded, unobserved variables at the community and household level – for example, labor market shocks, school quality, access to credit market and other costs of schooling – that affect both remittances and child education simultaneously can give rise to the problem of endogeneity. We use the IV technique to tackle this as follows:

$$Y_{ih} = \alpha_0 + \alpha_1 R_{ih} + \alpha_2 C_{ih} + \alpha_3 H_h + \alpha_4 U_{ih} + \varepsilon_{ih} \quad (3)$$

$$R_{ih} = \beta_0 + \beta_1 Z_h + \beta_2 C_{ih} + \beta_3 H_h + \beta_4 U_{ih} + \nu_{ih} \quad (4)$$

where the α_i terms represent structural parameters and the β_i terms are reduced-form vectors. Z_h is a vector of IVs (see Section 4.3).

Since we are using school enrollment to measure education, which is a binary variable, we apply an IV probit model to estimate equations (3) and (4). Using the maximum likelihood method, the IV probit model jointly estimates these equations on the assumption that (ε_{ih},ν_{ih}) are identically and independently distributed. The endogenous variable is treated as a linear function of the instrument(s) and certain other control variables (see Miluka & Dabalen, 2008).

4.2. Model for Grade Attainment

In order to examine the impact of remittances on children's grade progression, we use educational attainment (measured by the number of grade-years of schooling completed) as the dependent variable. In doing so, we use the two-stage least squares (2SLS) technique, which means taking the following issues into account.

First, we are interested in the final year of schooling completed in relation to the household's remittance-receiving status. Since we cannot observe the final year of schooling for children who are currently enrolled, we need to censor the data for children currently attending school. Neither 2SLS nor OLS take this censoring into account, and treat the educational attainment of children who are still in school as identical to that of children who have completed their schooling. This yields biased estimates of the impact of migration on educational attainment (see McKenzie & Rapoport, 2006).

Second, OLS and 2SLS assume a continuous distribution for the dependent variable, the years of schooling completed. However, this is a series of ordered discrete choices. To progress from one level of education to the next (primary to middle) and to continue for an extra year once the child has entered a certain level of education (secondary) are two different choices and should be modeled differently.

Accordingly, we follow the literature[1] and use a censored ordered probit model, which is an extended form of the ordered probit model. The reduced linear model of educational attainment is the same as equation (1):

$$Y_{ih} = \alpha_0 + \alpha_1 R_{ih} + \alpha_2 C_{ih} + \alpha_3 H_h + \alpha_4 U_{ih} + \varepsilon_{ih} \quad (5)$$

Here, we define Y_{ih} as the number of completed grade-years of schooling and Y^* as the latent desired level of schooling, which depends on the explanatory variables (X) and the error term (ε).

The latent desired level of schooling function is:

$$Y^* = \beta X + \epsilon \quad (6)$$

Although the survey does not provide data on the latent desired level of schooling, we do have data on the number of completed grade-years of schooling. Thus:

$Y = 0$ if $Y^* \leq \mu_0$

$Y = 0$ if $\mu_0 < Y^* \leq \mu_1$

$Y = 1$ if $\mu_0 < Y^* \leq \mu_1$

$Y = 2$ if $\mu_1 < Y^* \leq \mu_2$

$Y = n$ if $\mu_{j-1} \leq Y^*$

The μ_i terms are the cut-off points indicating the transition from one education level to the next. For those children who have completed their schooling, we observe a lower value of Y that falls between two cut-off points. For those children with no schooling, the value of Y will normalize at 0. The data for children who are currently enrolled will be

[1] See King and Lillard (1987), Glick and Sahn (2000), Maitra (2001), Holmes (2003), McKenzie and Rapoport (2006), Miluka and Dabalen (2008), Zhao and Glewwe (2010), and Chaaban and Mansour (2012).

censored with an unknown desired schooling level; we know they will have at least completed their current level of schooling. For these individuals, the desired latent level Y^* is at least equal to the observed level of schooling (Y), $Y^* \geq \mu_{max}$.

The variable educational attainment is classified into five different categories:

$$S = \begin{cases} 0 \; if \; no \; schooling \\ 1 \; if \; highest \; educational \; attainment \; is > 0 \; but \leq 5 \\ 2 \; if \; highest \; educational \; attainment \; is > 5 \; but \leq 8 \\ 3 \; if \; highest \; educational \; attainment \; is > 8 \; but \leq 10 \\ 4 \; if \; highest \; educational \; attainment \; is > 10 \end{cases} \quad (7)$$

In order to consider the potential endogeneity of remittances, a two-step maximum likelihood estimation is implemented. In the first stage, the remittances variable is regressed on the instrumental and control variables. In the second stage, the fitted values and residuals from the first stage are used in the censored ordered probit model (see Rivers & Vuong, 1988; Miluka & Dabalen, 2008; Zhao & Glewwe, 2010).

4.3. Variables

School enrollment is a dummy variable equal to 1 if the child is currently attending school and 0 otherwise. To capture the difference in school enrollment by gender and region, we also take into account enrollment data by gender and region. The sample of children comprises those aged 4–15 years.

In order to capture the completed level of education and the transition from one level to the next, an ordered discrete variable for schooling has be used. The variable (educational attainment) is classified into five different groups: (i) no schooling, (ii) 1–5 years of schooling (primary), (iii) 6–8 years of schooling (middle), (iv) 9–10 years of schooling (secondary) and (v) 11 years of schooling or more (higher secondary or above). For educational attainment, we consider only those children who are currently enrolled or have ever enrolled in the past.

Remittances are the main explanatory variable, taken as a dummy variable equal to 1 if the household receives remittances and 0 otherwise.

Different studies have used migrant networks, historical migration rates and distances to the border as an instrument for remittances and

current migration.[2] Here, we use the proportion of migrant households in the village (the migrant network) interacted with the number of male adult members as our instrument for remittances.

Numerous studies have used migrant networks at a community or PSU level as an instrument for remittances/migration. Migrant networks provide information on conditions in the host country and the costs of migration. They also help reduce the costs related to migration and remittances. Therefore, the probability of migrating and the volume of remittances will be higher in those areas with larger, stronger migrant networks. In Pakistan, especially in rural regions, the opportunity to migrate also depends heavily on the presence of adult males in the household, given women's restricted mobility. Hence, the rate of migration and the remittances inflow are likely to be higher in those households that have more than one adult male. We therefore interact the migrant network with the number of male adults at the household level. This creates household-level variation in the opportunity to migrate or receive remittances.

By itself, the migrant network is unlikely to be correlated with household-level unobservables, but it may be correlated with community-level unobservables and average child outcomes (Mansuri, 2006). The identification argument is that the migrant network interacted with the number of male adults in the household must affect the family's opportunity to send a migrant abroad or receive remittances, but is unlikely to be correlated with household or child-level unobservables. It is possible for the male adult members of the household to affect child schooling outcomes through household income or through the supervision or guardianship of the household's children. However, as Mansuri (2006) shows, conditional on the demographic characteristics of the household and other appropriate controls, the variable for male adult members of the household has no impact on child schooling outcomes in Pakistan. The instrument therefore satisfies the exclusion restriction.

In summary, the IV should fulfill three conditions: (i) it must be uncorrelated with the error term, (ii) it must be strongly correlated with the endogenous variable, and (iii) it must not be correlated with the dependent variable:

$$Cov\,(Z_h\,,\varepsilon_{ih}\,)=0$$

[2] See Hanson and Woodruff (2003); Alcaraz, Chiquiar and Salcedo (2010); Mansuri (2006); Acosta (2006); Lokshin, Bontch-Osmolovski and Glinskaya (2010); Sherpa (2011).

$$Cov\ (Z_h\ , M_h\ ) \neq 0$$

However, in some cases, even a valid instrument may not be strongly correlated with the variable being instrumented. To address this, we determine the relevance of the instruments in the first stage by testing their overall significance. Section 5 reports the results for the Wald test of exogeneity and the p-value and F-statistics from the first stage.

The vector of child-specific characteristics includes all the relevant control variables: the child's age (*Age_child*), age-squared (*Age2_child*) and gender (*gender_child*). As the child grows older, the opportunity cost of education is expected to increase because labor productivity increases and work becomes less harmful and more socially acceptable. For girls, both school and market-based work become less acceptable and decline in favor of home-based work as they grow older (Bhalotra, 2003).

In order to control for the gender effect, some studies have used a separate model for boys and girls, allowing the intercept and slope coefficient to be gender-specific (see Ilahi & Jafarey, 1999; Bhalotra, 2003. In these studies, most variables show a significant difference in results by gender. In most cases, a dummy is used to control for gender effects, with mixed results (see Mansuri, 2006; McKenzie & Rapoport, 2006; Hanson & Woodruff, 2003; Sherpa, 2011).

The vector of household characteristics comprises control variables including the number of school-going children (*No_child*), the number of earners in the household (*No_b.earners*), the mother's education level (*Mothedu*), the father's education level (*Fathedu*), and the gender (*Head gender*) and age of the household head (*Head age*).

We would expect households with more school-going children to have a lower level of child schooling since the available resources have to be divided among more individuals (Sherpa, 2011).

The gender of the household head is also an important control variable. Bhalotra and Tzannatos (2003) expect women-headed households to have fewer economic resources because, on average, the education level of women is lower than that of men and because women are more likely to face wage discrimination: on average, women are paid less in the labor market. Also, we would like to capture the role of women's decision-making in their children's education.

The age of the household head is used as an indicator of the household's lifecycle stage. For example, in some cases, the head of the household may be a grandparent and older household heads may have different attitudes toward education.

Parental education levels are expected to have a positive effect on child schooling. Educated parents are more likely to want schooling for their children, are more aware of the returns on education, and place more value on their children's schooling (Bhalotra, 2003; Miluka & Dabalen, 2008). Finally, educated household heads or parents may have higher incomes and be in a better position to devote more resources to their children's education.

In order to control for the wealth effect, we include monthly per capita consumption expenditure (*lnpcexp*). Household per capita expenditure is used in this case because it is less volatile than income. Using expenditure as a proxy for income implies that, over time, household expenditure is smoother than household income and reflects its permanent income (Bhalotra & Heady, 2003). Households with a higher monthly expenditure are expected to value child education more because they have greater resources available for schooling and attach less value to the child income foregone from being in school (Miluka & Dabalen, 2008).

The model also includes dummies for rural and urban regions. In most developing countries, the level of education is lower in rural areas, given the relative underdevelopment of market, social, economic and school infrastructure (Bhalotra, 2003). To capture these regional disparities, U_{ih} (*Region*) is used as a dummy variable equal to 1 if the household is in an urban area and 0 otherwise.

5. Results and Discussion

Section 5.1 discusses the results of the IV probit model examining the impact of remittances on child school enrollment. Section 5.2 presents the results of the IV censored ordered probit model for the impact of remittances on child school attainment.

5.1. Impact of Remittances on Child School Enrollment

In the first stage of the IV probit model, we regress remittances on the instrument and control variables. In the second stage, the predicted value of the dependent variable and the residuals are used as independent

variables. The results of the first-stage regression are given in Table 2. The impact of the IV (the migrant network interacting with the number of adults in the household) has a significant, positive impact on remittances. The positive impact is significant for the overall sample and for the subsamples across region and gender.

Table 2: First-stage regression results for IV probit model

Variable	1	All	Male	Female	Urban	Rural
Migrant network * no. of adults in HH		0.142*	0.146*	0.138*	0.124*	0.149*
		(0.009)	(0.012)	(0.009)	(0.022)	(0.009)
Gender_child		0.001	–	–	0.002	-0.0002
		(0.001)			(0.002)	(0.001)
Age_child		-0.001	-0.001	-0.0009	0.0003	-0.001
		(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Age2_child		0.0001	0.0001	0.00006	-7.31e-06	0.0001
		(0.00006)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Fathedu		-0.003*	-0.002*	-0.003*	-0.001	-0.004*
		(0.003)	(0.001)	(0.001)	(0.001	(0.001)
Mothedu		-0.002	-0.001	0.0008	-0.0008	0.0007
		(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Head gender		-0.187*	-0.174*	-0.198*	-0.218*	-0.151*
		(0.008)	(0.001)	(0.012)	(0.068)	(0.012)
Head age		0.0004	-0.0003**	0.0005*	-0.0003	0.0006*
		(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0001)
No_child		-0.0001*	-0.0002	0.00007	0.001**	-0.0007*
		(0.0002)	(0.001)	(0.001)	(0.002)	(0.001)
No_b.earners		-0.007*	-0.006*	-0.007*	-0.009*	-0.006*
		(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Lnpcexp		0.017*	0.016*	0.018*	0.016**	0.017*
		(0.004)	(0.004)	(0.005)	(0.006)	(0.005)
Region		-0.005*	-0.003	-0.009**	–	–
		(0.002)	(0.002)	(0.002)		
No. of adults	0.003					
	(0.004)					
Sample size	31,392	31,392	16,639	14,753	11,502	19,890

Notes: * significant at 1%, ** significant at 5%, *** significant at 10%.
Standard errors are given in parentheses (clustered at PSU level).
The dependent variable is remittances (binary, = 1 if the household receives remittances).
Source: Authors' calculations.

Table 3 presents the results of the IV probit model and the marginal effects of these variables on school enrollment. The results show that remittances have an overall significant, positive impact on child school

enrollment. Children from remittance-receiving households have a 34 percent higher chance of enrolling in school compared to children from nonrecipient households. A separate gender analysis shows that the impact is stronger for girls. The impact of remittances is 13 percentage points higher for girls' enrollment in school than boys.

Table 3: IV probit model results for child school enrollment: overall, by gender, by region

Variable	All	Male	Female	Urban	Rural
Remittances	0.340*	0.281*	0.410*	0.188*	0.436*
	(0.015)	(0.012)	(0.022)	(0.015)	(0.022)
Gender_child	0.138*	–	–	0.053*	0.178*
	(0.008)			(0.008)	(0.010)
Age_child	0.313*	0.309*	0.308*	0.251*	0.324*
	(0.006)	(0.007)	(0.011)	(0.007)	(0.009)
Age2_child	-0.015*	-0.014*	-0.015*	-0.012*	-0.016*
	(0.0003)	(0.000)	(0.000)	(0.000)	(0.000)
Fathedu	0.059*	0.056*	0.061*	0.038*	0.067*
	(0.003)	(0.004)	(0.004)	(0.004)	(0.005)
Mothedu	0.080*	0.052*	0.109*	0.061*	0.084*
	(0.012)	(0.008)	(0.019)	(0.005)	(0.030)
Head gender	0.057	0.037	0.077	0.072	0.023
	(0.054)	(0.061)	(0.074)	(0.075)	(0.084)
Head age	0.0007***	0.001*	0.0006	0.001*	0.0003
	(0.0004)	(0.0004)	(0.0006)	(0.005)	(0.0005)
No_child	-0.010*	-0.005*	-0.015*	-0.008*	-0.010*
	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)
No_b.earners	-0.026*	-0.037*	-0.013**	-0.030*	-0.023*
	(0.003)	(0.004)	(0.005)	(0.004)	(0.004)
Lnpcexp	0.079*	0.076*	0.065*	0.084*	0.056*
	(0.011)	(0.016)	(0.019)	(0.020)	(0.021)
Region	0.107*	0.058*	0.154*	–	–
	(0.008)	(0.013)	(0.018)		
Wald test of exogeneity	44.87*	41.55*	24.98*	11.00*	37.23*
F-statistics	648	368	287	190	464
Sample size	31,392	16,639	14,753	11,502	19,890

Notes: * significant at 1%, ** significant at 5%, *** significant at 10%.
Standard errors are given in parentheses (clustered at PSU level).
The dependent variable is school enrollment (binary, = 1 if the child is currently enrolled).
Source: Authors' calculations.

The literature shows that the impact of remittances on child school enrollment is not uniform across regions (see Sherpa, 2011; Mansuri, 2006;

Miluka & Dabalen, 2008). A regional segregation (rural and urban samples) shows that remittances have a stronger impact on children living in rural areas. In terms of marginal effects, remittances increase the likelihood of rural children being enrolled in school by 43.6 percent, which is about 24 percentage points more than for urban children. This means that remittances help to reduce the gender and regional gap in school enrollment in Pakistan.

Our results support the findings of previous studies conducted on Pakistan. Arif and Chaudhry (2015) find that the migration impact on school enrollment is positive and significant for younger children, but insignificant for older children. Similarly, Mansuri (2006) shows that migration has a positive effect on school enrollment. Our results also support her finding that migration reduces the gender gap in school enrollment.

The results for the other control variables are in accordance with what we would expect and conform to the literature. The impact of child gender is significant and positive: boys are more likely to attend school than girls. This may be because people are biased toward boys' education (Mansuri, 2006). The coefficient of the age variable is positive and that of age-squared is negative and significant. The relationship is quadratic in the case of child age, which implies that, up to a point, age increases the probability of attending school. Thereafter, it decreases the probability of school attendance because, as the child grows older, the opportunity cost of education also increases.

The coefficients of the mother and father's level of education are significant and positive, but the coefficient of the mother's education is higher than that of the latter. For the girls' sample, the impact of parental education is significantly greater, which means that better educated parents place more value on girls' education and vice versa. The higher value of the mother's education for the girls' sample means that households with educated mothers are more likely to send their daughters to school.

The coefficient of the number of children is negative and significant: families with more children have lower rates of school attendance. The positive coefficient of per capita expenditure indicates that families with more resources are more likely to send their children to school. The positive coefficient of region indicates that children living in urban areas are more likely to enroll in school. This may be because urban households value education more than their rural counterparts or because urban areas provide more opportunities to enroll.

5.2. Impact of Remittances on Child School Attainment

A censored ordered probit model is estimated to gauge the impact of remittances on child school attainment. In the first stage, we regress remittances on the instrumental and control variables. In the second stage, the predicted value of the dependent variable and the residuals are used as independent variables. The results of the model for the overall sample and subsamples across gender and region are presented in Tables 4–5. Table 4 gives the first-stage results, where remittances are regressed on the IV (the migrant network interacted with the number of adult male members in the household) and other control variables.

Table 4: First-order results for IV censored ordered probit model

Variable	All	Male	Female	Urban	Rural
Migrant network * no. of adults in HH	1.020*	1.073*	1.004*	1.182*	0.975*
	(0.030)	(0.039)	(0.047)	(0.064)	(0.034)
Gender_child	0.013	–	–	0.097	-0.023
	(0.046)			(0.074)	(0.059)
Age_child	-0.049	-0.052	-0.036	0.021	-0.072
	(0.048)	(0.064)	(0.073)	(0.075)	(0.064)
Age2_child	0.002	0.002	0.001	-0.001	0.003
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Fathedu	-0.080*	-0.058*	-0.112*	-0.040***	-0.112*
	(0.015)	(0.020)	(0.024)	(0.023)	(0.021)
Mothedu	0.033***	0.025	0.043	0.015	0.056***
	(0.019)	(0.025)	(0.029)	(0.025)	(0.032)
Head gender	-1.066*	-1.026*	-1.120*	-1.327*	-0.821*
	(0.105)	(0.145)	(0.155)	(0.145)	(0.160)
Head age	0.012*	0.009*	0.016*	0.003	0.018*
	(0.001)	(0.002)	(0.002)	(0.003)	(0.002)
No_child	-0.042*	-0.026	-0.070*	-0.032	-0.046*
	(0.013)	(0.017)	(0.022)	(0.023)	(0.017)
No_b.earners	-0.202*	-0.202*	-0.199*	-0.309*	-0.166*
	(0.022)	(0.029)	(0.033)	(0.042)	(0.025)
Lnpcexp	0.366*	0.324*	0.428*	0.328*	0.416*
	(0.054)	(0.070)	(0.080)	(0.069)	(0.079)
Region	-0.134**	-0.075	-0.215**	–	–
	(0.052)	(0.069)	(0.081)		
Sample size	21,046	12,059	8,987	9,046	12,000

Notes: * significant at 1%, ** significant at 5%, *** significant at 10%. Standard errors are given in parentheses.
The dependent variable is remittances (binary, = 1 if the household receives remittances).
Source: Authors' calculations.

The impact of the IV is positive and significant. The results for the other variables concur with theory and past research. From the first-stage regression, we use the predicted value of remittances in the second stage of the model. The results show that the negative impact of remittances becomes stronger and significant (Table 5). This means that children from migrant households (receiving remittances) are less likely to complete a higher level of schooling. Moreover, they are more likely to drop out of school when moving from a lower to a higher grade. The gender analysis shows that girls living in remittance-receiving households are less likely to attain a higher level of schooling. The impact of remittances on child school attainment is insignificant in the urban sample, but the negative impact of remittances on child school attainment is significant in the rural sample.

Table 5: IV censored ordered probit model results for child school attainment: overall, by gender, by region

Variable	All	Male	Female	Urban	Rural
Remittances	-0.506*	-0.363**	-0.703*	-0.304	-0.577*
	(0.150)	(0.151)	(0.201)	(0.240)	(0.171)
Gender_child	0.034***	–	–	-0.026	-0.031
	(0.019)			(0.033)	(0.026)
Age_child	0.786*	0.791	0.781*	0.770*	0.810*
	(0.025)	(0.030)	(0.038)	(0.038)	(0.031)
Age2_child	-0.012*	-0.013*	-0.012*	-0.008*	-0.015*
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Fathedu	0.045*	0.045*	0.045**	0.035*	0.045*
	(0.008)	(0.007)	(0.012)	(0.011)	(0.010)
Mothedu	0.090**	0.069*	0.114**	0.053*	0.194***
	(0.041)	(0.011)	(0.048)	(0.012)	(0.109)
Head gender	-0.034	-0.110	0.039	0.072	-0.088
	(0.136)	(0.121)	(0.165)	(0.155)	(0.139)
Head age	0.002**	0.002	0.002	0.003**	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
No_child	0.006	-0.019*	-0.011	0.001	0.009
	(0.007)	(0.007)	(0.009)	(0.011)	(0.009)
No_b.earners	-0.010	-0.012	-0.006	-0.009	-0.011
	(0.012)	(0.010)	(0.020)	(0.018)	(0.014)
Lnpcexp	0.153*	0.195*	0.098*	0.201*	0.174*
	(0.020)	(0.017)	(0.028)	(0.019)	(0.056)
Region	-0.033	0.001	-0.074	–	–
	(0.067)	(0.0267)	(0.087)		
Sample size	21,046	12,059	8,987	9,046	12,000

Notes: * significant at 1%, ** significant at 5%, *** significant at 10%.
Standard errors are given in parentheses (clustered at PSU level).
The dependent variable is school attainment, which is a categorical variable.
Source: Authors' calculations.

Miluka and Dabalen (2008) report the negative impact of migration on school attainment in Albania. Acosta, Fajnzylber, and Lopez (2008) also find that remittances have a negative effect on child school attainment in some Latin American countries. For Pakistan, Arif and Chaudhry (2015) show that the impact of migration on children's accumulated years of schooling is positive for the overall sample aged 5–17 years and the subsample aged 12–17 but the results are negative when they do not control for district fixed effects in the analysis.

The impact of the other control variables on child educational attainment is the same as in the case of child school enrollment. Child age has a positive impact, but its square has a significant, negative impact on school attainment. Parental education has a positive impact on children's education. The mother's education coefficient is higher for the girls' sample than for the boys' sample, indicating the significant role of educated mothers in their children's – and especially their daughters' – education. Household expenditure affects child educational attainment positively, but the estimated impact is higher for rural areas.

Why does the remittances variable affect child schooling attainment negatively? The literature on migration and remittances points to many factors explaining why the impact of remittances should become negative (see McKenzie & Rapoport, 2006; Miluka & Dabalen, 2008). Remittances have a positive impact on educational attainment through the income effect, which eases the credit constraint of the household and increases opportunities for households to invest more in their children's education. Migrant remittances are a direct outcome of migration. Other outcomes of migration can have a negative impact on schooling, a key outcome being parental absence, which leaves children who may be enrolled in school without someone to supervise their education. This may induce earlier dropouts.

Lucas (2005) argues that migrant remittances encourage household investment in children's education, but migration itself can affect their schooling negatively. As Nasir et al. (2011) point out, in societies such as Pakistan where the father is largely responsible for his children and family members, his absence may affect schooling outcomes adversely when he is not there to supervise his children's social and work habits. Another negative impact of parental absence on children's education is that it may increase the responsibilities of school-going children, who might be compelled to spend more time on household chores or nonlabor work at the expense of their schoolwork.

On a larger scale, when working-age labor migrates abroad, the demand for child work carries higher remuneration, increasing the opportunity cost of education. This may induce school-going children to drop out and start working to bridge the short-term gap in the supply and demand of labor in their home country and to reduce the cost of migration.

Another important effect of migration is the incentive effect (see McKenzie & Rapoport, 2006), which affects child education negatively and can offset the positive impact of remittances. Children from migrant households might not migrate today, but may do so in the future. This prospect reduces the expected future returns on their education if they migrate for low skilled work. As a result, children from migrant households may be less likely to progress to higher levels of schooling than those from nonmigrant households.

Finally, the effect of migration on education may be negative if the remittances received are invested in the household's self-run business. In rural areas, where households often depend on their own labor supply, children may spend more time helping to run their family business. This is likely to induce dropouts among children who are currently enrolled.

6. Conclusion and Policy Recommendations

This study investigates the impact of migrant remittances on child school enrollment and attainment in Pakistan. This study is an effort to reinvestigate the issue by employing better econometric techniques such as controls for endogeneity and censored data for currently enrolled children. The analysis uses a recent, nationally representative dataset, the PSLMS for 2010/11. We disaggregate the whole sample by gender and region, looking at children aged 4–15 years. An IV probit model is used to analyze the impact of remittances on child school enrollment in Pakistan. For educational attainment, we use an IV censored ordered probit model. The IV technique is used to tackle the problem of endogeneity.

The results of the study suggest that the impact of remittances on child school enrollment is positive. Moreover, remittances have a strong impact on girls' enrollment. The separate analysis for rural and urban regions indicates that the impact is greater for the rural sample. Remittances are shown to increase school enrollment and reduce the gender gap in school enrollment, especially in rural areas.

The impact of remittances on child educational attainment is significantly negative for the overall and subsamples, except the urban sample. The negative impact is more pronounced for the girls' sample. Children in remittance-receiving households are less likely to progress from one level to the next. The negative impact of remittances on educational attainment may be due to the following outcomes of migration: parental absence, family disruption, labor market conditions and the incentive effect.

Parental education has a positive impact on children's education. The effect of the mother's education is more significant, especially for girls, suggesting that educated mothers play an important role in educating their children and reducing the gender gap in schooling. The control variable for the number of school-going children has a negative impact, which implies that larger households have lower levels of child education. Household income affects child schooling positively: families with more resources are more likely to invest in their children's education.

The study concludes that remittances have a positive impact on child enrollment, but a negative effect in the case of school attainment. The positive impact is unsustainable, given the higher dropout rate at higher levels of education where school attainment is concerned. Further investigation is needed to critically evaluate how best to channel remittances to maximize human capital accumulation in Pakistan. Moreover, the government must pay attention to increasing the returns on education compared to the returns on household enterprises.

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