CREB Working Paper No. 03-12

The Effects of External Migration on Enrolments, Accumulated Schooling, and Dropouts in Punjab

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Preface

The Centre for Research in Economics and Business (CREB) was established in 2007 to conduct policy-oriented research with a rigorous academic perspective on key development issues facing Pakistan. In addition, CREB (i) facilitates and coordinates research by faculty at the Lahore School of Economics, (ii) hosts visiting international scholars undertaking research on Pakistan, and (iii) administers the Lahore School's postgraduate program leading to the MPhil and PhD degrees.

An important goal of CREB is to promote public debate on policy issues through conferences, seminars, and publications. In this connection, CREB organizes the Lahore School's Annual Conference on the Management of the Pakistan Economy, the proceedings of which are published in a special issue of the *Lahore Journal of Economics*.

The CREB Working Paper Series was initiated in 2008 to bring to a wider audience the research being carried out at the Centre. It is hoped that these papers will promote discussion on the subject and contribute to a better understanding of economic and business processes and development issues in Pakistan. Comments and feedback on these papers are welcome.

Abstract

In developing countries, external migration tends to ease household income constraints because of the external remittances that are generated. Using data on the Punjab, this working paper attempts to determine whether the external migration of individuals in a household has a positive effect on children's schooling outcomes as measured by school enrolments, the accumulated level of schooling, number of days spent in school, and dropouts. We use historic migration rates to instrument for migration in an analysis of school outcomes for children aged 5–17, 5–11, and 12–17 to determine which group is most affected by external migration. The results show that external migration has a significantly positive impact on the school enrolments of younger children, whereas the accumulated level of schooling among older children increases significantly if there is an external migrant in their households.

Keywords: Migration, schooling, enrolments, Pakistan.

JEL classifications: I21, C26.

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1. Introduction

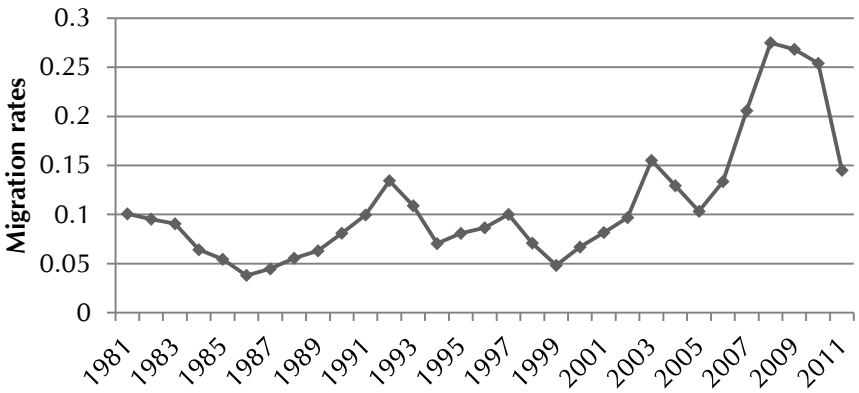
Despite the obvious benefits of education for socioeconomic development, the United Nation's statistics reveal that barely 63 percent of Pakistani children complete primary school education, while only 68 percent of Pakistani boys and 72 percent of Pakistani girls reach Grade 5 (United Nations Population Fund, 2009). One of the major reasons that Pakistan, like other developing countries, suffers from such a low level of private investment in education is due to liquidity constraints, which, in turn, can be the result of incomplete or missing credit markets (Jacoby, 1994; Jacoby & Skoufias, 1997). Therefore, remittances from migrants play a crucial role in easing, if not completely eliminating, such constraints.

Even though individuals migrate to improve their own living standards, a commonly asked question is how their migration affects their family members back home. Over the last 50 years, a significant number of people have emigrated from Pakistan, creating a vast network of migrants around the world, which, in turn, has reduced the formal and informal costs associated with migration. These networks reduce formal costs by sending back the remittances earned and informal costs by decreasing the barriers of asymmetric information regarding the opportunities in developed countries for labor in developing countries. According to international statistics, Pakistan falls within the top ten remittance-recipient countries (World Bank, 2006) and is also among the top ten immigration countries (World Bank, 2005). Additionally, Pakistan's net migration rate has always been negative, indicating that the emigration of individuals from Pakistan has always outweighed the immigration of individuals to Pakistan.

Data from the Bureau of Emigration and Overseas Migration suggests that 60 percent of the total number of people who migrated over time came from only 20 districts of Pakistan—mainly in northern Punjab, two districts from southern Punjab, Khyber Pakhtunkhwa, and Sindh (Arif,

2009) The historic migration rates for Punjab, calculated as the total number of people who migrated abroad divided by the total population of Punjab over time, are shown in Figure 1.

Figure 1: External migration rates for Punjab



Source: Government of Pakistan, Bureau of Emigration and Overseas Employment (2009); Government of Pakistan, Population Census Organization (1998).

Figure 1 shows that there have been fluctuations in the migration rate since 1981, and that it rose substantially in 2007–09 and declined drastically afterward.

The aim of this working paper is to explore the relationship between external migration and school enrolments in Pakistan. This will contribute to the debate on whether migration promotes human development in Pakistan through the stream of cash inflows generated via remittances, or whether remittances are spent merely on the consumption of goods and services together with households' leisure consumption, allowing us to understand which of the two effects dominate in the case of the Punjab. Our approach contributes to the existing literature by using historic migration rates in the Punjab as an instrument for an external migrant dummy.

The paper is structured as follows: This introduction is followed by a review of the literature. Section 3 puts forward a basic model of schooling. Section 4 presents an econometric model of schooling that incorporates external migration, together with the limitations of the specifications, the sources of the data used, and summary statistics.

Section 5 discusses the results of our estimations of the impact of historic migration rates on current migration. Section 6 presents the results of our estimations of the impact of external migration on enrolments, accumulated level of schooling, and days spent by a child in school last week. Section 7 reports the results of robustness checks, and Section 8 concludes the study.

2. A Review of the Literature

A large body of research has looked at the relationship between migration and remittances. Broadly speaking, this literature can be divided into three general categories: (i) studies that identify the determinants of migration, (ii) studies that examine the effects of migration on the overall development of countries, and (iii) those that review the effects of migration on educational attainment. Our paper is an extension of the last category and focuses on how external migration affects school enrolments and other educational outcomes.

Many analyses of migration have looked at factors affecting the decision to migrate. Authors such as Mincer (1978) and Hoddinott (1994) take migration as a dependent variable, present models that give the possible determinants of migration, and discuss how an individual's decision to migrate depends not only on his/her utility function but also on the family's utility function. Therefore, the decision to migrate is an outcome of both the individual's and household's utility function (Hoddinot, 1994; Rapoport & Docquier, 2005; Stark & Lucas, 1988). According to Hoddinott (1994), the level of remittances is influenced by a parent's ability to reward good behavior through the promise of bequests. In poor countries, migration is financed mostly by contributions from the resources of other family members. Thus, the migrant compensates for this investment by remitting to his/her household or family members. This argument is supported by the fact that the migrating member of the family usually remits to his/her household or family members.

Another branch of the literature looks at how migration eases constraints and improves opportunities in migrants' home countries. This is brought about by enhanced standards of living and is achieved mainly by reducing poverty, increasing employment and health expenditures, and bringing about improvements in education directly and indirectly via

remittances. Macroeconomic analyses by Russell (1992), Taylor, Arango, Hugo, Kouaouci, Massey, and Pellegrino (1996a, 1996b), Massey and Basem (1992), and Martin (1990) across countries indicate that these remittances are used for daily expenses such as food and clothing, and that they compose a significant portion of these households' income. Instead of being spent on education, healthcare, and small businesses, remittances are spent on building or improving housing, and buying land, cattle, or consumer goods.

Using a simple ordinary least squares (OLS) analysis, Adams (1998) studies the relationship between remittances and rural asset accumulation in Pakistan, and concludes that these households are less inclined to sacrifice their present consumption. Other studies, however, have found evidence supporting the argument that the remittances collected by a migrant's household are used consciously in productive investments since they are taken as an uncertain stream of income. Studies carried out by Adams (2005), Conway and Cohen (1998), and Kugler (2006) indicate that (i) females in the migrant's household have more influence in making decisions about capital inflows, (ii) villagers gain more experience by working outside, and (iii) overall, migration is the "lesser evil" despite the fact that family life may be disrupted by an absent family member. Essentially, migration creates high labor demand in the home market, thus increasing job opportunities for people who have not migrated.

Since this working paper analyzes the effect of migration on primary school enrolment in Punjab, it is important to link the decision to migrate with those concerning enrolments and schooling. The classical model of human capital investments over the life cycle formulated by Ben-Porath (1967) shows how the benefits of schooling change over time. The model suggests that the production function of human capital is concave and that the opportunity cost of allocating time to further skill acquisition increases as skills accumulate over time. Therefore, the marginal returns associated with schooling diminish over time. Moreover, a finite life span limits the time period available to capture returns from schooling as age increases. Hence, as age increases, the marginal returns to time in school tend to decrease after a specific age.

Becker (1991) has similarly argued that if, early in life, the present value of the return is sufficiently high relative to its current marginal cost, children will choose to study. Using a household production framework,

Becker and Tomes (1976) build on Ben-Porath (1967) and discuss how the educational decision-making process is important to household welfare. According to them, parents are altruistic in nature and their utility depends on that of the entire family. Parents' primary concern, however, is to maximize family wealth and, hence, to invest more in children if these children have higher academic potential and are likely to earn higher wages in future to support their parents. Likewise, the amount that poorer parents invest in their children's education will be smaller than the optimal, but the amount being invested will rise with an increase in the level of parents' income.

Another theory put forward by Sawada and Lokshin (2001) discusses how parents may end up choosing "winners" and allocate more resources toward their education. As an initial theoretical framework to account for this aspect of household behavior, the authors employ two sets of optimal behavioral rules. First, for the inter-temporal allocation of resources, parents decide to maximize the expected total lifetime utility of their family. Second, given an overall resource constraint, parents choose an optimal allocation of educational resources among their children.

Building on the theoretical analyses above, researchers have also empirically estimated the effect of external migration and remittances on enrolments in different countries. Acosta (2006) presents microeconomic evidence on the economic effects of remittances on household spending decisions. Average estimates suggest that young girls and boys (under 15 years of age) from remittance-recipient households are more likely to be enrolled in school. He concludes that remittances can affect household labor supply and investment in children's human capital. The study's results also suggest that, when differentiated on the basis of demographic groups, young girls and boys—11–14 years old—are seen to benefit from remittances in terms of higher enrolment rates, but that this positive impact does not apply to older—15–17-year-old—boys.

Remittances are also found to act as a substitute for child labor, resulting in higher school dropout rates. Mansuri (2006), Edwards and Ureta (2003), Hanson and Woodruff (2003), and Alcaraz, Chiquiar, and Salcedo (2012) have conducted similar studies for different countries and concluded that there is a positive relationship between primary enrolments and migration. Children receiving remittances with parents

who had attained low levels of schooling showed low levels of retention. Children in households with migrants were able to complete more years of schooling, although their parents had low levels of education. Empirical estimates also show that the remittances crisis has had a negative and significant effect on children's schooling and a positive and significant effect on child labor.

Our analysis is relatively unique in that we have used historic migration rates as an instrument in our analysis of the impact of migration on school enrolment, as well as an improved set of explanatory variables to account for the variations in schooling outcomes.

3. A Basic Model of Schooling

The theory we use builds on that used by Sawada and Lokshin (2001), who employ a standard investment model of education as a benchmark and apply it to Pakistan. Their model draws on work by Levhari and Weiss (1974) and Jacoby and Skoufias (1997) on human capital investment under uncertainty. They extend the Jacoby and Skoufias model to a generalized form with multiple children. Essentially, risk, uncertainty, and constraints to insurance and credit influence poor Pakistani families' investment and consumption decisions. Therefore, Sawada and Lokshin formalize human capital accumulation in rural Pakistan as households' sequential schooling investment decisions under uncertainty and credit constraints. The model is derived for Pakistan and further adapted by adding to it, additional sets of variables.

As per Sawada and Lokshin's (2001) model, let us assume that a household with n children chooses household consumption C and schooling for child i, S_i, so as to maximize the household's aggregated expected utility with a concave instantaneous utility function, $U(\bullet)$, given the information set at the beginning of time t, Ω_t. The information set Ω_t includes initial asset ownership and the entire history of household variables. Therefore, the household's problem can be represented as

$$MaxE_{\{C_t,S_{it}\}}\left\{\sum_{k=0}^{T-t}\beta^k U(C_{t+k})+\beta^{T+1}W(A_{T+1},H_{1T+1}^{C},H_{2T+1}^{C},...,H_{nT+1}^{C})\middle|\Omega_t\right\} \qquad (1)$$

where $B\geq 0$, and H^p, A_0, and B_0 are given. In this problem, the objective function includes a concave function, $W(\bullet)$, which comprises a financial bequest and the salvage value of the final stock of the child's

human capital. The parameter β represents the discount factor. The above household utility function is then maximized, given the following constraints:

$$A_{t+1} = A_t + Y_t(H^p) + \sum_{i=1}^{n} W(1 - S_{it}) - C_t(1 + r_t) \quad (2)$$

$$H_{it+1}^{C} = H_{it}^{C} + \sum_{i=1}^{n} [f(S_{it}, q_{it}) + e_{it}] \text{ where } i = 1,2,...,n \quad (3)$$

$$A_t + Y_t(H^p) + \sum_{i=1}^{n} Wi(1 - S_{it}) + B \geq C_t \quad (4)$$

The first constraint, equation (2), is the household's inter-temporal budget constraint. The household's consumable resources in each period comprise assets, A, where $A_T \geq 0$; stochastic parental income, Y, which is a function of parents' human capital H_p; and total child income, $\Sigma W_i(1 - S_{it})$, with W_i being the child-specific wage rate.

The second constraint, equation (3), is the human capital accumulation equation. The human capital production function, $f(\bullet)$, includes the variable q, which represents the school supply-side effect, the gender gap, and subjective factors. Among others, the variable q is a function of a time-invariant gender dummy variable that takes the value of 1 if the child is female and 0 if the child is male. Lastly, there is an additive stochastic element, e, which incorporates possibilities of exogenous shocks such as the risk of job mismatching after schooling and poor market conditions, etc. We assume that e is a stochastic error term, therefore $(e_{it} | \Omega_t) = 0$ for all i.

The third constraint—equation (4)—represents the potentially binding credit constraint where B is the maximum amount of credit available to the household. According to Sawada and Lokshin (2001), this stochastic programming model has $n+1$ state variables: physical assets, A, and child human assets, $H_i^C, i = 1,2,...,n$. When income is stochastic, analytical solutions to this problem—even without human capital—cannot be derived in general (Zeldes, 1989). The standard first-order conditions are derived to calculate the optimum conditions. Hence, the Kuhn-Tucker conditions are applied to the standard Bellman equation. The arguments below use the first-order conditions of the above problem.

Under credit market imperfections, the household's shadow interest rate is determined endogenously; it is given by the marginal rate of substitution of consumption over time because the separability between consumption and schooling investment decisions breaks down as indicated by equation (5) below. This implies that, once the constraint becomes binding—that is, once households are unable to save and borrow money freely—then schooling decisions over time are not independent of consumption decisions. The equalization of the marginal rate of transformation with the marginal rate of substitution would give the optimal condition, which is

$$\frac{\frac{\partial f}{\partial S_{it}}}{\frac{\partial f}{\partial S_{it}} - 1} = \beta E_{t-1}\left[\frac{\partial U}{\partial C_t} \Big/ \frac{\partial U}{\partial C_{t-1}}\right], \forall i \tag{5}$$

$$S_{it}^{*} = X_{it}\beta^{C} + S_{-it}^{*} + \varepsilon_{it}, \forall i \tag{6}$$

According to equation (6) above, the optimum decision for child i is conditional on the decision made for all other children in that household. The optimal choice for child i's schooling, S_i^*, depends on S_{-I}^*, where S_i^* is the schooling decision made for child I and S^* is the optimal schooling decision made for a child other than i. X includes the gender indicator variable, the access-to-school variable, and household-specific characteristics such as educational investments and the ownership and accumulation of human and physical assets, etc. In contrast to a household with perfect credit availability, where the parents' income does not affect the child's schooling, a household facing credit constraints would associate high marginal costs with its children's schooling if it were to experience a negative income shock. This reflects that consumption and schooling decisions are not separable under a binding credit constraint.

Based on the model above, one can conclude that, in developing countries such as Pakistan, where the limited-income constraint is the most important concern of individuals in their everyday life, decisions such as that of their children's schooling are indeed influenced by household income. Additionally, other factors such as children's own characteristics, household characteristics, and geographical and demographic indicators play an important role in determining their schooling.

4. A Model for Estimating the Impact of External Migration on Enrolments

4.1. A Schooling Model Incorporating External Migration

In order to derive an econometric model for the schooling of a child in Pakistan, we start with a simplified version of equation (6) (Section 3):

$$S_{it}^{*} = X_{it}\beta_{t} + \mu_{it} \tag{7}$$

where S_{it}^{*} is a dummy dependent variable that takes the value of 1 if the child attends school and 0 otherwise; and X_{it} includes the gender indicator variable, school supply variables, determinants of the household's preferences, household shock variables, and sibling composition. Therefore, unlike other economic decisions, the schooling decision is not based on a simple cost–benefit analysis (see Acosta, 2006; Edwards & Ureta, 2003; Hanson & Woodruff, 2003; Mansuri, 2006). Both household and geographical characteristics—the distance from the house to the school and whether the household lives in a remote area—together with the child's own characteristics are important in determining whether or not that child will be enrolled in school, especially in a developing country (see Edwards & Ureta, 2003; Hanson & Woodruff, 2003).

Since the dataset being used in this case is cross-sectional, so is the variation in schooling enrolment that will be incorporated in the model. Children with different characteristics such as age, gender, and ability will have different outcomes for enrolment. Even a simple cost–benefit analysis indicates that parents associate higher benefits with children who show higher ability. An unobserved characteristic could, however, be partially observed by incorporating parents' education in the model since parents' education is a correlate of children's ability—educated parents are more likely to have higher-ability children (as an inherited characteristic). In the context of developing countries, gender disparity is also a major concern, and a child's gender plays a vital role in his/her schooling decision process. Consequently, we also add a gender dummy to the model.

The bulk of the literature refers to school enrolment as a function of household characteristics. These include observed characteristics such as household income and level of education, but characteristics such as parents' ability are only partially observed, and others, such as parents' preferences, are unobserved. We therefore add all observed and partially observed household characteristics such as parents' education, age, and status to the final model. The number of siblings and their respective ages, which act as a resource constraint to parents, also plays an important role in the decision making process and are included in the model.

In addition to the variables discussed in equation (7), there are several ways in which household composition can affect the child's enrolment. Disruptions to family life in single-parent- or divorced-parent-households may affect the resources they devote to educating their children (Hanson & Woodruff, 2003). We therefore add several variables to explain these disruptions, such as the presence of a female household head or whether or not the parents are divorced.

Based on the discussion above, we will estimate the following equation:

$$S_{ghi} = \beta_1 M_{ghi} + \beta_2 C_{ghi} + \beta_3 X_{hi} + \beta_4 B_{ghi} + \mu_{ghi} \quad (8)$$

Equation (8) incorporates those factors that affect the measure of schooling attained by child g from a given household residing in a given district. S_{ghi} is the measure of the child's schooling, and is equal to 1 if child g in household h and district i is enrolled and 0 otherwise. C_{ghi} is a vector of the child's characteristics, X_{hi} is a vector of the household's characteristics, and B_{hi} is the child's gender. M_{ghi} is introduced to incorporate the effect of migration; this variable takes the value of 1 if the household includes a migrant and 0 otherwise.

A potential problem with this specification is that of endogeneity. Since unobserved household and district characteristics simultaneously influence both the decision to migrate and schooling decision, any OLS estimates would be biased. So, migration in this specification is an endogenous variable and an instrumental variable is required to obtain unbiased estimates.

Another point worth noting is that, in this empirical analysis, the migration coefficient could occasionally be capturing the combined effect

of household migration and remittance receipts, which are likely to work in opposite directions. Specifically, remittances are expected to ease investments in education by decreasing liquidity constraints. Additionally, household migration is thought to disrupt family life in ways that might impede educational investments or reduce the anticipated returns to the said educational investments. Considering that these two effects are expected to have opposite impacts on children's schooling, one has to understand that the results will show the impact of both.

In the estimation below, the equations used are based on the discussion above about the impact of easing the constraint on the schooling and other similar attributes of children such as accumulated level of schooling, the number of days spent last week in school, number of hours spent on household chores, and dropouts among children. The entire estimation procedure is repeated to measure the impact of migration on all the attributes mentioned above on age groups 5–17, 5–11, and 12–17, respectively, to determine whether migration affects older and younger children differently.

4.2. Specification Issues

Simple OLS estimations would give us biased coefficients for several reasons. First, there are several other children's and household characteristics that are unobserved—such ability and income shocks—and would result in omitted-variable bias. Second, certain characteristics of households and children could be correlated with the decision to migrate, resulting in an endogeneity problem. Third, if, while comparing socioeconomic and demographic characteristics, we were to establish that migrants differed from nonmigrants in terms of income, we would need to take corrective measures. The solutions to each of these problems are as follows.

4.2.1. Child's (Unobserved) Characteristics

As mentioned above, unobserved characteristics such as a child's ability would result in omitted-variable bias. To resolve this problem, we use parents' education as proxies. Dummy variables are used to indicate, respectively, if a child's father or mother has completed primary, secondary, or tertiary education.

4.2.2. Endogeneity of Migration Variable

The second and most important concern is the endogeneity of the migration variable. Certain variables omitted from the equation—such as market conditions—simultaneously affect the decision to migrate and send children to school; these are absorbed by the error term. Different authors have used different instrumental variables to resolve this problem. Bansak and Chezum (2009) use past literacy rates and political unrest, which suggests that, historically, districts with higher literacy rates have better job prospects due to agglomeration economies and, thus, individuals in these districts are less likely to migrate. Likewise, districts with political unrest have disrupted social networks. The presence of Western Union branches within a district during past years has also proved an important instrument for analysis (Amuedo-Dorantes & Pozo, 2007).

Acosta (2006) uses current migration rates calculated as the migration propensity of the county/village of residence to eliminate endogeneity. Mansuri (2006) uses the proportion of households that currently have a family member abroad—in the area of reference—as an instrument for migration. A better instrument suggested by Hanson and Woodruff (2003) is the historic migration rate of each village. Since some regions are more accustomed to sending migrants abroad for reasons other than income diversification—such as political unrest—this activity decreases the cost of future migration by establishing informal linkages between emigrants and their area members by decreasing the information barrier.

In this working paper, we use district-level data on historic migration rates in Punjab for the period 1980–2000 to create instruments, since previous migration networks facilitate current moves. These rates vary from one district to the next, but are constant for all households living in that district. One solution to the problem of constant rates across households in one district is for the historic migration rates to interact with a particular household characteristic that facilitates migration. Hanson and Woodruff (2003) are of the view that allowing district fixed effects to interact with mothers' education could explain these variations in the household's decision-making process—the better educated a mother, the less likely her husband is to migrate.

Mansuri (2006), however, argues that having the number of adult males in the household interact with the historic migration rate—which does not vary across districts—would prove a better instrument since

households with more adult males would face fewer security issues, in turn facilitating migration. She allows the historic migration rate to interact with the number of adult males in the household since the mother's education is highly correlated with the child's enrolment, which could also create an endogeneity problem.

4.2.3. Missing Families

Hanson and Woodruff (2003) raise the issue of "missing families," confining their analysis to rural areas where emigrants are more likely to leave their families behind. Urban emigrants tend to take their families with them, which results in missing families in the data (see Durand, Massey, and Zenteno, 2001; Marcelli & Cornelius, 2001; Massey, Arango, Hugo, Kouaouci, Pellegrino, & Taylor, 1993). Our data suggests that there are a significant number of urban households with external migrants. This means that missing families in urban areas do not create a problem and there are enough urban households with migrants to provide sufficient variation in the dataset to run regressions. We therefore conduct our analysis for both rural and urban areas.

A possible explanation for why Pakistan does not face the problem of missing families to as great an extent is that the majority of its labor force emigrates either to the United Arab Emirates or to developed countries such as the US or UK. The strict labor laws in the Emirates restrict individuals from taking their families with them, while many migrations to developed countries are illegal because of the high costs associated with it. These problems create barriers for migrants who might otherwise want to take their families with them.

4.2.4. Household Characteristics

Migrants' household characteristics, when compared to nonmigrants' households, show that there is a distinct difference between the two groups' income levels—migrants' households do not act as a random sample. We therefore have to add an income variable to the equation, but this variable acts as an endogenous variable since households make decisions concerning schooling and migration simultaneously, based on their income. This problem can be dealt with either by including an asset index (see Acosta, 2006) or simply by adding those assets the household already possesses, i.e., assets that do not depend on present

income and of which the migration decision is independent. We use both approaches in this working paper.

4.2.5. The Model with Specification Issues Resolved

Equation (8), therefore, uses historic migration rates—interacting with the number of adult males in the household—to instrument for migration. Similarly, in order to address the endogeneity of the income variable in the specification, we add household assets to the final equation, and derive the following econometric equation:

$$S_{ghi} = \beta_1 \widetilde{\widetilde{M}}_{ghi} + \beta_2 C_{ghi} + \beta_3 X_{hi} + \beta_4 B_{hi} + \mu_{ghi} \quad (9)$$

S_{ghi} is the schooling outcome, C_{ghi} is a vector of the child's characteristics, X_{hi} is a vector of the household's characteristics, B_{hi} is the child's gender and $\widetilde{\widetilde{M}}_{ghi}$ represents the fitted values of migration from the first-stage regression.

4.3. Data Sources

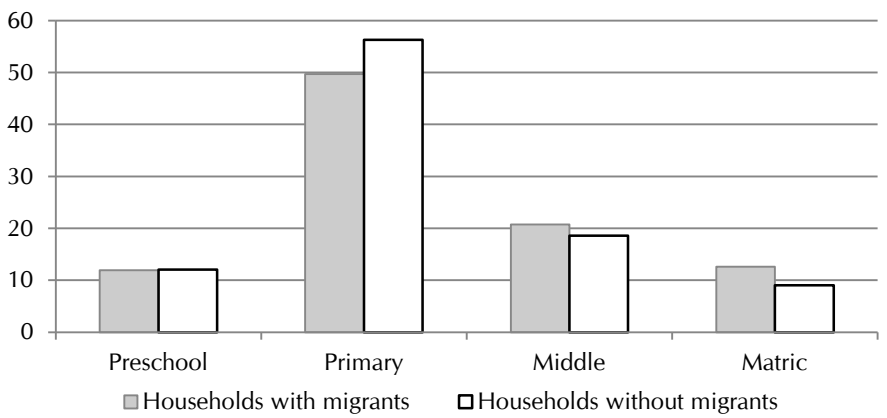
The data for this analysis has been taken from the Government of the Punjab's (2009) Multiple Indicator Cluster Survey for 2007/08—a household-level dataset for Punjab that is representative at the district and *tehsil* (district subdivision) level and comprises 91,075 households. We have also used unpublished data from the Bureau of Emigration and Overseas Employment in Pakistan (2009) to calculate historic migration rates by taking the average number of emigrating individuals at the district level and dividing this by the population in those districts. The historic migration rate then interacts with the number of adult males in each household in the given district to create an instrumental variable that varies at the household level, where the number of males was taken from the Multiple Indicator Cluster Survey.

4.4. Summary Statistics

4.4.1. Average Number of Children Going to School

The summary statistics reveal that there are some variations in the school level attended by children based on whether or not they come from migrants' households. Figure 2 shows that about 12 percent of children who come from households with migrants are enrolled in preschool with about the same figure for children who come from households without migrants. While about 50 percent of children from migrants' households attend primary school, the corresponding figure for children from households without migrants is 56 percent. Enrolments at matriculation level are almost 13 percent for children from households with migrants but 9 percent for children from households without migrants.

Figure 2: Percentage of children attending different levels of school in Punjab



Source: Authors' calculations based on data from Multiple Indicator Cluster Survey (Government of the Punjab, 2009) and Bureau of Emigration and Overseas Employment (2009).

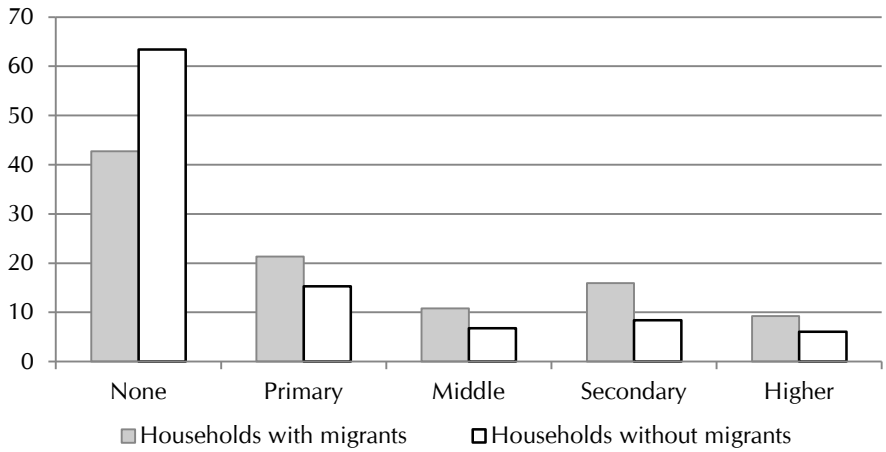
4.4.2. Household Mothers' Level of Education

Figure 3 shows how, on average, mothers' education varies significantly: Nearly 43 percent of mothers from households with migrants never enrolled in school as compared to 63 percent of mothers from households with migrants. As far as primary education is concerned, 21

percent of mothers who attended primary school came from families with migrants as compared 15 percent who did not.

The rate for mothers' education in families with migrants is 11, 16, and 9 percent for those who completed middle, secondary, and higher education, respectively. The corresponding figures for families without migrants are 7, 8, and 6 percent, respectively. This shows that, on average, mothers from households with migrants are more likely to be educated than those from households without migrants. The low percentage of 42 percent for mothers—from migrants' households—who have never attended school, relative to 63 percent for those from nonmigrants' households strengthens the argument that external migrants' households have better-educated mothers.

Figure 3: Education level of household mothers in Punjab



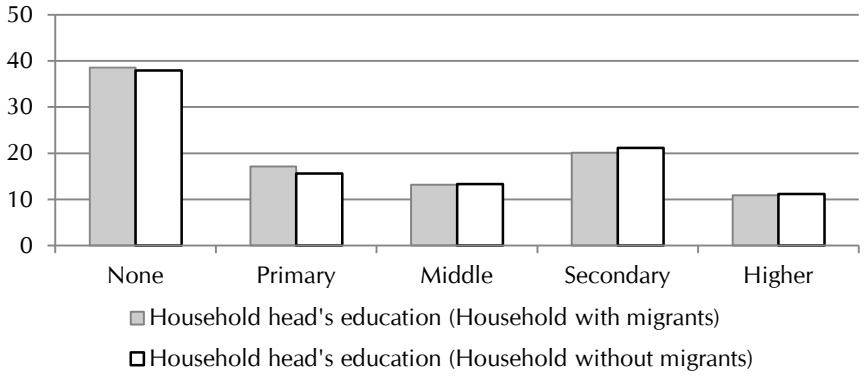
Source: Authors' calculations based on data from Multiple Indicator Cluster Survey (Government of the Punjab, 2009) and Bureau of Emigration and Overseas Employment (2009).

4.4.3. Household Heads' Level of Education and Profession

As Figure 4 shows, on average, almost 41 percent of household heads in migrants' households are unemployed, searching for a job, or engaged in domestic chores—that is, they have no source of primary income. In households without migrants, this figure drops to almost 10 percent.

If the household head is a government employee or is associated with a proper job or business, the chances of his/her having a migrant in the household is quite low—2.8 and 3.7 percent, respectively. This, in turn, supports the argument that the reason for an individual to migrate is to enhance his/her household's resources and decrease its constraints to credit.

Figure 4: Education level of household heads in Punjab

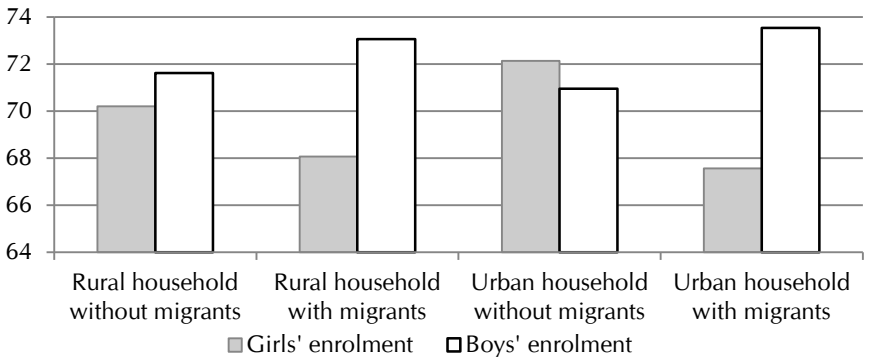


Source: Authors' calculations based on data from Multiple Indicator Cluster Survey (Government of the Punjab, 2009) and Bureau of Emigration and Overseas Employment (2009).

4.4.4. Average Enrolment of Children by Gender

As Figure 5 shows, girls from households with migrants have a significantly lower enrolment rate than that of boys. The enrolment of boys and girls from households without migrants is, however, not significantly different from one another. These statistics reinforce the argument that girls in migrants' households are likely to share in domestic chores at the cost of poor enrolment rates.

Figure 5: Average enrolment of children by gender in Punjab

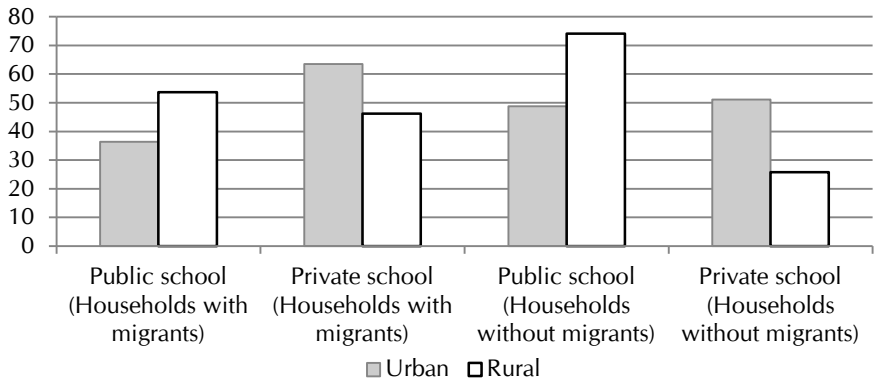


Source: Authors' calculations based on data from Multiple Indicator Cluster Survey (Government of the Punjab, 2009) and Bureau of Emigration and Overseas Employment (2009).

4.4.5. Average Enrolment in Public and Private Schools

The type of school is also very important in determining whether or not a child is likely to be enrolled. Figure 6 shows that 63 percent of enrolled students attend public, i.e., state-run, schools, while 37 percent go to private schools. About 42 percent of children from migrants' households in urban areas attend public schools, compared to 47 percent from those of non migrants. The corresponding figures for children attending private school are 58 and 54 percent, respectively.

Figure 6: Average enrolment in public and private schools in Punjab



Source: Authors' calculations based on data from Multiple Indicator Cluster Survey (Government of the Punjab, 2009) and Bureau of Emigration and Overseas Employment (2009).

The proportion of children enrolled in private school in rural areas is very low among those from households with and without migrants—46 and 26 percent, respectively, and 54 and 74 percent in public schools. The statistics show that, in both rural and urban areas, a high percentage of households with migrants send their children to private schools, whereas a comparatively high percentage of households without migrants send their children to public schools.

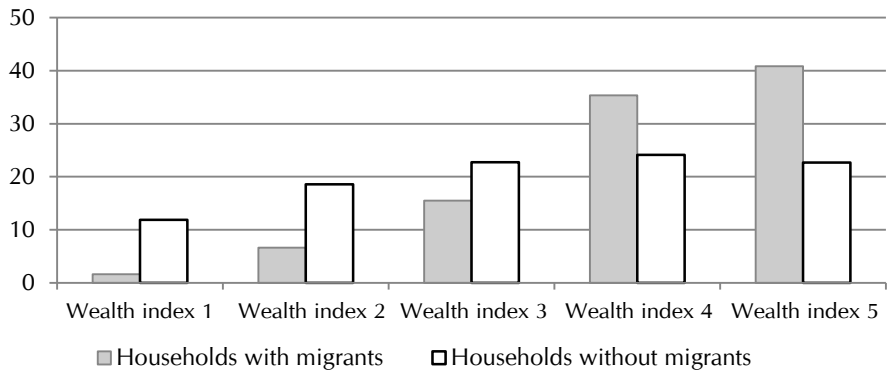
Another important point revealed by the statistics is that a high percentage of rural households send their children to public schools regardless of whether or not they have a migrant in their families. This could be accounted for by the low cost of schooling associated with public schools in terms of school fees and other factors.

4.4.6. Households' Wealth Index Quintile

For households, social status is also important when making the decision to migrate or to enroll a child in school. We use a wealth index to eliminate the endogeneity problem related with the household income variable—otherwise, any shocks in income can simultaneously affect the decision to migrate and enroll a child.

The wealth index is divided into five quintiles, from the lowest (poorest) to the highest (richest). Figure 7 shows that 12 percent of households without migrants fall in the lowest quintile of the wealth index. The percentage of households that fall in the lowest quintile decreases substantially to 2 percent for households with migrants. Among households without migrants, 19 percent fall in the second quintile whereas this figure is only 7 percent for households with migrants. The corresponding figures for the third quintile are 23 and 16 percent, for households without and with migrants, respectively.

Figure 7: Percentage of households in different wealth index quintiles in Punjab



Source: Authors' calculations based on data from Multiple Indicator Cluster Survey (Government of the Punjab, 2009) and Bureau of Emigration and Overseas Employment (2009).

The fourth and fifth quintiles represent the higher-income class of society. The statistics show that the collective majority of households with at least one external migrant lie in the fourth and fifth quintiles. About 36 percent of households with migrants lie in the fourth quintile; the figure rises to 41 percent in the fifth quintile. In the highest quintile, households without migrants account for 23 percent and for 23 percent in the fourth quintile. These statistics show that households with migrants and receiving remittances have access to greater resources and, hence, a better standard of living.

5. Estimating the Effect of Historic Migration Rates on Current Migration

The econometric specification we follow uses all the possible variables mentioned above that could affect the household's schooling decisions concerning its children. In the first stage, we estimate the impact of historic migration rates—interacted with the number of adult males in the household—on current migration. Note that this first stage remains the same for all the instrumental variable estimations mentioned in the previous section.[1] A priori, the current migration rate should be positively related to regional migration networks—i.e., the historic

[1] Regressions were run to check if there was a significant relationship between current school outcomes and the instrumental variable used for the analysis, because a good instrument would require that there be no relationship with the dependant variable. The results show that historic migration rates do not have any significant impact on current enrolments.

migration rate calculated at district level—since these networks strongly influence the current decision-making process of adults in those regions. This is because household characteristics are positively and consistently influenced by the gains from migration.

Table 1 gives the results for the first-stage regression. The migrant dummy is kept as a binary dependent variable, and district-level average historic migration rates for the period 1980–2000 interacted with the number of adult males in the household as the key explanatory variable in the specification. We also add to the specification all other variables that could influence the decision to migrate at the household level. These include the household head's age and age-squared, wealth indices, the household head's marital status and level of education, proportion of women working, and so forth.

The results from the simple OLS regressions are reported in the first and second columns of the table, which show that historic migration rates have a significant and positive relationship with having an external migrant in the household. The only difference between the two columns is that, in the OLS (1) specification, we add wealth indices to the specification, which deals with the fact that households with and without migrants are not random samples and, hence, variables that can distinguish between these households' social status and wealth need to be added. In the OLS (2) specification, the assets that each household possesses—rather than wealth indices—are added directly to the specification. The two specifications give approximately the same results and show a significant, positive relationship between the instrument and migration. The third column presents the results yielded by a probit analysis, where the coefficients are the marginal effects. These results reinforce the earlier result that the instrument is positively related to migration.

The other explanatory variables added to the specification also have the same signs as expected. The rural dummy has a significant, positive coefficient, indicating that individuals in rural areas migrate more so than those in urban areas because of their desire to improve their standard of living. The dummies for the wealth indices indicate that households who are among the higher-score indices tend to have an external migrant. The fourth column shows that individuals with better facilities such as a television, electricity, and so forth, tend to have an external migrant in their household. The proportion of women working

in a household decreases significantly if there is an external migrant in their household. This is also fairly consistent with the literature: If the proportion of women working in a household is higher, the probability of their having an external migrant in the household falls significantly as the need for migration decreases.

The household head's level of education and profession play an important role in determining whether male members are likely to choose to migrate. The results show that, if the household head has attained primary education, then there is a significantly high probability of having an external migrant in the household than in those with an uneducated head. The literature argues that better-educated household heads imply a greater awareness among such households of the opportunities available abroad; they would be more likely to send their family members abroad. However, migration in households whose heads have attained higher education is significantly lower than in those headed by uneducated individuals. This can be explained by the argument that highly educated household heads tend to have better opportunities in their home countries and, thus, are less likely to need to improve their standard of living through migration.

As the household head's age increases, the probability of his/her sending family members abroad decreases, but this effect diminishes as the person ages further. The coefficients' direction in the probit and OLS models was generally consistent with the literature. The dummy variables added for the profession of the household head in the regression indicate that, if the household head is a government employee or owns a private business, then the possibility of his/her household having an external migrant is significantly lower than that of those households with an unemployed head.

Table 1: Estimating the effect of historic migration rates on the migrant dummy

Dependent variable = 1 if there is an external migrant in the household	OLS (1)	OLS (2)	Probit (1)	Probit (2)
Number of adult males * average historic migration rate	4.761653***	6.686588***	1.821809***	2.804213***
	(0.471946)	(0.4809517)	(0.2564573)	(0.2721793)
Rural = 1	0.0519144***	0.0279441***	0.0170851***	0.0117522***
	(0.0038479)	(0.0040673)	(0.0015831)	(0.0021143)
Wealth index 2	0.0176122***	-	0.0621742***	-
	(0.0035141)		(0.0089763)	
Wealth index 3	0.0286561***	-	0.0794907***	-
	(0.0035282)		(0.0090346)	
Wealth index 4	0.0848196***	-	0.165182***	-
	(0.0038801)		(0.0134478)	
Wealth index 5	0.1546896***	-	0.3205208***	-
	(0.0053593)		(0.0240796)	
Married household head	0.080123***	0.0826849***	0.0181035***	0.0198425***
	(0.0045909)	(0.0046583)	(0.0014853)	(0.0015013)
Value of agricultural land owned	4.51e-12	2.92e-12	2.76e-12	2.41e-12
	(5.16 e-12)	(5.19 e-12)	(2.71 e-12)	(2.78 e-12)
Number of rooms in the house	0.0013146	0.0045243***	0.0005504	0.0024897***
	(0.0010488)	(0.001065)	(0.0006638)	(0.0006995)
Value of house owned	1.40 e-09**	2.00 e-09***	6.75 e-10**	8.33 e-10***
	(5.57 e-10)	(5.64 e-10)	(2.70 e-10)	(2.78 e-10)
Household head's gender (male = 1)	–0.3998146***	–0.4042105***	–0.3590238***	–0.383718***
	(0.0060193)	(0.0060714)	(0.0162192)	(0.0163884)

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Dependent variable = 1 if there is an external migrant in the household	OLS (1)	OLS (2)	Probit (1)	Probit (2)
Household head's age	–0.0071826***	–0.0072438***	–0.0026739***	–0.0028387***
	(0.0005137)	(0.0005294)	(0.0003294)	(0.0003466)
Household head's age-squared	0.0000845***	0.0000863***	0.0000324***	0.0000352**
	(4.86e-06)	(5.01e-06)	(3.01e-06)	(3.16e-06)
Household head's level of education if primary	0.0108956***	0.0138287***	0.0061144**	0.0104277***
	(0.0033522)	(0.0033895)	(0.0026067)	(0.0029049)
Household head's level of education if middle	0.0026338***	0.0048465	0.0013797	0.00525*
	(0.0034486)	(0.0034802)	(0.0025427)	(0.0028565)
Household head's level of education if secondary	–0.0054356***	–0.0014986	–0.0033749	5.38e-06
	(0.0031403)	(0.0031655)	(0.0021278)	(0.0023574)
Household head's level of education if higher	–0.0257753***	–0.0169949***	–0.0103228***	–0.0080037***
	(0.0042815)	(0.0043674)	(0.0023596)	(0.0027347)
Household head if government employee	–0.0244116***	–0.0258793***	–0.0141716***	–0.0141164***
	(0.0040563)	(–0.0041289)	(0.0021008)	(0.0022669)
Household head if private employee	–0.0036568	–0.004247	0.0018	0.0021113
	(0.0045842)	(0.0046507)	(0.0032817)	(0.0035149)
Household head if agriculturist	–0.0074228***	–0.0076244***	–0.0056748***	–0.0057853***
	(0.002553)	(0.0025947)	(0.0017622)	(0.0018601)
Household head if livestock owner	0.0019949	0.0049183	0.0097276*	0.0117848*
	(0.0081649)	(0.0082755)	(0.0063511)	(0.0069138)

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Dependent variable = 1 if there is an external migrant in the household	OLS (1)	OLS (2)	Probit (1)	Probit (2)
Total number of household members	–0.0078246***	–0.0093831***	–0.003206***	–0.0042923***
	(0.0006618)	(–0.0006805)	(0.0004518)	(0.0004898)
Total number of women (aged 15–49)	0.040853***	0.0429469***	0.0192612***	0.0215425***
	(0.0026921)	(0.0027306)	(0.0017044)	(0.0017809)
Proportion of working women	–0.0147761***	–0.0137542***	–0.0077925***	–0.0071589***
	(0.0026179)	(0.0026655)	(0.0021691)	(0.002267)
Total number of infants	0.0091721***	0.0090525***	0.004376***	0.004421***
	(0.0012492)	(0.0012756)	(0.000832)	(0.000883)
Total number of children (aged 5–17)	0.0016508*	0.0024494***	–0.0012317**	–0.0007727
	(0.0008836)	(0.0009022)	(0.0006107)	(0.0006489)
Constant	0.4107908***	0.4381186***	-	-
	(0.0145192)	(0.0152258)		
Number of observations	41,289	40,431	41,289	40,431
R-squared	0.1781	0.1717	-	-
Adjusted R-squared	0.1776	0.1711	-	-
Pseudo R-squared	-	-	0.259	0.2511
F-statistic (to test joint significance of excluded instruments)	343.86	253.82	-	-

Notes: * = p < 0.10, ** = p < 0.05, *** = p < 0.01. Standard errors are given in parentheses below estimates. In the OLS (2) and probit (2) columns, the assets that households use were added directly to the regression equation to incorporate the wealth effect. The coefficients indicate that both estimations yield the same results.
Source: Authors' calculations.

6. Estimating the Impact of External Migration on School Enrolment, Accumulated Level of Schooling, and Days Spent in School Last Week

6.1. Estimating the Impact of External Migration on School Enrolment

In the first part of our analysis, we estimate the impact of external migration on a child's school enrolment, using the equation

$$S_{ghi} = \beta_1 \widetilde{M}_{ghi} + \beta_2 C_{ghi} + \beta_3 X_{hi} + \beta_4 B_{hi} + \mu_{ghi} \quad (10)$$

where S_{ghi} is the schooling outcome, C_{ghi} is a vector of the child's characteristics, X_{hi} is a vector of the household's characteristics, B_{hi} is the child's gender, and $\widetilde{M}_{ghi}$ represents the fitted values of migration from the first-stage regression.

We first focus on children aged 5–17. Then, to test whether migration affects younger children differently, we divide the sample into two subsamples. Table 2 gives the results for the first hypothesis. The simple OLS results are given in columns 2, 6, and 10. The "IV reg" columns (3, 7, and 11) indicate those results yielded using an instrumental variable, while the "IV probit" column (4) gives the results yielded when a probit model is used with the instrumental variable to estimate the coefficients. District dummies are added to the IV probit with fixed effects in columns 8 and 12.

The results for the 5–17 age group show that external migration has a positive, significant relationship with school enrolments for children aged 5–17. This means that more children from households with migrants are enrolled in school than those from households without migrants. Columns 5, 9, and 13 give the results of the same analysis but without incorporating district fixed effects; in this regression equation, the external migrant coefficient becomes negative and insignificant.

The urban dummy becomes negative and significant if district fixed effects are eliminated from the specification, indicating that rural enrolment is high; this could be because of the higher rural population

compared to urban areas. The gender dummy—which takes the value of 1 if the child is male—has a positive, significant coefficient, which means that boys' enrolment is higher than that of girls, implying a gender bias. Likewise, the number of siblings of all ages is negatively related to school enrolments, which is also consistent with the literature.

The results for younger children—aged 5–11—indicate that external migration has a positive, significant impact on their school enrolment. All the other variables added to the specification show the same signs as they did for the first hypothesis and are consistent with the literature. For older children, we obtain the opposite results: The coefficient associated with the instrumental variable is not significant. Hence, external migration does not significantly affect the enrolment of older children. A plausible explanation for this result is that current migrations make it difficult for older children to enroll in that time period.

Table 2: Estimating the effect of external migration on school enrolments

Dependent variable: Child enrolled currently	Age group 5–17				Age group 5–11				Age group 12–17			
	OLS	IV reg	IV probit	IV probit *without* district FE	OLS	IV reg	IV probit *with* district FE	IV probit *without* district FE	OLS	IV reg	IV probit *with* district FE	IV probit *without* district FE
1	2	3	4	5	6	7	8	9	10	11	12	13
External migrant in household	0.187***	-0.165	4.079***	-1.107	0.0783	-0.502	5.028***	-0.955	0.203***	-0.0198	1.481	-1.590
	(0.0503)	(0.472)	(1.411)	(0.932)	(0.130)	(0.686)	(0.896)	(2.035)	(0.0540)	(0.346)	(1.316)	(1.475)
Household head's age	0.0112***	0.00104	0.0220***	0.00600	-0.0118	-0.00190	-0.0189***	-0.0160	-0.000172	-0.00118	0.00277	_
	(0.00379)	(0.00176)	(0.00380)	(0.00530)	(0.0103)	(0.00216)	(0.00574)	(0.0114)	(0.00416)	(0.00184)	(0.00628)	(0.00889)
Household head's age-squared	-0.0000964***	-0.00000729	-0.000235***	-0.0000351	0.000123	0.0000234	0.000229***	0.000171	-0.000137***	-0.0000334*	-0.000193***	-0.0000399
	(0.0000366)	(0.0000205)	(0.0000470)	(0.0000566)	(0.000101)	(0.0000273)	(0.0000554)	(0.000122)	(0.0000402)	(0.0000191)	(0.0000664)	(0.0000917)
Household head's gender = 1 if male	-0.0894*	-0.0707	1.082**	-0.482*	0.190	-0.151	-1.279***	-0.170	-0.134**	-0.0485	0.219	-0.639
	(0.0510)	(0.137)	(0.448)	(0.280)	(0.125)	(0.214)	(0.288)	(0.675)	(0.0550)	(0.0952)	(0.372)	(0.408)
Proportion of working women	-0.0667***	-0.0147**	0.00738	-0.0905***	-0.103***	-0.0121	-0.115***	-0.141***	-0.0585***	-0.0186***	-0.0398	-0.0839***
	(0.0155)	(0.00696)	(0.0394)	(0.0181)	(0.0357)	(0.0103)	(0.0239)	(0.0397)	(0.0172)	(0.00647)	(0.0270)	(0.0221)
Child's age	-0.122***	0.0788***	-0.0902***	-0.116***	0.598***	0.0283***	0.274	0.581***	-0.443***	0.0606**	-0.411***	-0.438***
	(0.0235)	(0.00207)	(0.0346)	(0.0236)	(0.101)	(0.00411)	(0.171)	(0.108)	(0.105)	(0.0263)	(0.113)	(0.103)
Child's age-squared	-0.00625***	-0.00514***	-0.00437**	-0.00610***	-0.0463***	-0.00209***	-0.0214*	-0.0449***	0.00519	-0.00473***	0.00434	0.00561
	(0.000924)	(0.0000907)	(0.00177)	(0.000927)	(0.00602)	(0.000261)	(0.0130)	(0.00678)	(0.00360)	(0.000916)	(0.00369)	(0.00350)
Child's gender = 1 if male	0.0992***	0.00946***	0.0652**	0.0973***	0.0683	0.00278	0.0463	0.0662	0.115***	0.0283***	0.109***	0.111***
	(0.0186)	(0.00245)	(0.0310)	(0.0184)	(0.0424)	(0.00225)	(0.0302)	(0.0413)	(0.0212)	(0.00537)	(0.0226)	(0.0219)
Total infants in household	-0.0430***	-0.00363	-0.0604***	-0.0300**	0.00333	0.00438	0.0461***	0.00935	-0.0560***	-0.0138***	-0.0631***	-0.0383**
	(0.00878)	(0.00372)	(0.00688)	(0.0126)	(0.0195)	(0.00584)	(0.0122)	(0.0265)	(0.00998)	(0.00347)	(0.0114)	(0.0181)
Total boys aged 5–9 in household	-0.0198*	-0.00528**	-0.0293***	-0.0143	-0.0654***	-0.000144	-0.00453	-0.0586**	-0.00880	-0.00182	-0.0128	-0.00159
	(0.0107)	(0.00223)	(0.00843)	(0.0112)	(0.0223)	(0.00335)	(0.0262)	(0.0258)	(0.0125)	(0.00335)	(0.0129)	(0.0134)

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Dependent variable: Child enrolled currently	Age group 5–17				Age group 5–11				Age group 12–17			
	OLS	IV reg	IV probit	IV probit *without* district FE	OLS	IV reg	IV probit *with* district FE	IV probit *without* district FE	OLS	IV reg	IV probit *with* district FE	IV probit *without* district FE
1	2	3	4	5	6	7	8	9	10	11	12	13
Total girls aged 5–9 in household	-0.0313***	-0.00601***	-0.0290***	-0.0282**	-0.0467**	0.000199	-0.00493	-0.0419*	-0.0362***	-0.00868***	-0.0333**	-0.0353***
	(0.0111)	(0.00160)	(0.0103)	(0.0110)	(0.0238)	(0.00284)	(0.0201)	(0.0250)	(0.0128)	(0.00330)	(0.0133)	(0.0125)
Total boys aged 10–17 in household	-0.0398***	-0.00451***	-0.0248*	-0.0405***	-0.0354*	-0.000491	-0.0121	-0.0333*	-0.0367***	-0.00999***	-0.0308***	-0.0438***
	(0.00804)	(0.00114)	(0.0131)	(0.00783)	(0.0183)	(0.000907)	(0.0145)	(0.0182)	(0.00911)	(0.00268)	(0.0115)	(0.00935)
Total girls aged 10–17 in household	-0.00264	-0.000603	0.00622	-0.00519	0.0193	0.000217	0.00298	0.0198	0.0000848	-0.00121	0.00544	-0.00837
	(0.00814)	(0.00143)	(0.00737)	(0.00824)	(0.0190)	(0.00107)	(0.0122)	(0.0189)	(0.00923)	(0.00273)	(0.0106)	(0.0112)
Household head if govt. employee	0.0926***	0.00798	0.155***	0.0635	-0.0728	-0.0119	-0.148***	-0.0941	0.122***	0.0222*	0.151***	0.0742
	(0.0327)	(0.0114)	(0.0270)	(0.0402)	(0.0807)	(0.0145)	(0.0436)	(0.0861)	(0.0354)	(0.0118)	(0.0433)	(0.0585)
Household head if private employee	0.0324	0.00284	0.0479**	0.00995	0.0554	-0.00173	0.0136	0.0325	0.0301	0.00600	0.0367	0.00457
	(0.0284)	(0.00463)	(0.0222)	(0.0290)	(0.0734)	(0.00492)	(0.0456)	(0.0745)	(0.0310)	(0.00784)	(0.0311)	(0.0324)
Household head if laborer	-0.0731***	-0.0117**	-0.0238	-0.0863***	-0.0701	-0.00620	-0.0807**	-0.0842	-0.0815***	-0.0266***	-0.0721**	-0.0921***
	(0.0233)	(0.00463)	(0.0345)	(0.0231)	(0.0555)	(0.00602)	(0.0320)	(0.0554)	(0.0260)	(0.00705)	(0.0284)	(0.0252)
Household head's education if primary	0.000930	0.00000169	-0.0231	0.0127	0.110**	0.00699	0.0781*	0.112**	-0.0187	-0.00536	-0.0258	-0.00124
	(0.0226)	(0.00422)	(0.0201)	(0.0231)	(0.0559)	(0.00465)	(0.0414)	(0.0549)	(0.0252)	(0.00701)	(0.0258)	(0.0277)
Household head's education if middle	0.0981***	0.0151***	0.0551	0.111***	0.0494	0.00458	0.0524	0.0602	0.111***	0.0306***	0.106***	0.122***
	(0.0259)	(0.00390)	(0.0368)	(0.0253)	(0.0628)	(0.00430)	(0.0364)	(0.0621)	(0.0286)	(0.00738)	(0.0294)	(0.0280)
Household head's education if secondary	0.253***	0.0330***	0.183***	0.261***	0.0285	0.00294	0.0293	0.0391	0.297***	0.0736***	0.295***	0.290***
	(0.0249)	(0.00318)	(0.0667)	(0.0259)	(0.0588)	(0.00278)	(0.0343)	(0.0572)	(0.0273)	(0.00690)	(0.0288)	(0.0415)

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Dependent variable: Child enrolled currently	Age group 5–17				Age group 5–11				Age group 12–17			
	OLS	IV reg	IV probit	IV probit *without* district FE	OLS	IV reg	IV probit *with* district FE	IV probit *without* district FE	OLS	IV reg	IV probit *with* district FE	IV probit *without* district FE
1	2	3	4	5	6	7	8	9	10	11	12	13
Household head's education if higher	0.481***	0.0418***	0.358***	0.482***	0.258***	0.00225	0.114	0.259***	0.516***	0.101***	0.504***	0.506***
	(0.0369)	(0.00443)	(0.121)	(0.0422)	(0.0932)	(0.00483)	(0.0942)	(0.0946)	(0.0398)	(0.00872)	(0.0474)	(0.0614)
Female bias	-0.0398	-0.0119	0.0440	-0.0605	-0.0393	-0.0133	-0.0869	-0.0724	-0.0120	-0.00355	0.0112	-0.0387
	(0.0523)	(0.0107)	(0.0550)	(0.0542)	(0.101)	(0.0170)	(0.0584)	(0.111)	(0.0601)	(0.0164)	(0.0640)	(0.0648)
Wealth index 2	0.108***	0.0125*	0.0302	0.116***	0.209***	0.0141**	0.159***	0.205***	0.0896***	0.0283***	0.0685*	0.109***
	(0.0269)	(0.00672)	(0.0498)	(0.0271)	(0.0540)	(0.00714)	(0.0567)	(0.0524)	(0.0318)	(0.0100)	(0.0398)	(0.0340)
Wealth index 3	0.251***	0.0330***	0.0802	0.271***	0.357***	0.0252	0.286***	0.359***	0.241***	0.0715***	0.198***	0.278***
	(0.0288)	(0.0124)	(0.103)	(0.0315)	(0.0620)	(0.0156)	(0.0824)	(0.0644)	(0.0333)	(0.0132)	(0.0608)	(0.0391)
Wealth index 4	0.455***	0.0667**	0.0959	0.495***	0.508***	0.0467	0.523***	0.531***	0.454***	0.130***	0.366***	0.518***
	(0.0326)	(0.0276)	(0.202)	(0.0497)	(0.0736)	(0.0393)	(0.0963)	(0.112)	(0.0371)	(0.0224)	(0.110)	(0.0616)
Wealth index 5	0.898***	0.121***	0.299	0.925***	0.874***	0.0676	0.825***	0.866***	0.894***	0.223***	0.758***	0.951***
	(0.0406)	(0.0409)	(0.357)	(0.0585)	(0.101)	(0.0580)	(0.169)	(0.143)	(0.0451)	(0.0324)	(0.173)	(0.0668)
Constant	3.474***	0.734***	1.068	3.886***	0.642	1.081***	1.714***	1.163	5.601***	0.773***	4.826***	6.147***
	(0.185)	(0.169)	(1.416)	(0.272)	(0.503)	(0.260)	(0.301)	(0.880)	(0.764)	(0.250)	(1.220)	(0.771)
Observations	69,273	69,286	58,355	69,286	39,193	39,429	37,858	39,429				
R-squared	.	0.194	.	.		.				0.147		
Adj. R-squared	.	0.194	.	.		.				0.145		
Pseudo-R-squared	0.312				0.115				0.154			

Notes: * = p < 0.10, ** = p < 0.05, *** = p < 0.01. Standard errors are given in parentheses below estimates. The district dummies, urban dummy, and the variables for the distance to public and private schools were also added to the model. The coefficients' signs are consistent with the literature.
Source: Authors' calculations.

6.2. Estimating the Impact of External Migration on Accumulated Level of Schooling

Since some economists believe that school enrolment is not an adequate measure of human capital, we also use the accumulated level of schooling acquired by a child, according to the following specification:

$$\textit{Accumulated level of schooling}_{ghi} = \beta_1 \widetilde{M}_{ghi} + \beta_2 C_{ghi} + \beta_3 X_{hi} + \beta_4 B_{hi} + \mu_{ghi} \quad (11)$$

where S_{ghi} is the schooling outcome, C_{ghi} is a vector of the child's characteristics, X_{hi} is a vector of the household's characteristics, B_{hi} is the child's gender, and $\widetilde{M}_{ghi}$ represents the fitted values of migration from the first-stage regression.

Table 3 presents the result of the regressions, with the accumulated level of schooling as the dependent variable for children from age groups 5–17, 5–11, and 12–17. The results for age group 5–17 are similar to those discussed in the previous section. Accumulated schooling appears to be affected significantly and positively by external migration. Likewise, the accumulated level of schooling in households headed by persons with a higher level of education is significantly higher than that of less educated or uneducated household heads. The same holds true for children whose households are headed by government employees compared to laborers or unemployed persons.

The results for the first subsample (aged 5–11) show that external migration does not have a significant impact on younger children when district fixed effects are added to the specification. Once these fixed effects are eliminated, however, the results yield a positive, significant coefficient for the external migrant variable. The coefficient of child age and child-age-squared is positive and significant, indicating that, as the child grows older, his/her level of accumulated schooling also increases. The distance-to-school variable only becomes significant when district fixed effects are eliminated from the specification.

The results for the older subsample (aged 12–17) are different from that of younger children. The regressions carried out without adding district fixed effects show that external migration has a significant, negative

relationship with older children's accumulated schooling. Once district fixed effects are added to the regression, the coefficient becomes positive and significant, indicating that external migration significantly improves older children's accumulated level of schooling.

Our results also show that among younger children, fewer males attain a higher level of education than females. Additionally, older children in households with a greater proportion of working women attain a significantly higher level of accumulated schooling, possibly indicating that such households are more aware of the job market and the opportunities associated with better education.

Table 3: Estimating the effect of external migration on accumulated level of schooling

	Age group 5–17			Age group 5–11			Age group 12–17		
Dependent variable: Accumulated level of schooling	**OLS**	**IV reg *with* district FE**	**IV reg *without* district FE**	**OLS**	**IV reg *with* district FE**	**IV reg *without* district FE**	**OLS**	**IV reg *with* district FE**	**IV reg *without* district FE**
External migrant in household	0.0222*	3.818**	-1.137***	-0.000737	-0.0639	0.459**	0.0556***	3.225***	-4.841***
	(0.0114)	(1.529)	(0.280)	(0.0114)	(1.781)	(0.208)	(0.0208)	(0.787)	(1.216)
Household head's age	0.00796***	0.0214***	0.00345**	0.00429***	0.00409	0.00580***	0.0120***	0.0253***	-0.0103*
	(0.00104)	(0.00567)	(0.00150)	(0.00105)	(0.00570)	(0.00126)	(0.00186)	(0.00413)	(0.00620)
Household head's age-squared	-0.0000606***	-0.000220***	-0.00000761	-0.0000300***	-0.0000274	-0.0000490***	-0.0000916***	-0.000235***	0.000149**
	(0.00000997)	(0.0000662)	(0.0000162)	(0.0000101)	(0.0000717)	(0.0000133)	(0.0000179)	(0.0000428)	(0.0000655)
Household head's gender = 1 if male	-0.0762***	1.029**	-0.429***	-0.0254*	-0.0452	0.117*	-0.112***	0.750***	-1.503***
	(0.0138)	(0.446)	(0.0862)	(0.0154)	(0.561)	(0.0692)	(0.0227)	(0.216)	(0.349)
Proportion of working women	-0.00852*	0.0445**	-0.0314***	-0.00279	-0.00373	-0.00589	-0.0113	0.0308**	-0.0827***
	(0.00448)	(0.0226)	(0.00620)	(0.00473)	(0.0271)	(0.00568)	(0.00767)	(0.0146)	(0.0213)
Child's age	0.115***	0.112***	0.116***	0.334***	0.334***	0.334***	-0.00723	0.0440	-0.0821
	(0.00400)	(0.00661)	(0.00431)	(0.0103)	(0.0111)	(0.0105)	(0.0438)	(0.0599)	(0.0773)
Child's age-squared	0.00324***	0.00332***	0.00321***	-0.00990***	-0.00988***	-0.00989***	0.00805***	0.00625***	0.0107***
	(0.000178)	(0.000290)	(0.000192)	(0.000637)	(0.000705)	(0.000653)	(0.00152)	(0.00208)	(0.00269)
Child's gender = 1 if male	-0.0130***	-0.0174**	-0.0113**	-0.0126***	-0.0125**	-0.0128**	0.00389	-0.000567	0.0109
	(0.00469)	(0.00780)	(0.00506)	(0.00486)	(0.00598)	(0.00499)	(0.00905)	(0.0122)	(0.0156)
Disability = 1 if child is disabled	0.00641	0.0536	-0.0120	-0.0124	-0.0132	-0.0156	0	0	0
	(0.0375)	(0.0635)	(0.0404)	(0.0280)	(0.0355)	(0.0287)	(.)	(.)	(.)
Total infants in household	-0.0275***	-0.0565***	-0.0189***	-0.0186***	-0.0181	-0.0253***	-0.0404***	-0.0621***	-0.00413
	(0.00219)	(0.0122)	(0.00332)	(0.00206)	(0.0154)	(0.00288)	(0.00438)	(0.00796)	(0.0116)

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Dependent variable: Accumulated level of schooling	Age group 5–17			Age group 5–11			Age group 12–17		
	OLS	**IV reg *with* district FE**	**IV reg *without* district FE**	**OLS**	**IV reg *with* district FE**	**IV reg *without* district FE**	**OLS**	**IV reg *with* district FE**	**IV reg *without* district FE**
Total boys aged 5–9 in household	0.0133***	-0.00111	0.0177***	0.0166***	0.0169*	0.0139***	0.00137	-0.00934	0.0192*
	(0.00271)	(0.00726)	(0.00312)	(0.00267)	(0.00873)	(0.00291)	(0.00535)	(0.00763)	(0.0101)
Total girls aged 5–9 in household	0.00904***	0.00309	0.0109***	0.0179***	0.0181**	0.0165***	-0.00361	0.000964	-0.00877
	(0.00278)	(0.00509)	(0.00300)	(0.00274)	(0.00719)	(0.00286)	(0.00554)	(0.00749)	(0.00954)
Total boys aged 10–17 in household	-0.0238***	-0.0206***	-0.0251***	-0.0140***	-0.0140***	-0.0157***	-0.0256***	-0.0139**	-0.0453***
	(0.00206)	(0.00357)	(0.00223)	(0.00207)	(0.00250)	(0.00211)	(0.00392)	(0.00599)	(0.00848)
Total girls aged 10–17 in household	-0.0168***	-0.00897**	-0.0192***	-0.0120***	-0.0121***	-0.0121***	-0.0162***	-0.00300	-0.0374***
	(0.00203)	(0.00455)	(0.00227)	(0.00202)	(0.00281)	(0.00208)	(0.00391)	(0.00617)	(0.00868)
Household head if govt. employee	0.0388***	0.126***	0.0132	0.0249***	0.0236	0.0348***	0.0419***	0.122***	-0.0806**
	(0.00768)	(0.0371)	(0.0104)	(0.00780)	(0.0379)	(0.00904)	(0.0137)	(0.0270)	(0.0385)
Household head if private employee	-0.00497	0.0180	-0.0176**	0.00299	0.00262	0.00812	-0.0164	0.00189	-0.0591**
	(0.00700)	(0.0146)	(0.00787)	(0.00696)	(0.0125)	(0.00736)	(0.0128)	(0.0177)	(0.0235)
Household head if laborer	-0.0361***	-0.00916	-0.0447***	-0.00868	-0.00917	-0.00273	-0.0865***	-0.0678***	-0.118***
	(0.00622)	(0.0148)	(0.00701)	(0.00615)	(0.0153)	(0.00654)	(0.0115)	(0.0161)	(0.0208)
Household head's education if primary	0.0309***	0.00833	0.0392***	0.0336***	0.0339***	0.0288***	0.0341***	0.0165	0.0714***
	(0.00618)	(0.0135)	(0.00698)	(0.00611)	(0.0125)	(0.00646)	(0.0114)	(0.0158)	(0.0215)
Household head's education if primary	0.0309***	0.00833	0.0392***	0.0336***	0.0339***	0.0288***	0.0341***	0.0165	0.0714***
	(0.00618)	(0.0135)	(0.00698)	(0.00611)	(0.0125)	(0.00646)	(0.0114)	(0.0158)	(0.0215)
Household head's education if primary	0.0309***	0.00833	0.0392***	0.0336***	0.0339***	0.0288***	0.0341***	0.0165	0.0714***
	(0.00618)	(0.0135)	(0.00698)	(0.00611)	(0.0125)	(0.00646)	(0.0114)	(0.0158)	(0.0215)

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Dependent variable: Accumulated level of schooling	Age group 5–17			Age group 5–11			Age group 12–17		
	OLS	IV reg *with* district FE	IV reg *without* district FE	OLS	IV reg *with* district FE	IV reg *without* district FE	OLS	IV reg *with* district FE	IV reg *without* district FE
Household head's education if middle	0.0915***	0.0773***	0.0993***	0.0576***	0.0579***	0.0551***	0.137***	0.132***	0.161***
	(0.00685)	(0.0125)	(0.00754)	(0.00682)	(0.0112)	(0.00713)	(0.0125)	(0.0168)	(0.0219)
Household head's education if secondary	0.154***	0.156***	0.159***	0.0612***	0.0614***	0.0591***	0.273***	0.288***	0.268***
	(0.00624)	(0.0101)	(0.00667)	(0.00622)	(0.00763)	(0.00639)	(0.0114)	(0.0157)	(0.0195)
Household head's education if higher	0.203***	0.216***	0.207***	0.0902***	0.0898***	0.0929***	0.376***	0.379***	0.395***
	(0.00796)	(0.0140)	(0.00851)	(0.00784)	(0.0127)	(0.00802)	(0.0148)	(0.0198)	(0.0250)
Female bias	-0.0313**	0.0369	-0.0557***	-0.0138	-0.0154	-0.00212	-0.0275	0.0278	-0.124**
	(0.0126)	(0.0342)	(0.0148)	(0.0121)	(0.0450)	(0.0136)	(0.0257)	(0.0369)	(0.0497)
Wealth index 2	0.0477***	0.00286	0.0579***	0.0493***	0.0499***	0.0457***	0.0856***	0.0392*	0.150***
	(0.00742)	(0.0217)	(0.00862)	(0.00699)	(0.0186)	(0.00738)	(0.0148)	(0.0228)	(0.0313)
Wealth index 3	0.125***	0.0307	0.149***	0.101***	0.103**	0.0921***	0.213***	0.123***	0.345***
	(0.00777)	(0.0400)	(0.0111)	(0.00744)	(0.0404)	(0.00899)	(0.0152)	(0.0301)	(0.0450)
Wealth index 4	0.197***	-0.0216	0.255***	0.121***	0.125	0.0976***	0.352***	0.167***	0.624***
	(0.00856)	(0.0890)	(0.0191)	(0.00827)	(0.102)	(0.0148)	(0.0165)	(0.0510)	(0.0798)
Wealth index 5	0.312***	-0.0129	0.389***	0.154***	0.160	0.119***	0.548***	0.272***	0.929***
	(0.0102)	(0.132)	(0.0259)	(0.00995)	(0.151)	(0.0195)	(0.0192)	(0.0731)	(0.111)
Constant	-0.876***	-2.233***	-0.417***	-1.661***	-1.637**	-1.802***	-0.345	-1.885***	2.114***
	(0.0380)	(0.550)	(0.112)	(0.0510)	(0.679)	(0.0963)	(0.316)	(0.569)	(0.817)
Observations	68,688	68,688	68,688	39,095	39,095	39,095	29,593	29,593	29,593
R-squared	0.628	0.026	0.569	0.414	0.414	0.384	0.387	.	.
Adjusted R-squared	0.627	0.025	0.569	0.413	0.413	0.384	0.386	.	.

Notes: * = p < 0.10, ** = p < 0.05, *** = p < 0.01. Standard errors are given in parentheses below estimates. The district dummies, urban dummy, and the variables for the distance to public and private schools were also added to the model. The coefficients' signs are consistent with the literature.
Source: Authors' calculations.

6.3. Estimating the Impact of External Migration on the Number of Days Spent in School Last Week

In our third analysis, we look at the number of days the child spent in school in the preceding week. The equation estimated is

$$\textit{Days spent in school last week}_{ghi} = \beta_1 \tilde{\tilde{M}}_{ghi} + \beta_2 C_{ghi} + \beta_3 X_{hi} + \beta_4 B_{hi} + \mu_{ghi} \qquad (12)$$

where S_{ghi} is the schooling outcome, C_{ghi} is a vector of the child's characteristics, X_{hi} is a vector of the household's characteristics, B_{hi} is the child's gender, and $\tilde{\tilde{M}}_{ghi}$ represents the fitted values of migration from the first-stage regression.

Table 4 presents the results for the regression when the number of days the child spent in school during the previous week is the dependent variable. The results indicate that, among the 5–17 age group, there is no significant difference in the number of days spent in school the preceding week between children from households with and those without external migrants. The results remain the same even if district fixed effects are eliminated from the specification. If we eliminate district fixed effects, the urban dummy becomes significantly negative, indicating that children in urban areas spend fewer days in school than those in rural areas. These results, however, should be considered in light of the fact that we only have data on one week's attendance.

The results for the subsample of younger children (aged 5–11) imply that external migration has no significant effect on the number of days they spent in school in the preceding week. The coefficient of the external migrant variable becomes significantly negative if district fixed effects are eliminated, showing that the attendance of younger children falls significantly if there is an external migrant in the household.

Table 4: Estimating the effect of external migration on the number of days spent in school last week

Dependent variable: No. of days spent in school last week	Age group 5–17			Age group 5–11			Age group 12–17		
	OLS	IV reg *with* district FE	IV reg *without* district FE	OLS	IV reg *with* district FE	IV reg *without* district FE	OLS	IV reg *with* district FE	IV reg *without* district FE
External migrant in household	-0.109***	5.616	-0.577	-0.0457	1.204	-1.135**	-0.0413	1.050	0.687
	(0.0212)	(3.635)	(0.491)	(0.0313)	(1.085)	(0.563)	(0.0293)	(1.081)	(1.014)
Household head's age	-0.00573***	0.0154	-0.00473*	-0.00822***	-0.00179	-0.00473	-0.00825***	-0.00275	-0.000885
	(0.00199)	(0.0137)	(0.00273)	(0.00301)	(0.00639)	(0.00322)	(0.00282)	(0.00617)	(0.00618)
Household head's age-squared	0.0000625***	-0.000186	0.0000539*	0.0000737**	0.00000677	0.0000661*	0.0000776***	0.0000202	-0.00000312
	(0.0000191)	(0.000160)	(0.0000292)	(0.0000287)	(0.0000653)	(0.0000342)	(0.0000269)	(0.0000632)	(0.0000635)
Household head's gender = 1 if male	0.0159	1.772	-0.125	0.0602*	0.434	-0.341*	0.0506	0.382	0.308
	(0.0262)	(1.115)	(0.159)	(0.0349)	(0.327)	(0.185)	(0.0329)	(0.330)	(0.320)
Proportion of working women	0.0156*	0.107*	0.00440	0.0128	0.0338	0.000522	0.0145	0.0327	0.0194
	(0.00869)	(0.0594)	(0.0118)	(0.0125)	(0.0224)	(0.0148)	(0.0116)	(0.0216)	(0.0219)
Child's age	0.0861***	0.0846***	0.0886***	0.129*	0.149**	0.0748***	0.134***	0.137***	0.112
	(0.00766)	(0.0114)	(0.00789)	(0.0699)	(0.0745)	(0.0267)	(0.0478)	(0.0491)	(0.0745)
Child's age-squared	-0.00298***	-0.00311***	-0.00310***	-0.00450*	-0.00525**	-0.00225	-0.00470***	-0.00484***	-0.00398
	(0.000349)	(0.000524)	(0.000360)	(0.00245)	(0.00262)	(0.00166)	(0.00172)	(0.00177)	(0.00262)
Child's gender = 1 if male	0.00970	-0.00273	0.00937	0.0206	0.0165	0.00237	0.0100	0.00591	0.0198
	(0.00890)	(0.0154)	(0.00922)	(0.0143)	(0.0152)	(0.0127)	(0.0133)	(0.0142)	(0.0152)
Disability = 1 if child is disabled	-0.133**	-0.0591	-0.173**	0	0	-0.179**	0	0	0
	(0.0672)	(0.110)	(0.0694)	(.)	(.)	(0.0726)	(.)	(.)	(.)
Total infants in household	-0.0154***	-0.0571**	-0.0167***	-0.00398	-0.0126	-0.0167**	-0.00356	-0.0111	-0.0149
	(0.00414)	(0.0272)	(0.00582)	(0.00704)	(0.0104)	(0.00728)	(0.00645)	(0.00999)	(0.0105)

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Dependent variable: No. of days spent in school last week	Age group 5–17			Age group 5–11			Age group 12–17		
	OLS	IV reg *with* district FE	IV reg *without* district FE	OLS	IV reg *with* district FE	IV reg *without* district FE	OLS	IV reg *with* district FE	IV reg *without* district FE
Total boys aged 5–9 in household	-0.00652	-0.0225*	-0.00785	-0.0146*	-0.0167*	-0.000436	-0.0156**	-0.0164**	-0.0170*
	(0.00513)	(0.0127)	(0.00548)	(0.00845)	(0.00893)	(0.00736)	(0.00769)	(0.00793)	(0.00900)
Total girls aged 5–9 in household	0.0000541	-0.00928	-0.00309	-0.00924	-0.00581	0.00174	-0.00578	-0.00269	-0.0129
	(0.00524)	(0.00977)	(0.00541)	(0.00873)	(0.00951)	(0.00732)	(0.00793)	(0.00869)	(0.00943)
Total boys aged 10–17 in household	-0.0141***	-0.00735	-0.0187***	-0.00900	-0.00212	-0.0211***	-0.00987*	-0.00432	-0.00869
	(0.00392)	(0.00723)	(0.00407)	(0.00621)	(0.00878)	(0.00538)	(0.00575)	(0.00806)	(0.00899)
Total girls aged 10–17 in household	-0.0195***	-0.00267	-0.0228***	-0.00989	-0.00221	-0.0288***	-0.0117**	-0.00539	-0.00541
	(0.00380)	(0.0121)	(0.00419)	(0.00610)	(0.00918)	(0.00532)	(0.00564)	(0.00850)	(0.00913)
Household head if govt. employee	-0.0499***	0.0827	-0.0680***	-0.0439**	-0.0109	-0.0785***	-0.0389**	-0.0104	-0.0321
	(0.0143)	(0.0868)	(0.0185)	(0.0207)	(0.0358)	(0.0232)	(0.0192)	(0.0344)	(0.0343)
Household head if private employee	0.00845	0.0382	0.00461	0.0270	0.0320	-0.0156	0.0298	0.0340*	0.0380*
	(0.0131)	(0.0271)	(0.0140)	(0.0198)	(0.0210)	(0.0187)	(0.0183)	(0.0193)	(0.0211)
Household head if laborer	-0.0150	0.0235	-0.0229*	0.000841	0.00687	-0.0292*	0.00114	0.00700	-0.00980
	(0.0119)	(0.0301)	(0.0127)	(0.0185)	(0.0199)	(0.0167)	(0.0170)	(0.0184)	(0.0197)
Household head's education if primary	0.0416***	-0.00597	0.0551***	0.0252	0.0113	0.0682***	0.0231	0.0102	0.0212
	(0.0118)	(0.0349)	(0.0131)	(0.0185)	(0.0226)	(0.0165)	(0.0170)	(0.0217)	(0.0238)
Household head's education if middle	0.0550***	0.0266	0.0644***	0.0288	0.0258	0.0855***	0.0222	0.0198	0.0282
	(0.0130)	(0.0263)	(0.0138)	(0.0198)	(0.0207)	(0.0183)	(0.0183)	(0.0190)	(0.0213)
Household head's education if secondary	0.0675***	0.0661***	0.0714***	0.0391**	0.0438**	0.0956***	0.0432***	0.0461***	0.0376**
	(0.0118)	(0.0174)	(0.0121)	(0.0177)	(0.0188)	(0.0163)	(0.0164)	(0.0171)	(0.0184)

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Dependent variable: No. of days spent in school last week	Age group 5–17			Age group 5–11			Age group 12–17		
	OLS	IV reg *with* district FE	IV reg *without* district FE	OLS	IV reg *with* district FE	IV reg *without* district FE	OLS	IV reg *with* district FE	IV reg *without* district FE
Household head's education if higher	0.0843***	0.0964***	0.0717***	0.0498**	0.0490**	0.0926***	0.0527**	0.0518**	0.0280
	(0.0148)	(0.0232)	(0.0151)	(0.0223)	(0.0231)	(0.0203)	(0.0207)	(0.0212)	(0.0232)
Female bias	-0.00766	0.118	-0.0165	-0.0172	0.00937	-0.0379	-0.0402	-0.0172	0.00217
	(0.0235)	(0.0869)	(0.0271)	(0.0395)	(0.0469)	(0.0346)	(0.0371)	(0.0444)	(0.0474)
Wealth index 2	0.0366***	-0.0220	0.0529***	0.0525**	0.0383	0.0479**	0.0597***	0.0492**	0.0525*
	(0.0141)	(0.0427)	(0.0154)	(0.0245)	(0.0282)	(0.0188)	(0.0223)	(0.0251)	(0.0284)
Wealth index 3	0.0746***	-0.0588	0.101***	0.0641**	0.0336	0.112***	0.0677***	0.0424	0.0619
	(0.0148)	(0.0875)	(0.0196)	(0.0249)	(0.0369)	(0.0234)	(0.0227)	(0.0342)	(0.0377)
Wealth index 4	0.106***	-0.214	0.167***	0.0872***	0.0169	0.202***	0.0921***	0.0344	0.0747
	(0.0162)	(0.205)	(0.0332)	(0.0267)	(0.0670)	(0.0387)	(0.0244)	(0.0624)	(0.0671)
Wealth index 5	0.0874***	-0.391	0.162***	0.0276	-0.0777	0.234***	0.0437	-0.0455	0.00787
	(0.0192)	(0.305)	(0.0448)	(0.0307)	(0.0968)	(0.0511)	(0.0282)	(0.0929)	(0.0928)
Constant	5.077***	2.888**	5.352***	4.831***	4.151***	5.615***	4.789***	4.302***	4.671***
	(0.0721)	(1.394)	(0.208)	(0.501)	(0.786)	(0.255)	(0.337)	(0.593)	(0.769)
No. of observations	60,900	60,900	60,900	22,833	22,833	38,067	26,688	26,688	22,833
R-squared	0.066	.	0.008	0.060	.	.	0.060	0.011	
Adjusted R-squared	0.065	.	0.007	0.057	.	.	0.058	0.009	

Notes: * = p < 0.10, ** = p < 0.05, *** = p < 0.01. Standard errors are given in parentheses below estimates. The district dummies, urban dummy, and the variables for the distance to public and private schools were also added to the model. The coefficients' signs are consistent with the literature.
Source: Authors' calculations.

Overall, the last set of results implies that children in households that include an external migrant do not spend extra time on domestic chores. Hence, the effect of external migration on children's schooling outcomes is positive. These results are consistent with the literature, which finds that external migration has a positive, significant impact on school enrolments and accumulated level of schooling. Eased income constraints help households invest more in their children's schooling, and the number of days that children attended school last week was not affected significantly negatively.

7. Robustness Checks

In order to verify the result that external migration has a positive effect on children's schooling outcomes, we also conduct a series of robustness checks by testing dropouts and the number of hours spent on household chores as dependent variables. Both these variables may measure the negative effect of external migration on children.

7.1. Estimating the Impact of External Migration on Dropouts

Equation (13) estimates whether a child belonging to a migrant's household drops out of school the following year. This analysis was conducted for children aged 5–17 to determine the overall effect of migration on dropout rates.

$$Dropouts_{ghi} = \beta_1 \tilde{\tilde{M}}_{ghi} + \beta_2 C_{ghi} + \beta_3 X_{hi} + \beta_4 B_{hi} + \mu_{ghi} \quad (13)$$

The dropouts variable takes the value of 1 if child i leaves school in 2008/09 assuming that he/she was previously enrolled. C_{ghi} is a vector of the child's characteristics, X_{hi} is a vector of the household's characteristics, B_{hi} is the child's gender, and $\tilde{\tilde{M}}_{ghi}$ represents the fitted values of migration from the first-stage regression.

Table 5 presents the results of our estimation for children dropping out of school if they belong to a household with an external migrant. The results show that the presence of an external migrant had no significant impact on dropouts among children aged 5–17 and 12–17. Another point worth noting was that, if district fixed effects are eliminated from

the regression equations, then the results in the table show that external migration has a significant negative effect on children aged 5–17. This analysis also holds true for the 12–17 age group.

Another important—and significant—variable is the proportion of women working outside the house, because it implies that households with a higher proportion of working women may create disruptions in children's schooling life if the latter are burdened with greater household responsibilities.

Table 5: Estimating the effect of external migration on dropouts

	Age group 5–17				Age group 12–17			
Dependent variable: Dropouts	**OLS**	**IV reg**	**IV probit *with* district FE**	**IV probit *without* district FE**	**OLS**	**IV reg**	**IV probit with district FE**	**IV probit *without* district FE**
External migrant in household	-0.207	0.0247	2.220	-3.240*	-0.170	0.00879	0.769	-4.217***
	(0.153)	(0.113)	(8.627)	(1.677)	(0.160)	(0.0819)	(4.097)	(1.483)
Household head's age	0.00856	0.000206	0.0164	-0.00310	0.0126	0.000273	0.0167	-0.00872
	(0.0117)	(0.000419)	(0.0265)	(0.0125)	(0.0133)	(0.000436)	(0.0212)	(0.0144)
Household head's age-squared	-0.000127	-0.00000261	-0.000218	0.0000190	-0.000185	-0.00000383	-0.000228	0.0000652
	(0.000115)	(0.00000490)	(0.000291)	(0.000138)	(0.000133)	(0.00000452)	(0.000216)	(0.000163)
Household head's gender = 1 if male	0.0718	0.00845	0.776	-0.844	0.0883	0.00515	0.345	-1.093**
	(0.132)	(0.0328)	(2.454)	(0.551)	(0.144)	(0.0226)	(1.122)	(0.487)
Proportion of working women	0.135***	0.00309*	0.154***	0.108	0.130***	0.00439***	0.141***	0.0593
	(0.0350)	(0.00166)	(0.0352)	(0.0668)	(0.0394)	(0.00153)	(0.0541)	(0.0803)
Child's age	0.176***	-0.00134***	0.156	0.141**	-0.102	-0.00682	-0.0823	-0.131
	(0.0592)	(0.000494)	(0.147)	(0.0573)	(0.286)	(0.00624)	(0.297)	(0.193)
Child's age-squared	-0.00240	0.000116***	-0.00211	-0.00185	0.00657	0.000304	0.00584	0.00657
	(0.00235)	(0.0000217)	(0.00288)	(0.00195)	(0.00984)	(0.000217)	(0.0103)	(0.00674)
Child's gender = 1 if male	0.0468	0.000608	0.0390	0.0443	0.0127	0.000341	0.0113	0.0192
	(0.0522)	(0.000586)	(0.0655)	(0.0432)	(0.0609)	(0.00127)	(0.0605)	(0.0409)
Disability = 1 if child is disabled	.	-0.00103	.	.	.	.	.	.
		(0.00478)						
Total infants in household	-0.00838	-0.000283	-0.0270	0.0256	0.0157	0.000304	0.00864	0.0441**
	(0.0248)	(0.000889)	(0.0663)	(0.0245)	(0.0279)	(0.000822)	(0.0421)	(0.0192)

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Dependent variable: Dropouts	Age group 5–17				Age group 12–17			
	OLS	IV reg	IV probit *with* district FE	IV probit *without* district FE	OLS	IV reg	IV probit with district FE	IV probit *without* district FE
Total boys aged 5–9 in household	0.00679	-0.0000781	-0.00302	0.0196	-0.0206	-0.000471	-0.0232	0.00211
	(0.0297)	(0.000532)	(0.0459)	(0.0247)	(0.0358)	(0.000794)	(0.0367)	(0.0265)
Total girls aged 5–9 in household	0.0316	0.000417	0.0243	0.0304	0.0565*	0.00140*	0.0571*	0.0303
	(0.0298)	(0.000382)	(0.0463)	(0.0249)	(0.0342)	(0.000782)	(0.0338)	(0.0297)
Total boys aged 10–17 in household	-0.0670***	-0.000633**	-0.0591	-0.0560***	-0.0737***	-0.00144**	-0.0696**	-0.0665***
	(0.0236)	(0.000271)	(0.0579)	(0.0217)	(0.0270)	(0.000635)	(0.0350)	(0.0234)
Total girls aged 10–17 in household	-0.0406*	-0.000375	-0.0317	-0.0404**	-0.0626**	-0.00119*	-0.0578	-0.0601***
	(0.0230)	(0.000342)	(0.0514)	(0.0192)	(0.0269)	(0.000647)	(0.0364)	(0.0215)
Household head if govt. employee	-0.0983	-0.000692	-0.0337	-0.154**	-0.106	-0.00224	-0.0819	-0.172***
	(0.0838)	(0.00271)	(0.276)	(0.0704)	(0.0918)	(0.00279)	(0.146)	(0.0615)
Household head if private employee	-0.305***	-0.00303***	-0.257	-0.270***	-0.302***	-0.00616***	-0.292***	-0.224**
	(0.0852)	(0.00111)	(0.298)	(0.0822)	(0.0930)	(0.00186)	(0.112)	(0.0996)
Household head if laborer	-0.159**	-0.00168	-0.124	-0.156***	-0.180**	-0.00398**	-0.171**	-0.143**
	(0.0646)	(0.00110)	(0.193)	(0.0556)	(0.0731)	(0.00167)	(0.0867)	(0.0671)
Household head's education if primary	0.0844	0.000977	0.0581	0.0973*	0.107	0.00259	0.0982	0.106**
	(0.0611)	(0.00101)	(0.137)	(0.0500)	(0.0681)	(0.00166)	(0.0806)	(0.0506)
Household head's education if middle	-0.0591	-0.000767	-0.0612	-0.0364	-0.0871	-0.00181	-0.0873	-0.0457
	(0.0757)	(0.000931)	(0.0702)	(0.0666)	(0.0853)	(0.00175)	(0.0842)	(0.0678)

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	Age group 5–17				Age group 12–17			
Dependent variable: Dropouts	**OLS**	**IV reg**	**IV probit *with* district FE**	**IV probit *without* district FE**	**OLS**	**IV reg**	**IV probit with district FE**	**IV probit *without* district FE**
Household head's education if secondary	0.000454	-0.0000122	0.000701	-0.00706	-0.0173	-0.000291	-0.0127	-0.0275
	(0.0668)	(0.000759)	(0.0604)	(0.0545)	(0.0744)	(0.00163)	(0.0763)	(0.0499)
Household head's education if higher	-0.199**	-0.00135	-0.168	-0.190**	-0.254**	-0.00360*	-0.248**	-0.178
	(0.102)	(0.00106)	(0.209)	(0.0912)	(0.115)	(0.00207)	(0.121)	(0.113)
Female bias	0.101	0.00159	0.143	0.0327	0.0793	0.00246	0.0954	-0.0208
	(0.117)	(0.00256)	(0.152)	(0.112)	(0.141)	(0.00388)	(0.154)	(0.113)
Wealth index 2	-0.0869	-0.00106	-0.109	-0.0373	-0.00545	-0.000389	-0.0198	0.0543
	(0.0771)	(0.00160)	(0.0829)	(0.0740)	(0.0934)	(0.00238)	(0.111)	(0.0680)
Wealth index 3	-0.0860	-0.00132	-0.140	0.0141	0.0157	0.0000477	-0.0117	0.137*
	(0.0803)	(0.00295)	(0.173)	(0.0899)	(0.0956)	(0.00313)	(0.153)	(0.0750)
Wealth index 4	-0.0839	-0.00211	-0.221	0.136	0.00574	-0.000608	-0.0520	0.269**
	(0.0890)	(0.00658)	(0.458)	(0.135)	(0.105)	(0.00532)	(0.272)	(0.110)
Wealth index 5	-0.271**	-0.00478	-0.460	0.0994	-0.126	-0.00349	-0.210	0.309*
	(0.112)	(0.00977)	(0.571)	(0.203)	(0.128)	(0.00767)	(0.380)	(0.179)
Constant	-3.960***	-0.000436	-4.434***	-2.404	-1.868	0.0523	-2.324	0.516
	(0.484)	(0.0404)	(0.458)	(1.546)	(2.088)	(0.0593)	(2.775)	(2.052)
No. of observations	64,897	69,286	64,897	69,081	28,075	29,857	28,075	29,857
R-squared		0.002				0.007		
Adjusted R-squared		0.001				0.005		
Pseudo-R-squared	0.125							

Notes: * = p < 0.10, ** = p < 0.05, *** = p < 0.01. Standard errors are given in parentheses below estimates. The district dummies, urban dummy, and the variables for the distance to public and private schools were also added to the model. The coefficients' signs are consistent with the literature.
Source: Authors' calculations.

7.2. Estimating the Impact of External Migration on the Number of Hours Spent on Household Chores

The number of hours in a day that the child spends on household chores is estimated by the following equation:

No. of hours spent on household chores $_{ghi}$

$$= \beta_1 \tilde{\tilde{M}}_{ghi} + \beta_2 C_{ghi} + \beta_3 X_{hi} + \beta_4 B_{hi} + \mu_{ghi} \quad (14)$$

where S_{ghi} is the schooling outcome, C_{ghi} is a vector of the child's characteristics, X_{hi} is a vector of the household's characteristics, B_{hi} is the child's gender, and $\tilde{\tilde{M}}_{ghi}$ represents the fitted values of migration from the first-stage regression.

Table 6 shows that external migration does not have a significant effect on the number of hours children spend on household chores. If, however, we eliminate district fixed effects from the regression, then external migration appears to have a significant negative effect on the number of hours spent by children on household chores. This implies that, since households' resources increase through remittances, they are able to engage extra assistance. Hence, the number of hours that children spend on household chores decreases significantly.

The results for the subsample of younger children support the result that children face no added responsibility when there is an external migrant in their household and, hence, no significant effect of external migration on the hours they spend on household chores. Other variables added to the specification reveal that male children spend significantly less time on household chores than female children. Likewise, children are likely to spend significantly more time on household chores as the proportion of working women in their household increases. It is also interesting to note that, for children who belong to wealthier families—those ranked higher on the wealth indices score—the number of hours spent on household chores drops significantly than if they had been ranked within the first wealth index.

The results for the subsample of older children show that the impact of external migration on the number of hours spent on household chores

remains insignificant. However, the coefficient of the external migrant variable becomes significant and negative as soon as the district fixed effects are eliminated from the regression.

In all, these results and robustness checks strengthen our results indicating that children from households with external migrants are better off than those from households without external migrants because of the greater availability of resources that remittances yield. Therefore, we can argue that external migration has a positive influence on children's school enrolments and accumulated level of schooling, and also helps reduce their household workload.

Table 6: Estimating the effect of external migration on the number of hours spent on household chores

Dependent variable: No. of hours spent on household chores	Age group 5–17			Age group 5–11			Age group 12–17		
	OLS	IV probit *with* district FE	IV probit *without* district FE	OLS	IV probit *with* district FE	IV probit *without* district FE	OLS	IV probit *with* district FE	IV probit *without* district FE
External migrant in household	-0.233	-50.80	-9.929**	-0.590***	-0.933	-3.509	0.426	5.955	-34.57*
	(0.200)	(109.9)	(4.049)	(0.227)	(6.724)	(3.373)	(0.375)	(9.108)	(18.84)
Household head's age	-0.0320*	-0.163	-0.0251	-0.0341*	-0.0349	-0.00832	-0.0328	-0.0151	-0.116
	(0.0170)	(0.286)	(0.0214)	(0.0193)	(0.0249)	(0.0218)	(0.0326)	(0.0440)	(0.0790)
Household head's age-squared	0.000318*	0.00192	0.000329	0.000367**	0.000377	0.000143	0.000268	0.0000717	0.00129
	(0.000164)	(0.00349)	(0.000222)	(0.000186)	(0.000276)	(0.000221)	(0.000313)	(0.000452)	(0.000847)
Household head's gender = 1 if male	-0.0979	-12.93	-2.614**	0.169	0.0807	-0.580	-0.378	1.000	-9.481*
	(0.247)	(27.90)	(1.104)	(0.305)	(1.759)	(0.952)	(0.419)	(2.307)	(5.015)
Proportion of working women	0.199***	-0.328	0.356***	0.238***	0.234**	0.392***	0.148	0.189	0.246
	(0.0707)	(1.152)	(0.0865)	(0.0818)	(0.118)	(0.0947)	(0.129)	(0.147)	(0.229)
Child's age	0.171*	0.432	0.221*	-0.00262	-0.00224	-0.0422	-0.0154	0.680	-5.200
	(0.103)	(0.596)	(0.114)	(0.209)	(0.210)	(0.222)	(3.649)	(3.861)	(5.702)
Child's age-squared	0.0208***	0.0101	0.0192***	0.0315**	0.0315**	0.0350***	0.0325	0.00600	0.230
	(0.00517)	(0.0251)	(0.00568)	(0.0127)	(0.0127)	(0.0134)	(0.141)	(0.149)	(0.219)
Child's gender = 1 if male	-0.543***	-0.371	-0.591***	-0.260***	-0.259***	-0.327***	-1.065***	-1.107***	-0.872***
	(0.0759)	(0.399)	(0.0838)	(0.0875)	(0.0893)	(0.0929)	(0.154)	(0.170)	(0.271)
Disability = 1 if child is disabled	-0.338	-1.446	-0.406	-0.258	-0.265	-0.243	0	0	0
	(0.613)	(2.644)	(0.670)	(0.550)	(0.568)	(0.586)	(.)	(.)	(.)
Total infants in household	-0.00135	0.383	0.0728	0.00507	0.00807	0.0364	0.00415	-0.0271	0.199
	(0.0348)	(0.838)	(0.0506)	(0.0377)	(0.0697)	(0.0505)	(0.0726)	(0.0896)	(0.164)

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Dependent variable: No. of hours spent on household chores	Age group 5–17			Age group 5–11			Age group 12–17		
	OLS	IV probit *with* district FE	IV probit *without* district FE	OLS	IV probit *with* district FE	IV probit *without* district FE	OLS	IV probit *with* district FE	IV probit *without* district FE
Total boys aged 5–9 in household	0.232***	0.386	0.201***	0.130***	0.131**	0.0834	0.316***	0.295***	0.368***
	(0.0425)	(0.342)	(0.0477)	(0.0480)	(0.0532)	(0.0519)	(0.0856)	(0.0931)	(0.137)
Total girls aged 5–9 in household	-0.0171	-0.0875	-0.108**	-0.0694	-0.0694	-0.137***	0.192**	0.218**	-0.0527
	(0.0440)	(0.172)	(0.0482)	(0.0497)	(0.0497)	(0.0525)	(0.0887)	(0.0990)	(0.148)
Total boys aged 10–17 in household	-0.136***	-0.194	-0.205***	-0.0941**	-0.0938**	-0.148***	-0.157**	-0.126	-0.420***
	(0.0338)	(0.141)	(0.0370)	(0.0382)	(0.0385)	(0.0402)	(0.0674)	(0.0854)	(0.147)
Total girls aged 10–17 in household	-0.0656**	-0.177	-0.159***	-0.0917**	-0.0922**	-0.162***	-0.114*	-0.0920	-0.344***
	(0.0332)	(0.248)	(0.0373)	(0.0376)	(0.0390)	(0.0401)	(0.0658)	(0.0758)	(0.122)
Household head if govt. employee	0.131	-1.337	-0.127	0.211	0.201	0.0964	0.0261	0.176	-0.826
	(0.132)	(3.200)	(0.184)	(0.152)	(0.258)	(0.190)	(0.242)	(0.347)	(0.612)
Household head if private employee	0.0377	-0.631	-0.00116	0.148	0.143	0.177	-0.150	-0.0790	-0.519
	(0.117)	(1.468)	(0.143)	(0.133)	(0.162)	(0.151)	(0.222)	(0.253)	(0.424)
Household head if laborer	-0.0971	-0.567	-0.0620	-0.144	-0.147	-0.0641	-0.0334	0.0118	-0.163
	(0.100)	(1.038)	(0.118)	(0.113)	(0.132)	(0.126)	(0.193)	(0.209)	(0.319)
Household head's education if primary	0.132	0.560	0.264**	0.222**	0.225*	0.262**	-0.0306	-0.0866	0.492
	(0.0982)	(0.946)	(0.114)	(0.111)	(0.121)	(0.120)	(0.188)	(0.211)	(0.356)
Household head's education if middle	0.202*	0.290	0.140	0.280**	0.281**	0.158	0.0379	0.0587	0.0177
	(0.111)	(0.276)	(0.121)	(0.126)	(0.130)	(0.134)	(0.213)	(0.218)	(0.295)

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Dependent variable: No. of hours spent on household chores	Age group 5–17			Age group 5–11			Age group 12–17		
	OLS	IV probit *with* district FE	IV probit *without* district FE	OLS	IV probit *with* district FE	IV probit *without* district FE	OLS	IV probit *with* district FE	IV probit *without* district FE
Household head's education if secondary	-0.0225	0.160	-0.0540	-0.000928	0.00124	-0.0432	-0.0906	-0.0870	-0.138
	(0.103)	(0.438)	(0.113)	(0.118)	(0.125)	(0.126)	(0.195)	(0.197)	(0.268)
Household head's education if higher	-0.219	-0.163	-0.463***	-0.215	-0.214	-0.436***	-0.255	-0.262	-0.428
	(0.136)	(0.272)	(0.146)	(0.152)	(0.153)	(0.159)	(0.262)	(0.265)	(0.371)
Female bias	0.0403	1.123	0.152	0.224	0.233	0.206	-0.284	-0.303	-0.171
	(0.218)	(2.384)	(0.248)	(0.241)	(0.304)	(0.268)	(0.455)	(0.461)	(0.631)
Wealth index 2	-0.0895	0.632	0.268**	-0.164	-0.160	0.0865	-0.0387	-0.117	0.753*
	(0.109)	(1.580)	(0.131)	(0.119)	(0.152)	(0.133)	(0.223)	(0.260)	(0.426)
Wealth index 3	-0.688***	0.502	-0.151	-0.665***	-0.658***	-0.358**	-0.865***	-1.027***	0.670
	(0.118)	(2.596)	(0.160)	(0.130)	(0.188)	(0.152)	(0.238)	(0.359)	(0.665)
Wealth index 4	-0.964***	1.649	0.0459	-1.008***	-0.990***	-0.437*	-1.001***	-1.279**	1.513
	(0.134)	(5.686)	(0.257)	(0.150)	(0.384)	(0.238)	(0.264)	(0.530)	(1.036)
Wealth index 5	-1.065***	2.721	0.258	-1.091***	-1.066**	-0.388	-1.152***	-1.567**	2.378
	(0.165)	(8.234)	(0.340)	(0.185)	(0.536)	(0.304)	(0.319)	(0.756)	(1.472)
Constant	6.758***	20.49	7.542***	6.748***	6.846***	6.140***	8.587	2.277	51.40
	(0.715)	(29.87)	(1.381)	(1.026)	(2.181)	(1.456)	(23.61)	(26.01)	(40.29)
No. of observations	29,222	29,222	29,222	18,672	18,672	18,672	10,550	10,550	10,550
R-squared	0.169	.	0.020	0.154	0.153	0.050	0.143	0.126	.
Adjusted R-squared	0.167	.	0.019	0.151	0.151	0.049	0.138	0.120	.

Notes: * = p < 0.10, ** = p < 0.05, *** = p < 0.01. Standard errors are given in parentheses below estimates. The district dummies, urban dummy, and the variables for the distance to government and private schools were also added to the model. The coefficients' signs are consistent with the literature.
Source: Authors' calculations.

8. Conclusion

We find that external migration has a positive and significant impact on schooling attainment, which means that, in the case of Pakistan, the positive effect associated with remittances outweighs the negative effect of external migration due to the absenteeism of a family member. The results show that children from external migrant households not only have higher enrolment levels than those from nonmigrant households, but also show a higher level of accumulated schooling. On repeating the analysis with subsamples of older and younger children, we see that the positive effect of external migration on enrolment is larger for younger children than for older children. Mansuri's (2006) results for children in rural Pakistan indicate that the effect of external migration for older children is positive and significant. However, since the instrumental variables used by Mansuri (2006) are current migration community averages, the coefficients estimated were not fully corrected for bias since current migration rates and current enrolments might have simultaneously affected the unobserved variables.

The results also show that a child's accumulated level of schooling is positively influenced by external migration. The effect of migration on accumulated schooling is significantly positive only for older children. Mansuri's (2006) results reveal that the effect of external migration remains significantly positive for both younger and older children. Another point worth noting is that all the coefficients estimated in her study are smaller than those in ours, which shows that the impact of external migration on school enrolment and accumulated level of schooling is larger than that reported by previous studies.

Since school enrolments does not give us a complete picture of the impact of external migration on children's schooling outcomes, we have also tested other hypotheses such as its impact on the number of hours spent by children on household chores, the number of days spent last week in school, and the number of dropouts. Most previous studies do not have specific data to address these questions in detail. The results for dropouts—conditional on the child having been enrolled last year—indicated that external migration had no significant effect on it. The coefficient for external migration became significantly negative when district dummies were omitted from the regression. The results remained consistent with those from the regressions run on the major dataset for all children aged 5–17.

Similarly, the results for the number of days spent by a child in school and the number of hours spent on domestic chores indicate that there is no significant effect on the two dependent variables even if there is an external migrant in the household. The education of children in the external migrant's household is not affected by the added responsibilities they might face because of an absent family member. Moreover, they do not have to spend significantly more hours on domestic chores, nor is the number of school days attended last week by the two different types of households mentioned in the study significantly different from one other.

The other variables added to the regression are reasonably consistent with other studies. The distance from the school significantly affects the accumulated level of schooling. The coefficient indicates that, as the distance increases, a child's accumulated schooling drops significantly. Likewise, if the household head has a higher level of education, this affects a child's schooling positively. Wealth indices also play a key role in determining school enrolment, accumulated levels of schooling, and the number of hours spent on household chores. Children from higher-income families have access to better resources and, hence, acquire higher levels of accumulated schooling than children from poor families. They also spend significantly less time on household chores than children from lower-income families. Our results also indicate the existence of a gender bias in rural Punjab: Boys have higher enrolment rates than girls but the latter's accumulated level of schooling is significantly higher than that of boys. Likewise, the number of hours that boys spend on household chores is significantly lower than that of girls.

As the proportion of working women in a household increases, the number of hours that a child spends on domestic chores increases significantly, as does the number of dropouts. This indicates that children face greater responsibilities when the proportion of women working outside the house rises; children may end up leaving school and spending more time on domestic chores. However, we also see that the accumulated level of schooling for children enrolled in schools increases significantly, which can be explained by the argument that households with a greater proportion of working women are more aware of the opportunities associated with higher education in the market.

Our results are also consistent with the similar studies conducted for other countries. Hanson and Woodruff (2003), in their study on Mexico, conclude that children complete more years of schooling if they belong to households with external migrants. Edwards and Ureta (2003), in their study on El Salvador, find that the retention rate among children in households receiving remittances is lower than those without remittances. Alcaraz, Chiquiar, and Salcedo (2012) conduct a similar study for Mexico and conclude that the remittance crisis has had a negative impact on children's schooling and a positive impact on child labor.

The findings of this working paper imply that external migration has a significant positive effect on human capital formation in the Punjab, Pakistan. Based on the positive impact of external migration on human capital outlined, one can argue in favor of external migration as well as for improvements in formal channels to promote migration.

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