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Effects of parental migration on the education of left-behind children

Jeenat Binta Jabbar

School of Economics, Finance and Marketing, RMIT University, Melbourne, Australia

jeenat.jabbar@gmail.com

Abstract. This study investigates the effects of remittances and migration on the school dropout rate of left-behind children in rural Bangladesh. Using household survey data from a two-wave panel, conducted by Bangladesh Integrated Household Survey (BIHS) in 2011 and 2015, this study combines the fixed-effects approach with a linear probability model and instrumental variable (IV) strategy to control for the possible endogeneity of migration and remittances. The estimated results show that children from remittance-receiving households are less likely to drop out of school, while parental migration has substantial disruptive effects. Heterogenous analysis indicates that boys seem to benefit from remittances in both primary and secondary school. However, girls do not move beyond primary education even when the household receives additional funds from remittances. The findings also suggest that remittances relax the poor households' budget constraints, making it easier for them to invest in their children. In contrast, the effect of remittances is insignificant for children in wealthier households. Therefore, the results may provide some guidance for policymakers in their efforts to increase the school attainment of children, especially for those who live in migrant households.

Keywords. remittance, migration, left-behind children, school dropouts, Bangladesh

1. Introduction

Millions of children experience out-migration of parents in their childhood. While some children migrate with their parents, the associated costs and risks of migration mean that many are left behind by one or both parents, who go out for work hoping to improve their children's standard of living. In 2017, the total volume of remittances sent by foreign nationals to their country of origin surpassed 466 billion USD in 2017, with much of the money used to support the health, education, and well-being of children left behind (World Bank, 2018). However, whether and how left-behind children potentially confront their social problems due to the separation from a parent is an issue often ignored in the analysis of the impact of migration on children.

Remittance is one of the potential means of migration through which migrants can help to ease household liquidity constraints and allow the family to invest more in their children's education (Alcaraz et al., 2012; Calero et al., 2009; Taylor & Lopez-Feldman, 2010). However,

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these positive impacts on financial constraints, derived from income earned abroad, are not without side effects. While some find that migration might raise parental academic aspirations for their children, others find detrimental effects of parental migration on education. The absence of adult household members, especially parents, can lead to a lack of supervision, problems in psychological development, or raise extra work in the household for left-behind children (Amuedo et al., 2010; Hanson & Woodruff, 2003; McKenzie & Rapoport, 2011).

Nevertheless, having a parent in another region may bring some outside information that is helpful for the children's education. Exposure to the outside world could lead migrants to learn more about the importance of investing in education, and about how best to educate the children in their own household (Lee & Park, 2010). Therefore, parental migration has ambiguous effects, which mostly depend on the relative magnitudes of the various relevant channels. It is also important to note that the act of migration is no guarantee that a migrant will send remittances (Gassmann et al., 2018). To better understand whether children's schooling benefits from the migration of their parents or remittances, it is necessary to see the effect of remittance and migration separately.

This study analyses the impacts of remittance and migration on education to quantify child deprivation in terms of school completion. The focus of this chapter is on the effects on primary and secondary school dropouts rather than focusing on school enrolment because enrolment does not necessarily imply attendance. Rather, dropout rates give a better understanding of school participation. Dropping out of schools occurs in developing and developed countries, but the rate of school dropout is higher in developing countries than in developed countries. According to the World Bank (2015), about 58 million children are still out of school, and most of these dropouts are found in developing nations. As a developing country, Bangladesh has witnessed a high school dropout rate, especially at the secondary school level. In Bangladesh, around 38 percent of the students have dropped out in 2016 (Sarker, Wu, & Hossin, 2019).

This paper particularly emphasises the completion of primary and secondary education for two reasons. First, primary education is a constitutional obligation in Bangladesh to ensure the literacy of all the citizens of the country. Also, completion of the primary cycle is needed to enter into secondary education. Second, after completing secondary education, early sorting of the participants into skilled labour markets (university, professional colleges) takes place. In Bangladesh, unlike primary education, secondary education is not free and compulsory. Thus, at this stage, students or their families face a choice between continuing school or joining the labour force because of poverty or income constraint, which is one of the major determinants of schooling.

This study focuses on the effect of remittances and migration on the primary and secondary school dropouts of left-behind children who are between 5 and 17 years old. To do so, I empirically test the hypotheses that economic migration and concomitant remittance may relax the household financial constraints, but migration may change the household members' education decision. Bangladesh provides an interesting setting to study this topic since the country has ranked sixth among the top 20 countries of origin for international migrants, with a total of 7.5 million Bangladeshis living abroad (IOM, 2019). Apart from international migration, rural-urban or internal migration of people is a regular event in Bangladesh. The remittances sent by Bangladeshi international migrants to their families back home contribute almost 9 percent of the country's gross domestic product (GDP). Further, the financial support provided by internal migrants

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constitutes about 80 percent of the consumption of families, help in savings and investment, facilitate the education of children, and transform landless families into landowners in the rural areas of Bangladesh (Afsar, 2003).

Using Bangladesh Integrated Household Survey (BIHS) data from a unique, large two-wave panel, conducted by International Food Policy Research Institute (IFPRI) in 2011 and 2015, this study improves the empirical methodology in the literature. The study uses a fixed-effects approach with a linear probability model to allow the estimation to control for time-invariant omitted=variable bias at the individual level. The study further combines the fixed-effect approach with an instrumental variable (IV) strategy to control for the possible endogeneity of remittances.

The estimated results show that remittances have a positive effect on school attainment of left-behind children, while parental migration reflects substantial disruptive effects. While the father's migration increases the probability of dropouts in both primary and secondary schools, the mother's migration increases the likelihood of secondary school dropouts for children who stay back in their home regions. In addition, a heterogeneous analysis indicates that, overall, boys seem to benefit in both primary and secondary school, but girls do not go beyond primary education even after having additional funds from remittances.

Nevertheless, the impact of both remittance and migration is strongly influenced by the wealth level of households. The findings suggest that remittances relax the budget constraints of poor households, which allows them to invest for their children; in contrast, the effect of remittances is insignificant for children in wealthier households. In other words, the results of the heterogeneous wealth effect analysis suggest that the poorest do not go to school because of income constraints, while the rest do not go for other reasons. This proposition is later tested with a cash transfer program in Bangladesh.

This study is closely related to the literature that evaluates the effect of the absence of household members and remittances on left-behind children's schooling. The existing analyses assess the causal impact of parental absence and remittances on the educational investment in children left behind, but much less attention has been paid to the disruption consequences of migration on those left behind. The present work contributes to the literature of migration and left-behind children in several ways, which have not yet been considered in the context of Bangladesh.

First, my empirical analysis focuses on both internal and international perspectives, along with the overall effect of migration and remittance on the schooling of left-behind children in Bangladesh. Second, my analysis explores the potential for migration to have differential impacts, based on the remitter's wealth in their host country. I allow for their heterogenous wealth impacts of a household on a child's education according to parental migration status. I look at relative poverty by using the wealth quintile in the impact of migration and remittance, which has not been done so far for Bangladesh.

Another key contribution of this chapter is an empirical test of the proposition that financial constraint is a major obstacle for education continuation. For analysing this proposition, this study assesses the impact of Bangladesh's conditional cash transfer program, which motivates the poor to go to school regularly. My findings may provide appropriate guidance for policymakers in their effort to increase the cash transfer or such programme for the well-being of the poor children in general, and those living in migrant households by highlighting the domains in which children face deprivation.

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The remainder of the paper is structured as follows. The next section provides a literature review, which discusses background information on labour migration and child education in Bangladesh and elaborates the hypotheses. Section three describes data, variables, and the estimation strategy. Section four presents the empirical results, followed by a conclusion and discussion in section five.

2. Literature Review

There has been a growing literature studying the impact of migration and remittances on education attainment of left-behind children (Antman, 2012; Dustmann & Glitz, 2011; Giannelli & Mangiavacchi, 2010). The results are mixed on the overall effect of migration and remittance on the educational outcomes of the left-behind children, depending on the specific group or context being studied.

Numerous studies have found a positive relationship between migration and education of left-behind children. With few exceptions, most of the studies support the result that remittances have positive effects on the schooling of children because the additional income, wage premiums, capital accumulation by migrant households, and the higher propensities of migrant families to invest in education (Bucheli, Bohara, & Fontenla, 2018; Göbel, 2013; Shrestha, 2017). For example, Hanson & Woodruff (2003) examine the effects of remittances on the schooling of children in migrant households, using cross-sectional data from Mexico. Assuming causal interference of observables, their results indicate that children in migrant households complete significantly more years of schooling. In the Philippines, it was found that increased receipts of overseas remittances due to favourable exchange rate movements increased child schooling and reduced child labour (Yang, 2008).

Although remittances from abroad have a large positive impact on school attainment, when the migration is included in the model, this effect disappears (Acosta, 2011). Using a differences-in difference strategy and controlling for the possible endogeneity of the migration decision, Alcaraz et al. (2012) find that the shock of remittances leads to a probability of increasing child labour and decreasing school attendance. Most of the time, remittances are sent by household members who have left the household. The departure of parents may reduce the number of adult role models, increase the child-rearing burdens of the remaining household members, and place greater demands on older children to assist in running and supporting the family (Hanson & Woodruff, 2003). McKenzie and Rapoport (2011) test this hypothesis in Mexico and find that international migration has an overall negative effect on the educational attendance and enrolment of boys aged 12 to 18 and girls aged 16 to 18 years old.

A lack of parental care may cause relational and psychological problems that may affect children's welfare in the long term. In a traditional setting, fathers are more involved than mothers with educational choices concerning their children. Hence, when fathers go abroad, the decision power might pass under the control of a member who might be less keen on human capital formation (Ginther & Pollak, 2004). Giannelli and Mangiavacchi (2010) analyse the phenomenon of children left behind, mainly by fathers, in Albania and find that international migration on the part of the father negatively influences a child's schooling in the long term. By contrast, father-only migration is reported to be the most advantageous to the children because of increases in family wealth in Thailand (Jampaklay, 2006).

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However, there is evidence that the extended family has more difficulty substituting for absent mothers than for absent fathers. Cortes (2015) investigates the effect of the mother's migration, in contrast to the father's, and finds a negative effect on the educational outcomes of Filipino children. He argues that the negative effect is driven by children who join the labour force or take over domestic responsibilities in the parent's absence. This research also suggests that maternal migration disrupts deeply entrenched gender and generation roles, including the mother's caring role, causing family stress. However, another study on overseas migration from the Philippines finds that children in mother-only migrant families complete more years of schooling than children from non-migrant families, while children in father-only migrant families complete the same amount of schooling (Arguillas & Williams, 2010).

A substantial range of research highlights the important gender-differentiated impacts of investment in children's education. In El Salvador, girls seem to increase school attendance upon remittance receipts by reducing their labour activities, but boys do not benefit, on average, from higher schooling. Among secondary school-aged children, the impact of remittance may even be negative for educational prospects (Acosta, 2011). In rural areas of Ecuador, remittances in conjunction with aggregate shocks, such as droughts and damage to agricultural production, increase school enrolment and decrease child labour, especially for girls (Edwards & Ureta, 2003).

Opposite results have been found in Asian countries. In Pakistan, female children in migrant households are significantly more likely to drop out, and they lose most of the benefits of migration on accumulated schooling as well (Mansuri, 2006). Gatskova et al. (2017) expand on the previous work from Dietz et al. (2015) focusing on the educational outcomes of girls. They find that left-behind teenage girls tend to reduce school attendance, and they face pressure to marry, which makes them abandon school. Another empirical study on Tajikistan uses a three-wave panel survey and considers potential gendered heterogenous effects. The research finds that boys living in migrant households benefit more than girls in terms of enrolling in school. The analysis also reveals that young females in migrant households marry earlier, and therefore leave school (Jaupart, 2018).

Moreover, the effect of remittance and migration can vary greatly across different dimensions such as wealth, age, rural vs. urban location, and family size. Using a bivariate probit model and considering both endogeneity and non-linearity issues, Bucheli et al. (2018) find that remittances benefits urban children more than their rural counterparts, supporting the existence of regional inequalities. Economic disparities also greatly influence the impact of migration on children. In Africa, most of the wealthier families experience international migration, as a result, children in migrant families are better off (Ferrone & Giannelli, 2015). Nevertheless, heterogeneity by wealth inequalities significantly affects the consequence of remittance on children's schooling. It is found that the positive income effects of remittances on children's education are most visible in poor households, where budget constraints are relaxed by receiving remittances, than in wealthier families (Bucheli et al., 2018).

There are several studies on children left behind in Bangladesh. One empirical study for Bangladesh uses multivariate analysis to examine the role of the economic and social aspects of overseas migration in improving the socio-economic well-being of household members left behind in rural communities of Bangladesh (Hadi, 1999). The study conceptualizes well-being by different indicators, such as economic, health behaviour, education, women's position, and the practice of

giving dowry. The findings indicate that migrants who earned money and stayed abroad longer are better able to save money and invest remittance to raise the standard of livings of their family members back home. The empirical evidence also shows that the role of overseas migration has a significant positive effect on raising school enrolment, reducing morbidity, and women's decision-making power. Though the framework addresses different aspects of well-being, the method of estimation is not concerned about causality, which may distort the findings and conclusions drawn from the study.

Hadi (2001) extends his study on how the migration of adult men changes the position of left-behind women in Bangladesh. Multivariate analysis, based on data from 70 Bangladeshi villages, finds that the chance for girls to be enrolled in school is 96 percent higher among migrant families than among non-migrant families, even when sociodemographic factors such as age, years of schooling, land ownership and religion are taken into consideration. The probability of school enrolment improves further with the duration of migration overseas. It is argued that the acceptance of gender equity in education among the migrants might have motivated women to send their female children to school. Therefore, international migrants from Bangladesh not only raise the standard of living of their left-behind kin by sending remittances, but also modify their social behaviour through the diffusion of secular, modern ideas into the traditional values of the receiving communities.

A few other studies clearly indicate that there are some positive changes in terms of a better educational outcome in Bangladesh because of migration. Kuhn (2006) explores the impact of fathers' and siblings' migration on children's pace of schooling in an area of rural Bangladesh with high rates of rural-urban and international out-migration. The study used a large sample of children aged 7 to 14 years old from the 1996 Health and Socioeconomic Survey. This study employs ordinary least squares regression on a child's pace of schooling and finds the overseas migration of their fathers and both the overseas and internal migration of their brothers are associated with improvements in the pace of the children's schooling. Although the study gives a notion of the association by econometric modelling, it does not address gender parity although other researches find that rural girls in Bangladesh have achieved parity with boys in school attendance (Maitra, 2003; Trapp et al., 2004).

This literature review shows both the positive and negative effects of migration and remittance are revealed in previous studies. Disparities among results might be caused by different contexts or countries; however, some conflicting results are found in the same region because of different methodologies, estimation or ignoring endogeneity or omitted variable bias in the analysis. This study contributes to the broad body of literature on remittance and children's education by highlighting potentially different effects by gender, wealth, and migration type (international and internal types), which has not been done before for Bangladesh. Furthermore, few studies extend the heterogeneity of family wealth in the decision of investment in a child's development while their parent is absent because of migration. Therefore, this study contributes to this underexplored case by providing tractable empirical evident that remittance has heterogenous effects on child's schooling by the wealth quintile.

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3. Data, variables, and estimation strategy

3.1 Data

The study uses data from a large household panel survey called Bangladesh Integrated Household Survey (BIHS), carried out in 2011/12 and 2015. The survey was administrated to the same sample of households in both rounds, creating a panel dataset. Both waves of the panel were designed and implemented by the International Food Policy Research Institution (IFPRI). The BIHS samples were collected through various levels stratified by random sampling and designed to be representative of rural Bangladesh throughout all seven of the country's administrative divisions. In the first round, 6,500 households from 325 selected villages were interviewed. In the second round, the same households from the first wave are surveyed, including households that had split into several households since the first interview. Each wave of the survey includes detailed data on the demographic characteristics, education, employment, production, consumption, health, and empowerment. One of the features of the dataset that makes it especially suited to answer questions on the role of migration on household investment is the comprehensiveness of the migration module with remittances, transfers, and other household incomes.

3.2 Variables

To measure left-behind children's educational attainment, school dropout is used as the dependent variable. Left-behind children are defined here as children who are left behind in their home by their fathers or mothers who migrate to seek employment. Depending upon specific age-group between 5 to 17 years old, children's school dropout is measured by two variables: primary school dropouts and secondary school dropouts. Both outcome variables are considered as dummy variables equal to 1 if the criteria are met. For instance, a child's dropout is equal to 1 if the child does not finish primary or secondary education.

The main regressor of interest is a variable capturing the incidence of receipt of remittances in a household. Since labour migration from Bangladesh in many cases is seasonal and circular, it is important to consider both migrants who are working abroad or working inside the country at the time of the interview. It is noted that this study restricts the analyses to the case of parental migration for employment purposes. To account for both internal and international migration, the study creates a dummy variable. A migrant is one who has left the household for six months or more within the last five years, either within the country or abroad. Remittance, another major regressor, captures how much total money a household received in the past 12 months from migrant parents in the last five years.

The study adopts fixed-effects estimation in analysing the impact of remittance and migration on school dropouts over time. Given the estimation, coefficients for remittances in the equation could be biased without proper controls. Thus, the set of control variables includes mother's age, head's occupation, sex of family head, head's workplace is rural or urban, father's highest class of schooling, mother's highest class of schooling, family size, number of children, wealth index, educational expenses and expenses for food. The wealth index for a household is determined using principal component analysis, with factor scores assigned to each household. The wealth index is taken to include all durable goods owned by a household that indicate the household's relative economic status, rather than its income.

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Even after accounting for omitted variable bias of the model, the study must be careful of endogeneity because of reverse causality. For example, the remittance could be sent to the family especially because children have already dropped out of school. Conversely, the opposite might occur, children at risk of dropping out of school may cause remittance; thus, remittance could depend on the probability of dropping out of school. To address such endogeneity problems, this study uses two instrumental variables (IVs): the cost of living and unemployment rate at the destination area. These variables are obtained from the ILO and World Bank databases (ILOSTAT, 2018; World Bank, 2020).

Table 1 presents descriptive statistics of the variables used in the empirical analysis. The total number of remittance-receiving households in the sample is 5,805, of which 2,380 households receive international remittances, and 3,367 households receive internal remittances. Almost half of the migrant households, where only parents (father or mother) are migrants, receive, on average, USD 267 as a remittance. Most migrant parents are fathers, while only 1.2 percent of households have migrant mothers. As a result, migrant households are mostly female-headed households. Children's secondary school dropouts are more than primary school dropouts. The average ages of the household head indicate that households' heads are mostly of working age. Additionally, Table 1 shows that households are mostly poor with respect to the wealth index. Their average monthly expense for food is about USD 10. However, education expense is more than USD 10, which might cause higher school dropouts at the secondary level, as primary education is free in Bangladesh.

Table 1: Descriptive statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
Primary school dropouts	61,597	0.025	0.155	0	1
Secondary school dropouts	61,597	0.052	0.223	0	1
Remittance receiving households	61,597	0.094	0.292	0	1
International remittance receiving households	61,597	0.209	0.406	0	1
Internal remittance receiving households	61,597	0.222	0.416	0	1
Total remittance (in USD)	61,597	267	917	0	51315
Household with migrant father	61,597	0.058	0.234	0	1
Household with migrant mother	61,597	0.012	0.107	0	1
Household head's age	61,595	45	14	0	105

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Household head's sex (female headed)	61,595	0.144	0.351	0	1
Household head's occupation					
Salaried worker	57,052	0.02375	0.1522714	0	1
Self-employed	57,052	0.044854	0.2069848	0	1
Trader	57,052	0.038316	0.1919595	0	1
Producing food	57,052	0.004435	0.0664452	0	1
Raising poultry	57,052	0.000421	0.0205061	0	1
Farming	57,052	0.208424	0.406185	0	1
Non-earning occupation	57,052	0.614	0.487	0	1
Household head's workplace (rural)	61,597	0.794	0.404	0	1
Household head's education	61,595	6.505	7.075	0	102
Family size	61,595	5.299	2.184	1	21
Number of children	61,595	1.648	1.224	0	10
Wealth index	58,932	0.091	0.994	-3.068	4.09
Expenses for food (monthly in BDT)	58,929	778	770	0	10015
Educational expenses (monthly in BDT)	61,597	4127	8034	0	284250
Unemployment rate at remittance sending country	16,082	4.063	1.119	0.2	24.9
Living expense at destination (in USD)	61,597	8096	67384	-3953	24329

Note: BIHS data from IFPRI.

Figure 1 displays the migration trends by age and gender across the sample period. It is found that the mean age of male migrants during 2011 and 2015 was the same, but there was an increase in the age during 2015 for female migrants. It means that the age of female labour migrants had increased from 2011. In general, more males migrate than females do; and migration has the highest rate at the prime working age of 20–40 years. In Figure 1, the peak of migration reaches around 27 years of age.

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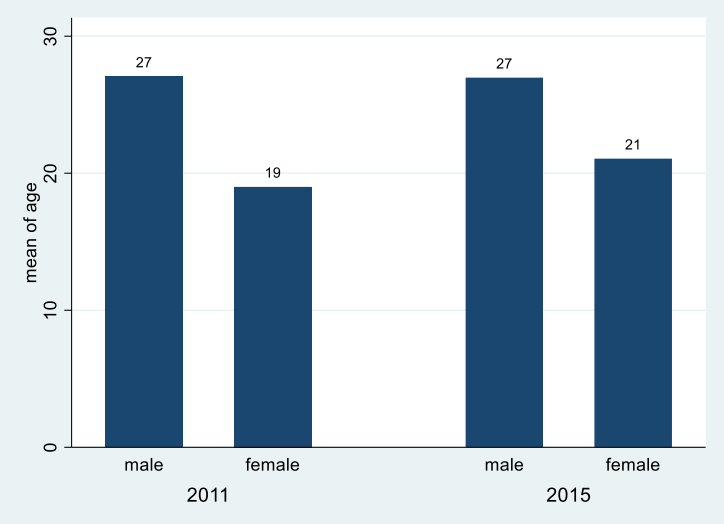

Figure 1: Migration trend by gender, age, and year

Another dimension this study explores is the potential for migration to have differential impacts based on their assets in their rural origin community. This allows for there to be heterogeneous wealth impacts of household on a child's schooling according to the migration status of the household member. Figure 2 provides a descriptive overview of the wealth distribution by migration status. We can see which wealth quintile has the highest migrant households.

Figure 2 also presents confidence intervals (or error bars) that assess the significance of difference among the groups. For instance, the bottom of the error bar belongs to the wealthiest quintile, which has the highest percentage of migrant households, does not overlap with any of the error bars. Therefore, the majority of the data that are collected for migrant households for the wealthiest group are significantly different than that of other wealth groups. Similarly, the graph shows that only 10 percent of migrant households belong to the poorest group, and 13 percent are in the poor groups, which are significantly identified by the confidence intervals. However, between middle and wealthy groups, we can see that a large portion of data in the wealthy quintile overlaps with the middle quintiles. Thus, the proportions of wealthy and middle quintiles are inconclusive.

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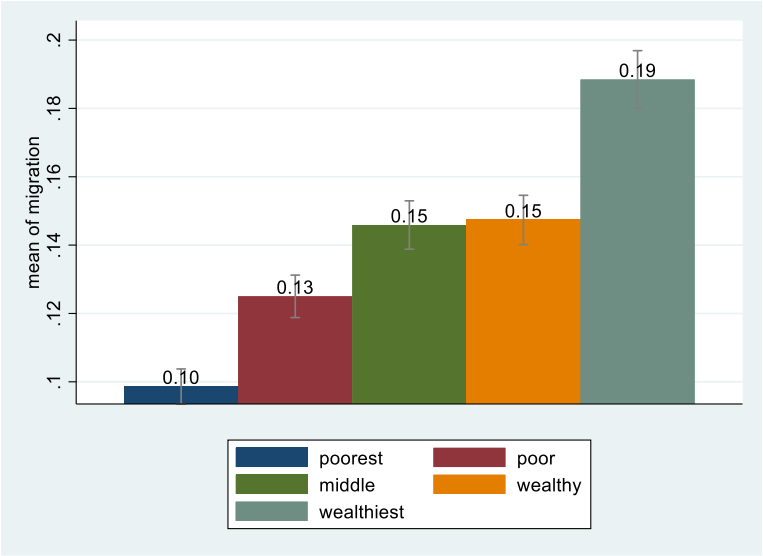

Figure 2: Asset quintile by migration status

3.3 Estimation Strategy

To estimate the effect of migration and remittance on the child's likelihood of dropout of school, the analysis uses a linear probability model (LPM) and instrumental variables (IV). The LPM is used for linear regression analysis. To explore further, each outcome of interest, primary and secondary school dropouts, is constructed with two sets of model specifications. First, the models start with remittance as a treatment variable, and the second set of models controls for parental migration decomposed by father's and mother's migration. Each set of models is further divided into different types of migration and remittances, such as internal, international, and overall, which incorporates both internal and international migrants.

The main empirical specification is the following:

$$Y_{i,j,t} = \beta_0 + \beta_1 M_{i,j,t} + \beta_2 X_{i,j,t} + \theta_{j,t} + \varepsilon_{i,j,t} \quad (1)$$

where i stand for individual, j for household, and t for year. $Y_{i,j,t}$ is outcome variable of left-behind children school dropouts (primary/secondary), $M_{i,j,t}$ is the treatment variable (remittance/migration), $X_{i,j,t}$ is a vector of control variables including mother's age, head's occupation, sex of family head, head's workplace in rural or urban, father's highest class of schooling, mother's highest class of schooling, family size, number of children, wealth index, educational expenses and expenses for food. Finally, $\theta_{j,t}$ is the child fixed-effect, and $\varepsilon_{i,j,t}$ is the error term.

Since two measures of school attendance are looked at, the outcome variables are primary school dropouts and secondary school dropouts. Given that the same children are observed over time, the study adopts a fixed-effects estimation. The panel dimension of the data allows estimation of individual fixed-effects regressions, which frees the estimation results from the confounding influence of time-fixed unobservable factors likely to affect both selection into migration and socio-economic outcomes as well as common country-wide time shocks (Jaupart, 2019). Furthermore, the models are estimated using strata clusters at the individual level as strata reduces the standard error and clusters increase variance therefore the standard error (Abadie et al., 2017).

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Despite the inclusion of the set of explanatory variables and fixed effects discussed above, the parameter on migration in Equation (1) would typically be biased or may not capture the causal effect of migration. The migration status is a choice variable by migrant households, which means that it is not exogenous to the household because time-varying characteristics might influence migration decision or labour market outcome (Dabalen & Miluka, 2010; Jaupart, 2018). However, the receipts of treatment effect may differ due to some unobservable variables. Also, reverse causation may bias the results in a way that remittances could be sent specifically because children have dropped out of school or are at risk of dropping out. So, remittances could depend on the probability of dropping out of school.

As a result of this reverse causality, the estimation faces a classic problem of 'endogeneity', which refers to a situation when there is a correlation between independent variables and the error term in the model. To address this endogeneity, an identification strategy should address the absence of treatment randomization (Adams & Cuecuecha, 2010). The instrumental variable method is well-suited to estimate the effect of migration or remittances on schooling (Angrist & Pischke, 2009; Sasin & McKenzie, 2007). To be valid, the instrumental variables must be uncorrelated with errors in the outcome equation, meaningfully correlated with endogenous regressor, and must be properly excluded from the model, so that their effect on the response variable is only indirect (Lewbel, 2012).

This study uses two instrumental variables for remittances: the cost of living and the unemployment rate at the destination areas. The choice of using the cost of living at the destination adjusted by minimum wage rate is supported by the logic that labour migrants or non-skilled migrants are more likely to remit excess income from the areas where the average non-skilled wage rate is higher (Davis & Brazil, 2016). Primarily, a migrant's main source of income is basic wages from which they manage to pay for their consumption, accommodation, and other expenses, which affect the migrants' remitting behaviour (Russell, 1986).

This instrumental variable is created in multiple steps. First, the data of minimum wage at destinations are obtained from the ILO database for respective year, and then it is subtracted from the total remittance transfers for each household. The second instrumental variable for remittances is the unemployment rate at destination areas. If the unemployment rate goes up in the remittance-sending country, some migrants will lose their jobs, and the total remittances sent by migrants will decrease. If the real interest rates go up in the remittance-sending country, migrants have more incentive to invest in the host country rather than the home country, and they will remit less.

Therefore, this is the first-stage equation for instrumenting remittances:

$$M_{i,j,t} = \alpha_0 + \alpha_1 Z_{i,j,t} + \alpha_2 X_{i,j,t} + \phi_{j,t} + \mu_{i,j,t} \quad (2)$$

Where $Z_{i,j,t}$ is a vector of instrumental variables, γ_t is year fixed effect, ϕ_j is the individual fixed effect and $\mu_{i,j,t}$ is the error term.

The two main concerns of the instrumental variable method are the validity and strength of the instruments. The reason for selecting economic variables from remittance-sending countries, rather than from remittance-receiving countries, as instruments is to ensure the validity of the instruments. Therefore, my identification assumption is that all instruments of remittance do not affect school dropout rate in remittance-receiving countries other than through remittances. The

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other concern about the instruments is whether they are strong or not, which is discussed in section 4.2.1.

4. Results

4.1 Benchmark findings

Table 2 reports benchmark LPM results of the analysis of the school dropouts in primary and secondary schools. The analysis draws on households having children who are between 5 and 17 years old, observed in both two waves of the survey. The results are divided into two panels, and each of the panels highlights the results with main regressor keeping other control variables and fixed effects. Panel A shows the results with remittances as a major regressor, while panel B shows the effect of remittances with the control for migration of father and mother in the model.

The sign of the coefficients of remittances in panel A are negative and significant for the primary school dropout rate of left-behind children. It indicates that children from remittance-receiving households have a lower probability of dropout from primary schools. The magnitude of international remittance-receiving households is higher than that of internal remittance-receiving households, but the results is marginally insignificant. The results for secondary school dropouts show a similar trend, but there is no statistically significant effect of remittances on school attendance. The point estimates in column (1) of panel A suggests that an increase in remittances by USD 1000 is associated with a fall in the probability of dropping out of school by approximately 1.02 percent. Next, looking at the coefficients separately for international and internal columns, it says that for both outcome variables, effects of international remittance tend to have higher effect than internal remittances.

Table 2: Effects of remittance on children's school dropouts (LPM result)

	(1)	(2)	(3)	(4)	(5)	(6)
	Primary school dropouts			**Secondary school dropouts**		
VARIABLES	**Overall**	**International**	**Internal**	**Overall**	**International**	**Internal**
Panel A: effects of remittance						
Remittance (1000 usd)	-0.0012*	-0.0012	-0.0010	-0.0017	-0.0016	-0.0019
	[-1.63]	[-1.58]	[-1.35]	[-1.43]	[-1.32]	[-1.45]
R-squared	0.0263	0.0263	0.0263	0.0616	0.0616	0.0616
Observations	44,392	44,392	44,392	44,392	44,392	44,392
Panel B: effects of remittance with control for migration						
Remittance (1000 usd)	-0.0013*	-0.0013*	-0.0010	-0.0020*	-0.0020*	-0.0020
	[-1.76]	[-1.78]	[-1.38]	[-1.71]	[-1.65]	[-1.53]
Father's migration	0.0052**	0.005**	0.0048**	0.018***	0.017***	0.016***
	[2.24]	[2.15]	[2.03]	[4.50]	[4.43]	[4.34]
Mother's migration	0.0022	0.003	0.0022	0.019**	0.02**	0.019**

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	[0.46]	[0.45]	[0.46]	[2.51]	[2.50]	[2.51]
R-squared	0.0264	0.0263	0.0263	0.0617	0.0617	0.0617
Observations	44,392	44,392	44,392	44,392	44,392	44,392

*Note. Robust t-statistics are in brackets for LPM, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and child fixed effects. Also, standard errors are clustered at the individual level.*

In panel B, the model disentangles the potential positive effect of additional income through remittances and the negative impact of a missing family member due to migration; this is discussed in the literature by McKenzie and Rapoport (2011) using bivariate probit models of school attendance. To this end, I estimate the effect of remittances with control for parental migration. Results show a similar trend as in panel A for remittance effect on children's dropout of school, while the current migration state of parents has effects with positive sign. These results indicate that remittances reduce children's dropout of primary school, but the absence of any parents increases the dropouts. The result also shows that the effect of both remittance and parental migration is worst for secondary school dropouts. International migrants' children who are left behind are more likely to drop out of primary school. Similarly, secondary school dropouts are larger for the children of international migrant households.

The result of the father's migration shows an increased probability of dropout throughout primary and secondary school. While the mother's migration has no significant effect on primary school dropouts, it significantly affects secondary school dropouts. Another interesting finding is that that remittances have a significant effect on school dropouts when the father is absent, but there is no effect of remittances when the mother is a migrant. These results support the hypothesis that children having migrant parent compensate for their missing parent by joining the labour force, or by taking over domestic responsibilities.

4.2 IV estimation result

4.2.1 Instrument testing

When assessing the validity of the instruments, Table 3 reports the p-value of the overidentification test. This tests the joint hypothesis that the model is correctly specified and that the orthogonality condition is satisfied. A rejection of the hypothesis indicates that either the IVs are wrongly excluded from the regression, or the orthogonality condition is not satisfied. The p-value of the Sargan or Hansen J-statistics in Table 3 with high values confirms that the null hypothesis cannot be rejected; thus, the instruments used for this study are valid.

As a test of the relevance of the instruments, Table 3 also reports the first stage F-statistics, which are quite high. According to the 'rule of thumb', F-statistics in the first stage of IV estimation larger than 10 indicate valid instruments (Angrist & Pischke, 2009). Furthermore, to investigate the strength of the instruments, first stage regressions are examined. The results of the first stage regressions are provided in Table A4 in the appendix.

In the first stage results, the instrument shows the expected signs and are statistically significant. The negative sign on the instrument indicates that a higher living cost in the remittance-sending areas decreases the probability of receiving remittances. Also, the results of regressing

remittances on the unemployment rate indicates that a higher unemployment rate at the sending areas causes reduced remittances.

4.2.2 The second stage results

Table 3 presents the results of the second stage of IV estimation. Although LPM results shows significant effects of remittance on children's schooling, once the endogeneity of remittance is controlled, the IV results shows different results. The results of panel A indicate that remittances have no statistically significant impacts on both primary and secondary school dropouts. A comparison of the LPM results and IV estimation suggests that children in remittance-receiving households have unobserved characteristics, which reveal no effects of remittances on the children's dropout from school. This implies that remittances cannot compensate for the absence of parents who care about the education of their children.

The results of panel A are consistent with the results of panel B once the remittance is controlled for parental migration. The results in panel B shows no significant impact of remittances on children's schooling even after controlling for parental migration. It is also found that the absence of international migrant parents causes more dropouts than from those of internal migrant parents. It indicates that distance may cause disruption in regular contact with children while internal migrant can supervise their children in closer contact.

The IV results from panel B in Table 3 show a significant effect of father's migration on their left-behind children's dropouts. In line with the results of LPM results which suggest that families get negative shocks when the father migrates, the results of the IV estimation in panel B also show that the father's migration increases the dropouts of both primary and secondary schools. It is found that children having a migrant father are 1.6 percent likely to drop out from primary school and 2.5 percent more likely to drop out of secondary school. Similar association is found between children dropout and father's international and internal migration. In the absence of fathers who go abroad, secondary school children are much affected as the dropout rate is higher than that of primary dropouts. This finding supports the typical findings of the migration literature that migration has negative effect on children's educational outcomes and wellbeing since the prolonged absence of a close family member tends to disrupt child development and education.

In addition, the IV results from panel B in Table 3 shows mother's migration only increases secondary dropouts of left-behind children. The coefficient says that migration of the mother increases the child's dropout from secondary school by 1.9 percent, which is very close to the result for the father's migration. This result is also supported by Cortes (2015), who finds robust evidence that mother's migration, in contrast to father's, has a negative effect on the educational outcomes of Filipino children. Another research project conducted in Bangladesh has found a similar result, which says 32 percent of children left behind by women migrants in Bangladesh dropped out of school before the age of 16 (Farole et al., 2017). A lack of motherly care causing loneliness and depression is found to be another reason for not attending schools regularly.

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Table 3: Effects of remittance and migration on children's school dropouts (second stage IV result)

VARIABLES	(1) Primary school dropouts Overall	(2) Primary school dropouts International	(3) Primary school dropouts Internal	(4) Secondary school dropouts Overall	(5) Secondary school dropouts International	(6) Secondary school dropouts Internal
Remittance (1000 usd)	-0.0055	-0.0058	-0.0019	0.00057	0.00016	0.0017
	[-1.15]	[-1.24]	[-0.64]	[0.085]	[0.024]	[0.39]
Observations	44,392	44,392	44,392	44,392	44,392	44,392
R-squared	0.03	0.03	0.03	0.07	0.07	0.07
First stage F-stat	51.1	39.1	141	51.1	39.1	141
Sargan J statistics	0.76	0.94	0.96	0.96	0.94	0.88
Panel B: effects of remittance with control for migration						
Remittance (1000 usd)	-0.0046	-0.0041	-0.0019	0.0027	0.0044	0.0014
	[-0.97]	[-0.87]	[-0.66]	[0.40]	[0.67]	[0.33]
Father's migration	0.016**	0.018**	0.0074**	0.025**	0.035**	0.0086
	[2.28]	[2.21]	[2.08]	[2.21]	[2.53]	[1.35]
Mother's migration	0.0039	0.074	0.004	0.019**	0.04*	0.019**
	[0.67]	[0.49]	[0.67]	[2.09]	[1.72]	[2.08]
Observations	44,392	44,392	44,392	44,392	44,392	44,392
R-squared	0.03	0.03	0.03	0.07	0.07	0.07
First stage F-stat	50.8	37.6	138	50.8	37.6	138
Sargan J statistics	0.78	0.86	0.9	0.99	0.79	0.93

*Note. robust t-statistics are in brackets for LPM, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and child fixed effects. Also, standard errors are clustered at individual level.*

4.3 Heterogeneous effects

This section answers the question whether the effect of remittance and migration differ by the gender of the children and by wealth groups. The section explores the heterogenous effects on school dropouts of left-behind children using an instrumental variable strategy.

4.3.1 Gender effect

This section explores whether the effects of remittance or migration on schooling differ by the gender of children. Considering panels of previous tables, Figure 3 graphically presents IV estimation result of equation (1) by gender considering margins in x-axis with a 90 percent confidence interval. Pooled results can be found in Appendix Table A8.

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From Figure 3, it is found that in panel A, the coefficient for boys remains on the left side of the line and it passes the confidence intervals (the vertical red line), which indicates that the coefficient is not statistically significant. On the other hand, the coefficient for girls shows a positive sign which does not pass the confidence interval; thus, it is statistically significant. Therefore, the results for panel A say that remittances significantly increase the dropouts from both primary and secondary school for girls. In panel B, the trend of remittance effect is similar as panel A, but the scenario for parental migration is different especially for girls.

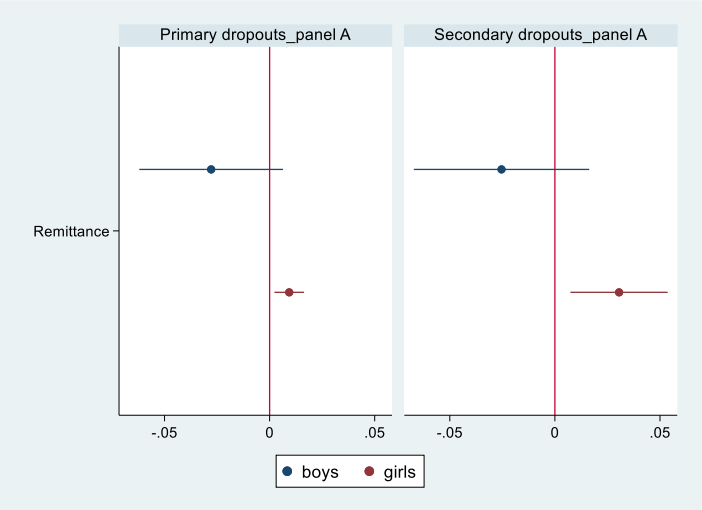

Figure 3: Effect of remittances on school dropouts (IV results)

Regarding the father's migration, in Table 5, it is found that boys from remittance-receiving households are less likely to drop out of primary school, but the results are not statistically significant. However, girls are significantly found to be prone to drop out of school for both internal and international remittance (in Table A8).

An interesting result is found when the father is the migrant. It says that when the father is an international migrant, both left-behind boys and girls are benefitted. In the regression results in panel B, none of the coefficients for the mother's migration are statistically significant. Both boys and girls get benefits when they live in migrant households where the father is an international migrant. There is a large effect that boys are 9.7 percent less likely to drop out from secondary school, while girls reduce their dropouts by 6.6 percent when they live in an international father's migrant household (in Table A8). Although girls benefit from the father's migration, the smaller percentage indicates girls' deprivation in schooling.

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Table 5: Children's school dropouts by gender (IV results)

	(1)	(2)	(3)	(4)
	Primary school dropouts		**Secondary school dropouts**	
VARIABLES	Boys	Girls	Boys	Girls
Panel A: effects of remittance				
Remittance (1000 USD)	-0.028	0.0093**	-0.025	0.031**
	[-1.34]	[2.18]	[-1.00]	[2.17]
Observations	5,881	8,417	5,881	8,417
R-squared	-0.03	0.00	0.00	0.03
First stage F-stat	11.9	18.5	11.9	18.5
Sargan J statistics	0.32	0.43	0.50	0.13
Panel B: effects of remittance with control for migration				
Remittance (1000 USD)	-0.026	0.0099**	-0.021	0.033**
	[-1.26]	[2.18]	[-0.84]	[2.17]
Father's migration	-0.012	-0.010*	-0.032***	-0.019*
	[-1.51]	[-1.70]	[-3.15]	[-1.68]
Mother's migration	-0.0051	-0.0048	0.0057	-0.011
	[-0.75]	[-0.51]	[0.55]	[-0.67]
Observations	5,881	8,417	5,881	8,417
R-squared	-0.03	0.00	0.01	0.02
First stage F-stat	11.5	18.6	11.5	18.6
Sargan J statistics	0.37	0.38	0.66	0.19

*Note. Robust t-statistics are in brackets for LPM, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and child fixed effects. Also, standard errors are clustered at the individual level.*

4.3.2 Heterogeneous wealth effect

To analyse the different effects of remittances and migration on schooling of children left-behind, this study has examined the heterogeneous wealth impacts. Table 6 is about the effect of remittances and migration on left-behind children's dropout rate by their family's wealth level. A straightforward way of looking at relative poverty is to divide the population into equal quintiles. Once each respondent's household has been given a wealth index score by principal component analysis (PCA), then all of them have been put in order of wealth and separated into quintiles. A key reason for creating wealth quintiles is to look at how equitably other indicators are distributed by wealth status.

Since LPM leads to biased estimates, this section provides regression results with IV estimation of four panels with each wealth index quintile (see Table 6.) The results provide strong evidence of the impact of remittances and migration based on a cut-off point of asset accumulation

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in terms of durable household goods. The condition of having different level of assets may affect the household decision make to invest in the children's education. The results of panel A in Table 6 show that remittances have no significant effect on school dropout rates, except for children in poor households going to secondary school. It suggests that remittances reduce the likelihood of dropouts of secondary school for poor children.

Table 6: Children's school dropouts by wealth quintiles (IV results)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Primary school dropouts					**Secondary school dropouts**				
VARIABLES	Poorest	Poor	Middle	Wealthy	Wealthiest	Poorest	Poor	Middle	Wealthy	Wealthiest
Panel A: effects of remittance										
Remittance (1000 usd)	0.0085	-0.0038	0.0069	-0.11	0.0022	-0.095	-0.038*	0.012	-0.092	-0.0045
	[0.26]	[-0.48]	[0.63]	[-0.66]	[0.72]	[-0.78]	[-1.81]	[0.76]	[-0.52]	[-0.39]
Observation	7,102	3,622	2,682	2,726	3,976	7,102	3,622	2,682	2,726	3,976
R-squared	0.06	0.05	0.10	0.01	0.03	0.09	0.09	0.10	0.10	0.10
First stage F-stat	18.1	12.7	44.5	14.69	30.8	18.1	12.7	44.5	14.69	30.8
Sargan J statistics	0.36	0.24	0.27	0.46	0.22	0.15	0.082	0.74	0.91	0.94
Panel B: effects of remittance with control for migration										
Remittance (1000 usd)	-0.0047	-0.0036	0.0092	-0.19	0.0023	-0.11	-0.035*	0.015	-0.11	-0.0020
	[-0.13]	[-0.52]	[0.82]	[-0.47]	[0.75]	[-0.90]	[-1.85]	[0.92]	[-0.34]	[-0.18]
Father's migration	-0.015	-0.0028	-0.022	-0.0056	0.029**	0.000012	-0.034	-0.021	0.026	0.031
	[-0.68]	[-0.10]	[-0.70]	[-0.32]	[2.31]	[0.00045]	[-0.99]	[-0.57]	[0.68]	[1.27]
Mother's migration	-0.014	0.033***	0.012	-0.015**	-0.0064	-0.0046	0.061***	0.020	0.069	-0.012

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	[-1.03]	[4.60]	[1.11]	[-2.23]	[-1.49]	[-0.29]	[5.52]	[1.07]	[1.35]	[-1.47]
Observation	7,102	3,622	2,682	2,726	3,976	7,102	3,622	2,682	2,726	3,976
R-squared	0.06	0.05	0.10	-0.02	0.03	0.09	0.09	0.10	0.10	0.11
First stage F-stat	19.1	13.2	42.3	13.32	31.9	19.1	13.2	42.3	13.32	31.9
Sargan J statistics	0.22	0.25	0.35	0.48	0.23	0.19	0.085	0.63	0.68	0.59

*Note. Robust t-statistics are in brackets for LPM, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and child fixed effects. Also, standard errors are clustered at the individual level.*

After controlling for parental migration, an interesting result in panel B says that left-behind children in wealthier households are more likely to drop out of their primary school as a result of the father's migration. This finding shows that much additional income of families indulge their children in luxury rather than education. On the other hand, remittances have a significant effect to decrease the rate of children's dropout rare for the middle and poorest groups. In panel B, similar effects have been found when the mother is absent due to migration. After controlling for mother's migration, the results of IV estimation find that absence of the migrant mother increases the probability of dropout of primary school by 3.3 percent and of secondary school by 6.1 percent, which is a very significant impact in the poor quintile. An exceptional result is found that children living in the wealthy group are less likely to drop out of primary school when their mother is the migrant. It suggests that the family's income level outweighs the negative impact of the mother's migration on their children.

Overall, heterogenous results by partitioning the data into wealth quintiles suggest that the impact of remittances depends on wealth levels, and those levels in budget constraints may matter a great deal. In particular, the income effect of remittances may be more substantial for poor households with smaller budgets. Additional income may not offset the potential negative impact of a missing parent for wealthier households, but the pre-existing wealth status of families may balance the adverse effect of parental migration on their children. These heterogenous wealth findings are consistent with the recent studies by Bucheli et al. (2018), who also get the evidence for the impact on education varies strongly by income level, where school attendance increases the most for poorer children.

4.4 Testing proposition

From the results of heterogenous wealth effect, it is clear that remittances affect the poor group of individuals. In other words, the poorest do not go to school because of income constraints, and the rest do not go for other reasons. This proposition can be tested with a cash transfer scheme, which is a part of the policy in Bangladesh for the poor.

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Conditional cash transfer started in Bangladesh as a part of the government's social safety net (SSN) program. The Social Safety Net Program (SSNP) is a component of social protection and a well-recognized instrument for the economic wellbeing of the poor from the government and non-government agencies. Under the major SSNPs in Bangladesh, one of the categories is to provide incentives to parents for their children's education (Barkat e, 2011). The conditional cash transfers for education include Food-for-Education programme, primary education stipend programme, and female secondary school assistance project to the poor and vulnerable population groups who do not have land up to 10 decimal or whose average income is below BDT 30 per person per day or whose debt exceed savings by BDT 2,500 or disadvantaged members such as vulnerable women (Khan & Hasan, 2016). In order to test the proposition, the study uses the data from the module on SSNP in the BIHS dataset. The SSN variable includes the stipend for primary students, school feeding program, stipend for dropout students, stipend for secondary and higher secondary/ female student, stipend for poor boys in secondary school and stipend for disable students. The study has used the LPM with child and year fixed effects to test the proposition that relaxing income constraints through cash transfer to the poor can benefit their children with continuing the education.

Table 7: Effects of social safety net (SSN) program on children's school dropouts (LPM result)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Primary school dropouts					**Secondary school dropouts**				
VARIABLES	Poorest	Poor	Middle	Wealthy	Wealthiest	Poorest	Poor	Middle	Wealthy	Wealthiest
SSN	-0.0084**	0.00092	-0.0056	-0.0053	-0.0023	-0.013***	-0.0090	-0.0053	-0.024	0.0040
	[-1.97]	[0.27]	[-1.06]	[-1.42]	[-1.05]	[-2.69]	[-1.62]	[-0.81]	[-3.48]	[0.65]
Observations	86,761	61,196	54,395	50,847	44,435	86,761	61,196	54,395	50,847	44,435
R-squared	0.01	0.012	0.03	0.013	0.02	0.01	0.02	0.012	0.03	0.01

*Note. Robust t-statistics are in brackets for LPM, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and child fixed effects. Also, standard errors are clustered at the individual level.*

The results in Table 7 show that the SSNP conditional cash transfers for education decrease the probability of dropout from both primary and secondary schools for the poorest. The percentage of dropouts from secondary school is higher than that of primary school, which indicates that the program benefits the poor financially and motivates the parents to continue their children to go to secondary school. Therefore, the results support the proposition that due to income constraints, the poorest are unable to send their children to school. However, the incentive is monthly BDT 96 (almost USD 1.2) is very small for running the education smoothly. Although the objective of this program is to attract students to the school, the incentive of almost USD 1 is a negligible amount, which is certainly not enough for stopping dropouts. As a result, many students in Bangladesh drop out of primary school, and start working unless their parents can finance the education.

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5. Conclusion

This paper sets out to measure, using panel data, the net effect of remittances and migration on the schooling outcomes of left-behind children in rural Bangladesh. As a top remittance-receiving country, Bangladesh provides an interesting case, since a large number of rural and urban households rely on remittance as a means of moving out of poverty.

Overall, the analysis yields mixed results regarding the impact of remittance and migration on children in rural Bangladesh. Classical LPM estimates show that children from households that receive remittances are less likely to drop out of school. Further, children in international remittance-receiving households are benefitted more than those from internal remittance-receiving households. The father's migration increases the probability of dropouts in both primary and secondary schools, while the mother's migration increases the likelihood of secondary school dropouts for their left-behind children.

To account for possible endogeneity bias, the study uses an instrumental variable (IV) approach. Using this method, I find that, on average, remittances have no effect on school dropouts for both primary and secondary school students. However, parental migration has a consistent detrimental to children's schooling. Unlike the findings from LPM estimation, the results do not show any significance for the effect of the father's migration. For the mother's migration, the effect is significant, which increases the likelihood of dropping out of secondary school.

Further, the study conducts heterogenous analysis by gender and wealth levels. The heterogeneous effect of remittances and migration across male and female groups shows that both migration and remittance-receiving household members have positive influence mostly on boys, but not on girls. Even after receiving remittance, girls have higher dropout rates compared to boys. This suggest that even additional earnings do not let the girl-child continue their education to secondary school, where boys get this advantage. This result reflects traditional gender norms in Bangladesh, where left-behind girls are more likely to drop their secondary education when their parents are absent. However, the father's migration decreases the probability of dropouts for left-behind girls.

The findings from heterogenous wealth effect show differences in the effect of remittances among different wealth quintiles. The additional income received in the form of remittances relaxes the household's budget constraints for poor households, which increases the probability of investing in children's human capital. This proposition is also proved in this study with the conditional cash transfer program directed by the government of Bangladesh. However, the remittances may not offset the absenteeism effect from parental migration for wealthier families. Therefore, the evidence suggests that the left-behind children of more affluent families may be pushed towards lower school attendance, which shows that when they gain resources, they face have to choose where to utilize the additional funds.

This study has several limitations, which require careful consideration when interpreting its results. First, when measuring the impact of remittances and migration, it is not possible to separate permanent, seasonal, and return migrants as the questionnaires do not include any information on return migration. Therefore, the results could be different if the person who ended up in the treatment group experiences seasonal or permanent migration. Also, the dataset does not have data on the cost of migration, which could be an important control variable in the study.

Although the fixed-effects design attempts to overcome all observable and unobservable heterogeneity at the individual level, the estimates could still be affected by any family-level characteristics, such as genetic ability or work ethic, which affect both parental migration patterns and children's educational attainment.

Nevertheless, my results have some important implications. Since the findings described in this paper suggest an overall positive effect of migration and associated remittances, government should give more emphasis on skilled manpower development so that Bangladesh can capture the skilled job market abroad. In this way, the country would able to ensure increased remittance flow to contribute significantly to human resource development. As part of its development strategy, the Bangladesh government should carry out an awareness program to sensitise people in the migrant-sending communities in Bangladesh regarding the importance and advantage of education. It should also aim to encourage a positive attitude toward female education and employment.

Since the findings suggest that migration affects left-behind children in different ways depending on child gender, national policy should be tailored toward the specific needs of boys and girls. Since women constitute half of the working population in Bangladesh, the education of girl children should be encouraged at all levels so that they can get appropriate skills to build independent careers at home or abroad. In addition, exclusive public and private schemes should be introduced to ensure effective investment of remittances in education and youth development. The contribution of remittances to human resource development can be encouraged by offering incentives for the education of migrant's children e.g., scholarships, fee waiver and so on.

Nevertheless, further research should be undertaken to explore the remittance-education nexus in the case of permanent and seasonal migrants. In a broader perspective, the effects found during the relatively short time period of this study could imply more significant effects of migration who return to their native place. This suggests the need for more long-term research in the future. Future research should also examine in finer detail the mechanisms by which migration affects left-behind children's academic performance in Bangladesh.

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(a) **Appendix A**

Table A1: Effects of remittance and migration on children's school dropouts (LPM result)

	(1)	(2)	(3)	(4)
	Primary school dropouts		**Secondary school dropouts**	
VARIABLES	**Panel A**	**Panel B**	**Panel A**	**Panel B**
Remittance (1000 USD)	-0.0012*	-0.0013*	-0.0017	-0.0020*
	[-1.63]	[-1.76]	[-1.43]	[-1.71]
Father's migration		0.0052**		0.017***
		[2.24]		[4.43]
Mother's migration		0.0022		0.019**
		[0.46]		[2.51]
Mothers's age	0.000061	0.000053	0.000060	0.000060
	[0.52]	[0.45]	[0.38]	[0.38]
Father's education	0.00043*	0.00042	-0.00040	-0.00040
	[1.68]	[1.63]	[-1.05]	[-1.05]
Mother's education	-0.00056**	-0.00057**	-0.0016***	-0.0016***
	[-2.36]	[-2.41]	[-3.30]	[-3.30]
HH's sex	-0.00047	-0.0021	0.0036	0.0038
	[-0.070]	[-0.30]	[0.43]	[0.45]
HH's occupation	0.00016	0.00014	0.0015*	0.0015*
	[0.26]	[0.22]	[1.95]	[1.95]
HH's working place (urban/rural)	-0.0069**	-0.0069**	-0.0066*	-0.0066*
	[-2.36]	[-2.36]	[-1.65]	[-1.65]
Family size	0.016***	0.016***	0.032***	0.032***
	[9.80]	[9.75]	[14.4]	[14.4]
Numbers of children	-0.0041**	-0.0038*	-0.0043	-0.0043
	[-2.07]	[-1.94]	[-1.64]	[-1.64]
Wealth index	-0.0010	-0.00099	0.0017	0.0017
	[-0.51]	[-0.49]	[0.57]	[0.57]
Expenditure for food	-0.000012***	-0.000012***	-0.000033***	-0.000033***
	[-10.1]	[-10.0]	[-17.7]	[-17.6]

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Expenditure for education	-4.4e-07***	-4.3e-07***	-1.0e-06***	-1.0e-06***
	[-5.40]	[-5.36]	[-7.99]	[-7.97]
Constant	-0.033***	-0.033***	-0.072***	-0.072***
	[-3.79]	[-3.77]	[-5.93]	[-5.92]
Observations	44,392	44,392	44,392	44,392
R-squared	0.02	0.02	0.05	0.05

*Note. robust t-statistics are in brackets for LPM, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and child fixed effects. Also, standard errors are clustered at individual level.*

Table A2: Effects of international remittance and migration on children's school dropouts (LPM result)

	(1)	(2)	(3)	(4)
	Primary school dropouts		**Secondary school dropouts**	
VARIABLES	**Panel A**	**Panel B**	**Panel A**	**Panel B**
International remittance (1000 USD)	-0.0012	-0.0013*	-0.0016	-0.0020*
	[-1.58]	[-1.78]	[-1.32]	[-1.65]
Father's migration		0.0050**		0.017***
		[2.15]		[4.43]
Mother's migration		0.0022		0.019**
		[0.45]		[2.51]
Mother's age	0.000061	0.000061	0.000060	0.000056
	[0.52]	[0.52]	[0.38]	[0.36]
Father's education	0.00043*	0.00043*	-0.00040	-0.00043
	[1.68]	[1.67]	[-1.05]	[-1.13]
Mother's education	-0.00056**	-0.00056**	-0.0016***	-0.0017***
	[-2.36]	[-2.36]	[-3.30]	[-3.32]
HH's sex	-0.00034	-0.00061	0.0038	0.0016
	[-0.050]	[-0.090]	[0.45]	[0.19]
HH's occupation	0.00016	0.00016	0.0015*	0.0015*
	[0.26]	[0.26]	[1.95]	[1.92]

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HH's working place (urban/rural)	-0.0069**	-0.0069**	-0.0066*	-0.0065
	[-2.36]	[-2.36]	[-1.65]	[-1.63]
Family size	0.016***	0.016***	0.032***	0.032***
	[9.78]	[9.79]	[14.4]	[14.4]
Numbers of children	-0.0041**	-0.0040**	-0.0043	-0.0041
	[-2.07]	[-2.06]	[-1.64]	[-1.59]
Wealth index	-0.0011	-0.0010	0.0017	0.0018
	[-0.52]	[-0.51]	[0.57]	[0.62]
Expenditure for food	-0.000012***	-0.000012***	-0.000033***	-0.000033***
	[-10.1]	[-10.1]	[-17.6]	[-17.6]
Expenditure for education	-4.4e-07***	-4.3e-07***	-1.0e-06***	-9.8e-07***
	[-5.39]	[-5.36]	[-7.97]	[-7.81]
Constant	-0.033***	-0.033***	-0.072***	-0.072***
	[-3.79]	[-3.79]	[-5.92]	[-5.94]
Observations	44,392	44,392	44,392	44,392
R-squared	0.02	0.02	0.05	0.05

*Note. robust t-statistics are in brackets for LPM, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and child fixed effects. Also, standard errors are clustered at individual level.*

Table A3: Effects of internal remittance and migration on children's school dropouts (LPM result)

	(1)	(2)	(3)	(4)
	Primary school dropouts		**Secondary school dropouts**	
VARIABLES	**Panel A**	**Panel B**	**Panel A**	**Panel B**
Internal remittance (1000 USD)	-0.0010	-0.0010	-0.0019	-0.0020
	[-1.35]	[-1.38]	[-1.45]	[-1.53]
Father's migration		0.0048**		0.017***
		[2.03]		[4.34]
Mother's migration		0.0022		0.019**
		[0.46]		[2.51]
Mother's age	0.000061	0.000053	0.000062	0.000030

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	[0.52]	[0.45]	[0.40]	[0.19]
Father's education	0.00044*	0.00043*	-0.00040	-0.00042
	[1.68]	[1.65]	[-1.03]	[-1.10]
Mother's education	-0.00056**	-0.00057**	-0.0016***	-0.0017***
	[-2.36]	[-2.41]	[-3.29]	[-3.38]
HH's sex	-0.00014	-0.0013	0.0043	-0.00016
	[-0.020]	[-0.19]	[0.51]	[-0.019]
HH's occupation	0.00017	0.00014	0.0016**	0.0015*
	[0.27]	[0.23]	[1.97]	[1.87]
HH's working place (urban/rural)	-0.0069**	-0.0069**	-0.0065	-0.0066*
	[-2.35]	[-2.36]	[-1.63]	[-1.66]
Family size	0.016***	0.016***	0.032***	0.032***
	[9.77]	[9.71]	[14.4]	[14.2]
Numbers of children	-0.0041**	-0.0039**	-0.0044*	-0.0035
	[-2.11]	[-1.98]	[-1.69]	[-1.34]
Wealth index	-0.0011	-0.0010	0.0017	0.0018
	[-0.53]	[-0.51]	[0.58]	[0.62]
Expenditure for food	-0.000012***	-0.000012***	-0.000033***	-0.000033***
	[-10.1]	[-10.0]	[-17.5]	[-17.4]
Expenditure for education	-4.4e-07***	-4.4e-07***	-9.9e-07***	-9.9e-07***
	[-5.37]	[-5.38]	[-7.85]	[-7.90]
Constant	-0.033***	-0.033***	-0.072***	-0.071***
	[-3.76]	[-3.73]	[-5.93]	[-5.84]
Observations	44,392	44,392	44,392	44,392
R-squared	0.02	0.02	0.05	0.05

*Note. robust t-statistics are in brackets for LPM, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and child fixed effects. Also, standard errors are clustered at individual level.*

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Table A4: First stage results of IV estimation

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: effect of remittance			**Panel B: effect of remittance with controlling for migration**		
VARIABLES	Remittance	International remittance	Internal remittance	Remittance	International remittance	Internal remittance
Living cost at destination	-0.101***	-0.0834***	-0.162***	-0.102***	-0.0852***	-0.160***
	(0.0124)	(0.0124)	(0.0108)	(0.0126)	(0.0134)	(0.0108)
Unemployment rate at sending countries	-0.132***	-0.135***	-0.293***	-0.133***	-0.137***	-0.292***
	(0.0303)	(0.0296)	(0.0305)	(0.0301)	(0.0289)	(0.0305)
Father's migration				2.977***	1.259***	0.0754
				(0.449)	(0.455)	(0.182)
Mother's migration				-0.319	-0.646***	-0.220
				(0.210)	(0.210)	(0.185)
Mother's age	-8.85e-05	-0.000431	-0.000212	-0.000181	-0.000521	-0.000462
	(0.00247)	(0.00251)	(0.00261)	(0.00247)	(0.00250)	(0.00260)
Father's education	0.0102	0.0100	0.00736	0.0100	0.00969	0.00706
	(0.00623)	(0.00627)	(0.00664)	(0.00621)	(0.00623)	(0.00666)
Mother's education	0.00271	0.00244	0.00544	0.00235	0.00202	0.00463
	(0.00773)	(0.00796)	(0.00747)	(0.00775)	(0.00795)	(0.00747)
HH's age	0.0687	0.156	-0.198*	0.0623	0.147	-0.210**
	(0.101)	(0.0993)	(0.105)	(0.101)	(0.0982)	(0.106)
HH's occupation	0.0565***	0.0484**	0.0455**	0.0562***	0.0481**	0.0443**
	(0.0189)	(0.0191)	(0.0211)	(0.0190)	(0.0191)	(0.0211)
HH's working place (urban/rural)	0.278***	0.281***	0.193***	0.277***	0.280***	0.192***
	(0.0657)	(0.0659)	(0.0646)	(0.0656)	(0.0658)	(0.0645)
Family size	-0.0386	-0.0324	-0.000312	-0.0403	-0.0352	-0.00304
	(0.0411)	(0.0415)	(0.0430)	(0.0415)	(0.0416)	(0.0432)
Numbers of children	-0.0558	-0.0495	0.0762	-0.0546	-0.0478	0.0784*
	(0.0418)	(0.0422)	(0.0473)	(0.0416)	(0.0418)	(0.0474)
Wealth index	0.0287	0.0541	0.155***	0.0294	0.0552	0.156***
	(0.0461)	(0.0465)	(0.0473)	(0.0463)	(0.0468)	(0.0473)
Expenditure for food	0.000503***	0.000516***	0.000328***	0.000506***	0.000519***	0.000333***
	(7.78e-05)	(7.92e-05)	(7.88e-05)	(7.81e-05)	(7.93e-05)	(7.90e-05)
Expenditure for education	1.25e-05***	1.18e-05***	1.44e-05***	1.25e-05***	1.19e-05***	1.44e-05***
	(2.85e-06)	(2.96e-06)	(2.67e-06)	(2.85e-06)	(2.96e-06)	(2.67e-06)

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Observations	44,392	44,392	44,392	44,392	44,392	44,392

*Note. robust t-statistics are in brackets for LPM, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and individual fixed effects. Also, standard errors are clustered at individual level.*

Table A5: Effects of overall remittance and migration on children's school dropouts (IV result)

	(1)	(2)	(3)	(4)
	Primary school dropouts		**Secondary school dropouts**	
VARIABLES	**Panel A**	**Panel B**	**Panel A**	**Panel B**
Remittance (1000 USD)	-0.0055	-0.0046	0.00057	0.0027
	[-1.15]	[-0.97]	[0.085]	[0.40]
Father's migration		-0.016**		-0.025**
		[2.28]		[2.21]
Mother's migration		0.0039		0.019**
		[0.67]		[2.09]
Mother 's age	0.00017	0.00014	0.00028	0.00014
	[0.95]	[0.75]	[0.97]	[0.50]
Father's education	-0.00044***	-0.00054***	-0.0019***	-0.0023***
	[-2.88]	[-3.06]	[-3.90]	[-4.19]
Mother's education	-0.00079**	-0.00093**	-0.0026***	-0.0031***
	[-2.07]	[-2.26]	[-3.57]	[-3.67]
HH's sex	-0.011	-0.014	-0.016	-0.026
	[-0.88]	[-1.08]	[-0.86]	[-1.39]
HH's occupation	-0.0019	-0.0022	-1.5e-06	-0.00097
	[-1.14]	[-1.29]	[-0.00053]	[-0.34]
HH's working place (urban/rural)	-0.012**	-0.013**	-0.018*	-0.021**
	[-2.00]	[-2.09]	[-1.84]	[-2.09]
Family size	0.0049	0.0043	0.014**	0.012**
	[1.35]	[1.20]	[2.44]	[2.06]
Numbers of children	-0.0011	-0.00051	0.0069	0.0091
	[-0.26]	[-0.13]	[1.10]	[1.45]
Wealth index	-0.0069*	-0.0066*	0.0045	0.0053
	[-1.77]	[-1.71]	[0.61]	[0.73]
Expenditure for food	-9.1e-06**	-9.2e-06**	-0.000020***	-0.000021***

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	[-2.08]	[-2.10]	[-2.78]	[-2.83]
Expenditure for education	-5.0e-07***	-5.1e-07***	-1.3e-06***	-1.3e-06***
	[-3.42]	[-3.42]	[-4.87]	[-4.87]
Observations	44,392	44,392	44,392	44,392
R-squared	0.03	0.03	0.07	0.07
First stage F-stat	51.1	50.8	51.1	50.8
Sargan J statistics	0.76	0.78	0.96	0.99

*Note. robust t-statistics are in brackets for LPM, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and child fixed effects. Also, standard errors are clustered at individual level.*

Table A6: Effects of international remittance and migration on children's school dropouts (IV result)

	(1)	(2)	(3)	(4)
	Primary school dropouts		**Secondary school dropouts**	
VARIABLES	**Panel A**	**Panel B**	**Panel A**	**Panel B**
Remittance (1000 USD)	-0.0058	-0.0041	0.00016	0.0044
	[-1.24]	[-0.87]	[0.024]	[0.67]
Father's migration		0.018**		0.035**
		[2.21]		[2.53]
Mother's migration		0.074		0.04*
		[0.49]		[1.72]
Mother's age	0.00018	0.00017	0.00029	0.00022
	[0.97]	[0.91]	[0.99]	[0.75]
Father's education	-0.00046***	-0.00053***	-0.0019***	-0.0023***
	[-2.83]	[-2.81]	[-3.85]	[-3.93]
Mother's education	-0.00079**	-0.00086**	-0.0026***	-0.0029***
	[-2.03]	[-2.08]	[-3.51]	[-3.39]
HH's sex	-0.013	-0.015	-0.018	-0.027
	[-0.99]	[-1.10]	[-0.97]	[-1.43]
HH's occupation	-0.0019	-0.0021	0.000014	-0.00094
	[-1.14]	[-1.23]	[0.0050]	[-0.32]
HH's working place (urban/rural)	-0.013**	-0.013**	-0.019*	-0.023**
	[-2.05]	[-2.13]	[-1.87]	[-2.26]

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Family size	0.0049	0.0046	0.014**	0.013**
	[1.34]	[1.27]	[2.43]	[2.15]
Numbers of children	-0.0011	-0.00071	0.0069	0.0089
	[-0.26]	[-0.17]	[1.10]	[1.41]
Wealth index	-0.0073*	-0.0073*	0.0039	0.0040
	[-1.88]	[-1.87]	[0.53]	[0.53]
Expenditure for food	-0.000010**	-0.000011**	-0.000022***	-0.000028***
	[-2.14]	[-2.23]	[-2.71]	[-3.22]
Expenditure for education	-5.2e-07***	-5.4e-07***	-1.3e-06***	-1.5e-06***
	[-3.37]	[-3.34]	[-4.71]	[-4.80]
Observations	44,392	44,392	44,392	44,392
R-squared	0.03	0.03	0.07	0.07
First stage F-stat	39.1	37.6	39.1	37.6
Sargan J statistics	0.94	0.86	0.94	0.79

*Note. robust t-statistics are in brackets for LPM, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and child fixed effects. Also, standard errors are clustered at individual level.*

Table A7: Effects of internal remittance and migration on children's school dropouts (IV result)

	(1)	(2)	(3)	(4)
	Primary school dropouts		**Secondary school dropouts**	
VARIABLES	**Panel A**	**Panel B**	**Panel A**	**Panel B**
Remittance (1000 USD)	-0.0019	-0.0019	0.0017	0.0014
	[-0.64]	[-0.66]	[0.39]	[0.33]
Father's migration		0.0074**		0.0086
		[2.08]		[1.35]
Mother's migration		0.004		0.019**
		[0.67]		[2.08]
Mother's age	0.00017	0.00015	0.00028	0.00022
	[0.96]	[0.85]	[0.97]	[0.78]
Father's education	-0.00036***	-0.00038***	-0.0018***	-0.0019***
	[-2.72]	[-2.84]	[-4.10]	[-4.17]

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Mother's education	-0.00080**	-0.00086**	-0.0026***	-0.0027***
	[-2.22]	[-2.34]	[-3.74]	[-3.84]
HH's sex	-0.0090	-0.010	-0.013	-0.016
	[-0.71]	[-0.79]	[-0.70]	[-0.86]
HH's occupation	-0.0015	-0.0016	0.00053	0.00035
	[-0.92]	[-0.96]	[0.19]	[0.12]
HH's working place (urban/rural)	-0.0097*	-0.0097*	-0.015*	-0.015
	[-1.74]	[-1.74]	[-1.65]	[-1.64]
Family size	0.0044	0.0042	0.014**	0.013**
	[1.24]	[1.18]	[2.33]	[2.24]
Numbers of children	-0.0024	-0.0022	0.0051	0.0057
	[-0.60]	[-0.55]	[0.83]	[0.93]
Wealth index	-0.0077**	-0.0075*	0.0035	0.0039
	[-1.98]	[-1.93]	[0.46]	[0.52]
Expenditure for food	-4.8e-06	-4.3e-06	-0.000015***	-0.000013**
	[-1.61]	[-1.41]	[-2.62]	[-2.34]
Expenditure for education	-4.4e-07***	-4.3e-07***	-1.2e-06***	-1.2e-06***
	[-3.72]	[-3.64]	[-5.30]	[-5.17]
Observations	44,392	44,392	44,392	44,392
R-squared	0.03	0.03	0.07	0.07
First stage F-stat	141	138	141	138
Sargan J statistics	0.96	0.9	0.88	0.93

*Note. robust t-statistics are in brackets for LPM, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and child fixed effects. Also, standard errors are clustered at individual level.*

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Table A8: Effect of remittance and migration on school dropout (IV results by gender)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Primary school dropouts						**Secondary school dropouts**					
	both		**International**		**Internal**		**both**		**International**		**Internal**	
VARIABLES	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Panel A: effects of remittance												
Remittance (1000 USD)	-0.028	0.0093**	-0.024	0.0097**	-0.012	0.0064***	-0.025	0.031**	-0.022	0.035**	-0.011	0.015**
	[-1.34]	[2.18]	[-1.25]	[2.11]	[-1.46]	[2.73]	[-1.00]	[2.17]	[-0.89]	[2.17]	[-1.12]	[2.30]
Observations	5,881	8,417	5,881	8,417	5,881	8,417	5,881	8,417	5,881	8,417	5,881	8,417
R-squared	-0.03	0.00	-0.02	0.00	0.01	0.01	0.00	0.03	0.01	0.02	0.03	0.05
First stage F-stat	11.9	18.5	11.6	20.6	133	12.4	11.9	18.5	11.6	20.6	133	12.4
Sargan J statistics	0.32	0.43	0.21	0.29	0.69	0.73	0.50	0.13	0.37	0.30	0.81	0.41
Panel B: effects of remittance with control for migration												
Remittance (1000 USD)	-0.026	0.0099**	-0.018	0.0093**	-0.012	0.0063***	-0.021	0.033**	-0.0070	0.032**	-0.010	0.015**
	[-1.26]	[2.18]	[-1.07]	[2.25]	[-1.45]	[2.72]	[-0.84]	[2.17]	[-0.36]	[2.23]	[-1.09]	[2.28]
Father's migration	-0.012	-0.01*	-0.037	-0.036*	-0.018	-0.014	-0.032***	-0.019*	-0.097***	-0.066*	-0.047***	-0.025
	[-1.51]	[-1.70]	[-1.47]	[-1.94]	[-1.52]	[-1.57]	[-3.15]	[-1.68]	[-3.08]	[-1.92]	[-3.16]	[-1.55]
Mother's migration	-0.0051	-0.0048	-0.16	-0.18	-0.0052	-0.0049	0.0057	-0.011	-0.027	-0.42	0.0063	-0.012
	[-0.75]	[-0.51]	[-1.06]	[-0.54]	[-0.73]	[-0.51]	[0.55]	[-0.67]	[-0.12]	[-0.69]	[0.59]	[-0.67]
Observations	5,881	8,417	5,881	8,417	5,881	8,417	5,881	8,417	5,881	8,417	5,881	8,417

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R-squared	-0.03	0.00	-0.00	0.00	0.02	0.01	0.01	0.02	0.04	0.02	0.03	0.05
First stage F-stat	12	18.6	14	16.6	137	12.5	12	18.6	14	16.6	137	12.5
Sargan J statistics	0.37	0.38	0.79	0.38	0.67	0.72	0.66	0.19	0.70	0.24	0.79	0.4

*Note. robust t-statistics are in brackets for LPM, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and child fixed effects. Also, standard errors are clustered at individual level.*

Table A9: Effect of remittance on children's school dropouts by wealth quintiles (IV results)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Primary school dropouts					**Secondary school dropouts**				
VARIABLES	Poorest	Poor	Middle	Wealthy	Wealthiest	Poorest	Poor	Middle	Wealthy	Wealthiest
Remittance (1000 USD)	0.0085	-0.0038	0.0069	-0.11	0.0022	-0.095	-0.038*	0.012	-0.092	-0.0045
	[0.26]	[-0.48]	[0.63]	[-0.66]	[0.72]	[-0.78]	[-1.81]	[0.76]	[-0.52]	[-0.39]
HH's age	-0.00031	-0.00018	-0.00071	-0.0026	-0.000038	-0.00038	-0.00050	-0.00083	-0.0038	0.00052
	[-0.64]	[-0.44]	[-1.52]	[-0.72]	[-0.42]	[-0.49]	[-0.56]	[-1.59]	[-1.06]	[0.62]
Father's education	-0.00027	0.0049	0.00051	-0.00088	-0.000089	-0.00042	0.0043	0.00021	-0.0013	-0.0021
	[-0.87]	[1.29]	[1.03]	[-0.64]	[-0.46]	[-0.75]	[0.89]	[0.31]	[-0.86]	[-1.58]
Mother's education	0.0036	-0.00053	-0.0052**	0.00032	-0.00018	0.0091	-0.0033	-0.0047	0.000051	-0.0018
	[0.41]	[-0.27]	[-2.01]	[0.047]	[-0.90]	[0.70]	[-1.17]	[-1.54]	[0.0095]	[-1.20]
HH's sex	-0.018	0.036	0.070**	0.23	0.0025	-0.067	0.070	0.073*	0.28	0.000025
	[-0.34]	[0.80]	[2.12]	[0.69]	[0.76]	[-0.85]	[1.08]	[1.84]	[0.81]	[0.00058]
HH's occupation	-0.00054	0.0024	-0.0098	0.012	0.000013	0.0047	0.0098	-0.0031	0.017	-0.0013
	[-0.11]	[0.48]	[-1.57]	[0.72]	[0.015]	[0.42]	[1.07]	[-0.28]	[0.90]	[-0.15]
HH's working place (urban/rural)	0.011	-0.024	-0.0097	0.075	0.0020	0.030	-0.047	0.022	0.084	-0.037

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	[0.41]	[-1.46]	[-0.99]	[0.91]	[0.43]	[0.66]	[-1.46]	[0.95]	[0.96]	[-1.55]
Family size	0.032	0.0081	0.054**	-0.066	0.00094	0.018	-0.0019	0.062**	-0.017	0.019
	[1.55]	[0.80]	[2.10]	[-0.96]	[0.17]	[0.69]	[-0.11]	[2.13]	[-0.24]	[1.20]
Numbers of children	-0.040	-0.0070	-0.050	0.050	0.0084	-0.0065	0.0078	-0.051	0.025	0.0095
	[-1.35]	[-0.59]	[-1.54]	[1.03]	[1.34]	[-0.18]	[0.44]	[-1.56]	[0.47]	[0.56]
Wealth index	-0.032	-0.079*	0.059	-0.29	-0.0029	-0.038	-0.100	-0.026	-0.11	0.013
	[-1.21]	[-1.95]	[0.76]	[-0.73]	[-0.24]	[-0.97]	[-1.25]	[-0.27]	[-0.27]	[0.46]
Expenditure for food	-9.5e-06	-7.1e-06	0.000031	-0.000025	-4.4e-06	-7.2e-06	3.2e-06	0.000040	-0.000022	-6.9e-06
	[-0.43]	[-0.66]	[1.31]	[-1.43]	[-0.76]	[-0.29]	[0.21]	[1.41]	[-1.10]	[-0.50]
Expenditure for education	-2.5e-06	-3.0e-07	-3.2e-07	4.5e-07	-4.0e-08	-2.6e-06	-3.3e-06*	-4.8e-07	-9.8e-07	-5.6e-07**
	[-1.50]	[-0.59]	[-1.22]	[0.19]	[-0.55]	[-0.62]	[-1.67]	[-1.52]	[-0.35]	[-2.00]
Observations	604	474	410	466	964	604	474	410	466	964
R-squared	0.07	0.05	0.11	0.11	0.03	0.09	0.08	0.10	0.22	0.10
First stage F-stat	17.5	11.7	62	37	24.7	17.5	11.7	62	37	24.7
Sargan J statistics	0.44	0.20	0.16	0.58	0.11	0.17	0.15	0.90	0.91	0.31

*Note. robust t-statistics are in brackets for LPM, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and child fixed effects. Also, standard errors are clustered at individual level.*

Table A10: Effect of remittance with control for migration on children's school dropouts by wealth quintiles (IV results)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
			Primary school dropouts					**Secondary school dropouts**		
VARIABLES	Poorest	Poor	Middle	Wealthy	Wealthiest	Poorest	Poor	Middle	Wealthy	Wealthiest

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Remittance (1000 USD)	-0.0047	-0.0036	0.0092	-0.19	0.0023	-0.11	-0.035*	0.015	-0.11	-0.0020
	[-0.13]	[-0.52]	[0.82]	[-0.47]	[0.75]	[-0.90]	[-1.85]	[0.92]	[-0.34]	[-0.18]
Father's migration	-0.015	-0.0028	-0.022	-0.0056	0.029**	0.000012	-0.034	-0.021	0.026	0.031
	[-0.68]	[-0.10]	[-0.70]	[-0.32]	[2.31]	[0.00045]	[-0.99]	[-0.57]	[0.68]	[1.27]
Mother's migration	-0.014	0.033***	0.012	-0.015**	-0.0064	-0.0046	0.061***	0.020	0.069	-0.012
	[-1.03]	[4.60]	[1.11]	[-2.23]	[-1.49]	[-0.29]	[5.52]	[1.07]	[1.35]	[-1.47]
Mother's age	-0.00049	-0.00017	-0.00077*	-0.0044	-0.000049	-0.00057	-0.00049	-0.00097**	-0.0040	0.00019
	[-0.91]	[-0.42]	[-1.69]	[-0.48]	[-0.50]	[-0.69]	[-0.56]	[-1.97]	[-0.61]	[0.23]
Father's education	-0.00040	0.0052	0.00045	-0.00065	-0.00010	-0.00056	0.0038	0.000059	-0.0014	-0.0025*
	[-1.19]	[1.29]	[0.94]	[-0.36]	[-0.50]	[-0.93]	[0.78]	[0.072]	[-0.84]	[-1.95]
Mother's education	0.0025	-0.00040	-0.0059**	0.0012	-0.00019	0.0080	-0.0035	-0.0063*	-0.00014	-0.0023
	[0.28]	[-0.22]	[-2.02]	[0.12]	[-0.94]	[0.61]	[-1.28]	[-1.82]	[-0.023]	[-1.31]
HH's sex	-0.022	0.040	0.066**	0.41	0.0022	-0.071	0.066	0.067*	0.30	-0.0083
	[-0.43]	[0.79]	[2.08]	[0.48]	[0.67]	[-0.92]	[0.99]	[1.72]	[0.47]	[-0.20]
HH's occupation	-0.0017	0.0023	-0.011	0.018	-0.000049	0.0036	0.0098	-0.0044	0.018	-0.0031
	[-0.34]	[0.47]	[-1.62]	[0.50]	[-0.054]	[0.32]	[1.08]	[-0.40]	[0.66]	[-0.35]
HH's working place (urban/rural)	0.0089	-0.023	-0.0096	0.11	0.0019	0.028	-0.047	0.022	0.091	-0.039*
	[0.35]	[-1.39]	[-1.00]	[0.59]	[0.40]	[0.62]	[-1.45]	[0.97]	[0.64]	[-1.67]
Family size	0.031	0.0090	0.053**	-0.092	0.00061	0.016	-0.0023	0.060**	-0.022	0.0089
	[1.50]	[0.85]	[2.09]	[-0.63]	[0.11]	[0.64]	[-0.13]	[2.08]	[-0.19]	[0.55]

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Numbers of children	-0.037	-0.0081	-0.049	0.072	0.0088	-0.0036	0.0089	-0.051	0.028	0.024
	[-1.28]	[-0.60]	[-1.54]	[0.66]	[1.34]	[-0.10]	[0.47]	[-1.56]	[0.32]	[1.40]
Wealth index	-0.029	-0.078*	0.053	-0.48	-0.0028	-0.034	-0.098	-0.036	-0.14	0.015
	[-1.05]	[-1.94]	[0.69]	[-0.50]	[-0.23]	[-0.88]	[-1.22]	[-0.37]	[-0.19]	[0.55]
Expenditure for food	-9.0e-06	-7.9e-06	0.000035	-0.000028	-4.4e-06	-6.7e-06	4.1e-06	0.000045	-0.000021	-4.6e-06
	[-0.41]	[-0.77]	[1.38]	[-1.20]	[-0.76]	[-0.27]	[0.27]	[1.51]	[-0.99]	[-0.34]
Expenditure for education	-2.3e-06	-3.7e-07	-2.4e-07	1.2e-06	-4.0e-08	-2.4e-06	-3.3e-06*	-3.4e-07	-7.4e-07	-5.3e-07*
	[-1.44]	[-0.73]	[-0.92]	[0.24]	[-0.54]	[-0.57]	[-1.71]	[-1.06]	[-0.19]	[-1.91]
Observations	604	474	410	466	964	604	474	410	466	964
R-squared	0.08	0.05	0.10	-3.23	0.03	0.08	0.09	0.10	-0.32	0.12
First stage F-stat	18.3	12.7	53.4	18	25	18.3	12.7	53.4	18	25
Sargan J statistics	0.47	0.21	0.22	0.79	0.11	0.16	0.13	0.76	0.83	0.53

*Note. robust t-statistics are in brackets for LPM, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and child fixed effects. Also, standard errors are clustered at individual level.*

Table A11: Effects of social safety net (SSN) program on children's school dropouts (LPM result)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
			Primary school dropouts						**Secondary school dropouts**	
VARIABLES	Poorest	Poor	Middle	Wealthy	Wealthiest	Poorest	Poor	Middle	Wealthy	Wealthiest
SSN	-0.0084**	0.00092	-0.0056	-0.0053	-0.0023	-0.013***	-0.0090	-0.0053	-0.024***	0.0040
	[-1.97]	[0.27]	[-1.06]	[-1.42]	[-1.05]	[-2.69]	[-1.62]	[-0.81]	[-3.48]	[0.65]
Mother's age	-0.00027	-.00081***	-.00073***	-.00048***	-.00020***	-.00078***	-.0013***	-.0013***	-.00079***	-.00068***
	[-1.57]	[-4.51]	[-5.88]	[-4.35]	[-3.71]	[-3.80]	[-5.16]	[-6.42]	[-3.68]	[-3.16]
Father's education	0.00068**	0.00049	0.00073	-0.00014	-0.000025	-0.000048	0.000100	0.0013	-0.00017	-0.00064**

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	[2.23]	[1.41]	[1.32]	[-0.41]	[-0.25]	[-0.050]	[0.16]	[1.29]	[-0.26]	[-2.22]
Mother's education	0.00086	-0.0012	-0.0013***	-0.0014***	-0.00072***	0.0012	-0.000042	-0.00079	0.00082	-0.0011
	[1.50]	[-0.71]	[-3.03]	[-2.91]	[-4.08]	[0.73]	[-0.019]	[-1.12]	[0.96]	[-1.13]
HH's sex	-0.0034	0.015	0.036**	0.020	0.0061**	0.0020	0.0012	0.061***	0.022	-0.0098
	[-0.25]	[1.31]	[2.20]	[1.50]	[2.23]	[0.13]	[0.056]	[2.78]	[1.01]	[-0.39]
HH's occupation										
Salaried worker	0.021	-0.029	-0.015	-0.0086	0.0051	0.070*	-0.046	-0.025	-0.029	0.00051
	[0.94]	[-1.55]	[-0.31]	[-0.66]	[0.75]	[1.72]	[-1.15]	[-0.47]	[-1.42]	[0.018]
Self employed	0.041	-0.00064	-0.0051	-0.023*	-0.0071	0.11**	-0.043	-0.052	-0.016	0.0025
	[1.51]	[-0.039]	[-0.11]	[-1.65]	[-0.91]	[2.37]	[-1.04]	[-0.97]	[-0.55]	[0.12]
Trader	0.015	0.0059	0.0074	-0.041**	0.013	0.067	-0.0019	0.010	-0.048*	-0.021
	[0.60]	[0.34]	[0.16]	[-2.49]	[1.48]	[1.57]	[-0.046]	[0.20]	[-1.87]	[-1.58]
Production food	0.016	-0.0018	-0.015	-0.033***	0.0084	0.069*	0.020	-0.0099	-0.044**	-0.0056
	[0.70]	[-0.13]	[-0.32]	[-2.69]	[1.15]	[1.72]	[0.55]	[-0.19]	[-2.16]	[-0.44]
Livestock Poultry	0.035	-0.045	-0.034	-0.082**	0.020**	0.088*	0.012	-0.078	-0.10**	0.044***
	[1.30]	[-1.34]	[-0.68]	[-2.03]	[2.40]	[1.88]	[0.18]	[-1.46]	[-2.23]	[3.08]
Farming	0.0087	-0.036***	-0.022	-0.052***	0.0013	0.15	-0.053	-0.075	-0.11***	0.059
	[0.35]	[-3.58]	[-0.47]	[-4.09]	[0.15]	[1.47]	[-1.50]	[-1.53]	[-5.05]	[0.94]
Non-earning occupation	0.013	-0.014	-0.0099	-0.027***	0.0062	0.071*	-0.028	-0.011	-0.036**	-0.0075
	[0.57]	[-0.82]	[-0.20]	[-2.64]	[0.87]	[1.77]	[-0.69]	[-0.20]	[-2.02]	[-0.56]
others	-0.010	-0.024**	0.019	-0.017	0.0033	0.057	0.035	-0.028	-0.017	0.00087
	[-0.49]	[-2.19]	[0.40]	[-1.21]	[0.51]	[1.43]	[0.84]	[-0.55]	[-0.94]	[0.053]

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HH's working place (urban/rural)	-0.028**	-0.015	0.038**	0.00081	0.00031	-0.0079	0.013	0.017	-0.0041	-0.011
	[-2.33]	[-1.30]	[2.13]	[0.15]	[0.13]	[-0.47]	[0.82]	[0.75]	[-0.31]	[-1.05]
Family size	0.0050	0.0084**	0.0064**	0.0058*	0.0034	0.0023	0.0073	0.013***	0.015***	0.0059*
	[1.49]	[2.13]	[2.05]	[1.81]	[1.33]	[0.52]	[1.42]	[2.73]	[3.20]	[1.72]
Numbers of children	0.0038	0.00019	-0.0043	0.00015	0.0016	0.014***	0.0063	-0.0055	0.0014	0.012**
	[0.86]	[0.036]	[-0.86]	[0.042]	[0.51]	[2.65]	[0.97]	[-0.79]	[0.24]	[2.34]
Wealth index	0.00054	-0.012	-0.015	0.021*	-0.014***	0.0071	-0.0023	-0.0059	0.033	-0.017**
	[0.074]	[-0.76]	[-0.80]	[1.66]	[-3.04]	[0.82]	[-0.11]	[-0.22]	[1.50]	[-2.38]
Expenditure for food	-3.9e-06	7.2e-06	-3.7e-07	-1.7e-06	1.4e-06	-8.8e-06	6.7e-06	-0.000010	-4.9e-06	-6.5e-06
	[-0.69]	[1.08]	[-0.075]	[-0.48]	[0.80]	[-1.13]	[0.79]	[-1.29]	[-0.97]	[-1.37]
Expenditure for education	-3.3e-06***	-1.8e-06***	-6.7e-07***	-3.9e-07***	-1.3e-07*	-6.3e-06***	-3.6e-06***	-1.2e-06***	-7.5e-07***	-4.8e-07**
	[-4.80]	[-2.82]	[-3.17]	[-3.44]	[-1.73]	[-6.60]	[-4.60]	[-4.17]	[-3.06]	[-2.12]
Constant	0.010	0.0064	-0.025	0.0042	0.0063	-0.031	0.012	0.0016	-0.0075	0.046**
	[0.44]	[0.36]	[-0.54]	[0.28]	[0.55]	[-0.75]	[0.31]	[0.033]	[-0.28]	[2.18]
Observations	86,761	61,196	54,395	50,847	44,435	86,761	61,196	54,395	50,847	44,435

*Note. robust t-statistics are in brackets for LPM, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and child fixed effects. Also, standard errors are clustered at individual level.*