Murakami, Enerelt

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INTERNATIONAL MIGRATION AND REMITTANCE EFFECTS ON THE SCHOOL ENROLLMENT OF CHILDREN STAYING BEHIND: EVIDENCE FROM TAJIKISTAN

Enerelt Murakami

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Enerelt Murakami is a research fellow at the JICA Research Institute in Tokyo.

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Please contact the authors for information about this paper.

Email: Murakami.Enerelt@jica.go.jp

Asian Development Bank Institute
Kasumigaseki Building, 8th Floor
3-2-5 Kasumigaseki, Chiyoda-ku
Tokyo 100-6008, Japan

Tel: +81-3-3593-5500
Fax: +81-3-3593-5571
URL: www.adbi.org
E-mail: info@adbi.org

Abstract

This paper explores the impact of international migration on school enrollment of children staying behind in Tajikistan, by using data from a large nationally representative household survey. The methodology employed is a switching probit model that accounts for the endogeneity and self-selection of migration and remittance with respect to school enrollment. Counterfactual situations are constructed for children belonging to households with and without migrants, remittance receiving and nonreceiving households, and households with migrant parents to single out the impact of migration and remittances. The results show that migration of household members reduces the probability of enrolling in school by 10 percentage points for children who belong to households with migrants. The effect of parental migration is much larger than that of migration of other household members. Receiving remittances reduces the adverse impact of migration by only 1–3 percentage points. The effect is especially prominent for poor households with young and uneducated household heads.

Keywords: international migration, remittances, school enrollment, endogenous switching

JEL Classification: F22, F24, I25, C34

Contents

1. INTRODUCTION

The number of international migrants rose from 175 million in 2000 to 247 million in 2013, reaching about 3.4% of the world's total population (World Bank 2016). The increase in the number of international migrants coincides with large worldwide remittance flows estimated to have exceeded $601 billion in 2015. However, the true size of the remittance flows is expected to be significantly larger, if one considers unrecorded flows through informal channels; approximately $441 billion of the total recorded flows went to developing countries in 2015. The remittance flows have exceeded the total official development aid and foreign direct investment received by numerous developing countries. Understanding how these large migrant and remittance flows affect migrants' households of origin and their economic behaviors regarding investment in human capital is important in enabling small developing countries like Tajikistan to reduce their excessive dependency on remittances and exposure to external turbulences.

Most studies of migration and remittances focus on their impacts on poverty and inequality. Until recently, relatively little attention has been given to the impact of migration on the economic behavior of left-behind household members, especially regarding educational investment and labor supply decisions (Kanaiaupuni 2000). While many of these studies have found that migration and remittances have a positive effect on poverty and inequality in developing countries, a few studies on decisions about investment in human capital show inconclusive results.

There are several possible ways that migration can impact on the educational attainment of left-behind children (Yang 2008; Alcaraz, Chiquiar, and Salcedo 2010; Amuedo-Dorantes and Pozo 2010). First, migration could help ease liquidity constraints faced by migrants' households through remittances, thereby allowing more investment in schooling of their children. Second, migration of adult household members, especially parents, implies less supervision and care for left-behind children, leading to less schooling for them. Third, even if migrants send remittances, children might have to step up to replace paid or unpaid work that was previously provided by the adult members who migrated. Fourth, migration of adults has a signaling effect on children. For example, if migrants are better educated and get high-skilled and high-paid jobs at their migration destinations, children tend to pursue more education if they want to migrate in the future. Finally, the worst case could be that migrants decided to abandon their households of origin. The family disruption induced by migration could have a long-term adverse effect on left-behind children's educational attainment, by putting labor pressure on them.

Tajikistan is a good setting to study the impact of migration on the educational attainment of left-behind children for a number of reasons. The country has been experiencing unprecedented outmigration since its independence in 1991. In the early years after independence, the migration was mostly driven by cultural and ethnical motivations. More recently, however, migration has mostly been driven by economic motivations to seek job opportunities abroad and improve earning potentials. As of 2014, more than 607,000 people, or 7.5% of the Tajik population, were living outside Tajikistan (World Bank 2016). Remittances sent by these emigrants accounted for about 42% of its GDP, the highest share in the world, in 2015. Although remittances make significant contributions to the Tajik economy, migration has created some new problems in the society: left-behind children and wives and deterioration of human capital of both migrants and their households.

Past empirical evidence on the impact of migration on children's school enrollment in Tajikistan is scarce. To the best of the author's knowledge, the only paper that empirically studied the impact for the case of Tajikistan is that of Dietz, Gatskova, and Ivlevs (2015),

who found a significant negative relationship between migration and school enrollment. While the authors controlled time-invariant heterogeneities in their estimates, the selection bias and endogeneity of migration decisions were not addressed in their study. In this paper, I further extend their findings by using a switching probit method, which is new to this literature, to appropriately correct the endogeneity and selection bias with respect to migration and remittance decisions. Moreover, I study the effects of parental migration and remittances on children's schooling in addition to the migration and remittances of any household members and derived average treatment effects in terms of impact evaluation.

The objective of this paper is to contribute to the few empirical studies with new evidence on the major migrant-sending country of Tajikistan. In particular, it aims to address common methodological issues that are present in empirical studies of migration and remittances. These include simultaneity, reverse causality, selection bias, and omitted variable bias. Generally, migration is not random and migrants self-select. Thus, migration is likely to be correlated with factors that affect the schooling decisions of the households. Decisions on international migration, remittances, and education are likely to be made simultaneously. A household may decide to send its oldest male to work abroad at the same time that it decides to send one of their children to school. Reverse causality could be at work, where households with school-age children are more likely to send migrants to work abroad to finance the educational investment. Moreover, many of the characteristics that influence international migration and remittances are unobservable. Perhaps the best solution to these methodological problems is to use a randomized experiment with individuals who want to pursue international migration but are denied the right to migrate (control group), and actual migrants (treatment group). For example, Mergo (2016) and Gibson, McKenzie, and Stillman (2011) exploit visa lottery programs to evaluate the impact of migration on those left behind. Comparing the characteristics of would-be migrants to those of actual migrants would then yield accurate information on the causal motives for migration (Adams Jr 2011). Unfortunately, however, such randomized experiments are quite rare and sometimes unethical.

In the absence of a randomized experiment, three main econometric techniques have been applied by researchers: instrumental variable regressions, bivariate probit estimators, and matching type estimators. The advantage of the switching probit model (Lokshin and Sajaia 2011) over the competing models is threefold. First, it is more efficient and flexible because it relaxes the assumption of equal coefficients across regimes. Second, the switching probit model takes into account both observable and unobservable heterogeneities arising from selection bias and endogeneity. Third, the switching probit model enables the average treatment effects to be measured by constructing counterfactual situations in an impact evaluation sense. Therefore, this paper applies a switching probit model (Lokshin and Sajaia 2011) in which school-age children (7–17 years old) are sorted into distinct regimes, belonging to migrant households or nonmigrant households, belonging to remittance-receiving households or nonreceiving households, and belonging to parental migration households or parental nonmigration households. The methodology was applied to the most recent household survey publicly available in Tajikistan – the Tajikistan Jobs, Skills, and Migration Survey 2013. The results suggest that school-age children living in migrant households had a 10 percentage points lower probability of enrolling in school, compared with the counterfactual scenario of children living in nonmigrant households. Receiving remittances reduces the adverse impact of migration by only about 2 percentage points. The impact of parental migration is even larger and estimated to reduce school enrollment by 14 percentage points, and receiving remittances does not compensate for the absence of parents.

The rest of the paper is organized as follows. The next section briefly reviews the literature on the impact of migration and remittances on school enrollment. Section 3 discusses the education system in Tajikistan and presents a descriptive analysis of the data used. Section 4 introduces the methodology and empirical strategy. Section 5 presents and discusses results. Finally, Section 6 concludes.

2. LITERATURE REVIEW

Migration may have either a positive or negative impact on school enrollment of children left behind. If the primary obstacle to school enrollment is financial constraints, migration could increase enrollment by easing liquidity constraints through remittances. Conversely, migration could disrupt family life, inducing more paid or unpaid work by children to replace adult members who have migrated.

Papers that find a positive impact of migration emphasize the role of remittances in relaxing budgetary constraints and reducing child labor. For example, Cox-Edwards and Ureta (2003) find that remittances have a significant positive effect on school attendance in El Salvador. Alcaraz, Chiquiar, and Salcedo (2012) argue that remittance-receiving households in Mexico are credit constrained as negative shocks on remittances lead to an increase in child labor and a drop in school attendance. Amuedo-Dorantes and Pozo (2010) and Hu (2012) find that receiving remittances partially compensates for the negative impact of migration on the school attendance of left-behind children. Calero, Bedi, and Sparrow (2009) claim that remittances increase school enrollment and decrease child labor, especially among girls in rural Ecuador. Similarly, Yang (2008) finds that a favorable exchange shock on remittances leads to more schooling and less child labor in the Philippines.

The negative impacts of migration and remittances are largely explained by the absence of parents and other adults who previously cared for the left-behind children's schooling and well-being. Even in the presence of remittances, it is not clear whether the intra-household allocation of remittances promotes more schooling for children. Giannelli and Mangiavacchi (2010) study the long-term impact of parental migration in Albania and find that past parental migration negatively affects school attendance and increases the number of school dropouts. Furthermore, Lahaie et al. (2009) show that households with an experience of paternal migration have at least one child who has academic, behavioral, and emotional problems. As most international labor migrants are male, many studies focus on the impact of paternal migration. Conversely, a recent study by Cortes (2015) analyzed the effects of mothers' migration on children's well-being in the case of the Philippines where international migration has become more feminized. Cortes finds that maternal migration has a much larger impact on children's school attainment than that of paternal migration.

The impact of migration on school attainment could be heterogeneous depending on the age and gender of children. McKenzie and Rapoport (2011) find a significant negative effect of migration on the school attainment of teenage boys and girls in rural Mexico. However, they demonstrate that girls from poorer households are less likely to face a reduction in schooling due to migration. The authors explain their results by the fact that remittances relax credit constraints in poorer households and mitigate the negative impact of migration, especially for young children. On the other hand, older children are more likely to be involved in housework or migration even in the presence of remittances. Acosta (2011) shows that girls benefit from remittances and gain more schooling while boys do not.

Past evidence on Tajikistan is limited. To the best knowledge of the author, the only paper that has addressed the same question in Tajikistan is that of Dietz, Gatskova, and Ivlevs (2015). Using three waves of the Tajikistan Living Standards Survey (2007, 2009, and 2011), the authors find a significant negative impact of migration of family members on children's schooling. Although it is unclear how the authors matched children with their parents for adults other than household heads, they find that nonparent migration has the most detrimental effect on schooling. The most negatively affected are teenagers aged between 12 and 17. In addition, the authors find no evidence that remittances offset the negative impact of migration. While the authors exploited the panel structure of their data to control for time-invariant unobserved heterogeneities, they did not address the time-variant unobserved heterogeneities, endogeneity, and selection bias with respect to migration and remittances in their estimations. In this paper, I further extend their findings by constructing counterfactual situations on the migration and remittance status of households to appropriately correct the endogeneity and selection bias with respect to migration and remittance decisions.

3. MIGRATION AND SCHOOL ENROLLMENT IN TAJIKISTAN

The general education system in Tajikistan can be categorized into three levels: primary education (Grades 1–4), basic education (Grades 5–9), and secondary education (Grades 10–11). The Constitution of Tajikistan, adopted in 1994, guarantees free and compulsory education at the primary and basic education levels, starting at the age of seven. After completing Grade 9, there are two options available for further education: the academic track (Grades 10–11) and technical and vocational training. Grades 10–11 are not compulsory but still provided free for those who choose to attend. The technical and vocational education school system has almost collapsed since the demise of the Soviet Union.

3.1 Descriptive Analysis

The data used in this paper are from the Tajikistan Jobs, Skills, and Migration Survey 2013, one of three identical household surveys conducted by the World Bank and the German Federal Enterprise for International Cooperation (GIZ) in Tajikistan, Uzbekistan, and the Kyrgyz Republic. The survey has two instruments: core and skills questionnaires. The core questionnaire is a typical household survey questionnaire with modules on education, health, employment, migration, remittances, government transfers, financial services, subjective poverty, housing, and household consumption expenditures. The skills questionnaire is targeted at one to two members, aged 15–64, randomly selected from each household and administered to collect data on labor and work expectations, labor migration, cognitive and noncognitive skills, and trainings. For the analysis in the paper, only the core questionnaire data were used.

The Tajikistan Jobs, Skills, and Migration Survey (TJSMS) 2013 is representative at national, regional, and urban-rural locational levels. The total sample size of the survey is 3,300 households with 20,142 individuals covering all regions of Tajikistan.

International migration and remittances have become a major contributing factor to economic growth in Tajikistan since its independence. Our data show that 43% of all sampled households have at least one member who migrated abroad in the survey reference year. The migrants make up about 10% of the total population and are predominantly young men aged 18–45 (Table 1).

Table 1: Share of Migrants in the Population by Age and Gender

Age Group	Male	Female
under 6	0.01	0.01
7–10	0.01	0.01
11–15	0.02	0.01
16–17	0.03	0.01
18–25	0.32	0.04
26–35	0.37	0.05
36–45	0.34	0.06
46–59	0.18	0.02
60 and older	0.03	0.01

Source: Author's computations based on the TJSMS 2013.

About half of them are either household heads or spouses of household heads and have at least secondary general education (completion of Grade 10/11). Some 15% of migrants even have higher education. As such, the impacts of outmigration on human capital could be adverse not only in terms of a "brain drain" of educated people but also of constraints on human capital formation of younger generations due to disruption of family life.

The data show that there are still numerous school-age children (7–17 years old) out of school, despite free and compulsory primary and lower-secondary education. The survey mean estimates from the TJSMS 2013 show that approximately 83%–84% of school-age children from migrant and nonmigrant households, respectively, are currently enrolled in school. Table 2 shows mean enrollment rate estimates by households' migration status. The survey mean estimates demonstrate that there is no major difference between the enrollment rates of children belonging to migrant and nonmigrant households. However, the mean annual education expenditure per school-age child is much higher for nonmigrant households.

Table 2: Household Characteristics and School Enrollment by Migration Status

	Nonmigrant	Migrant
Enrollment rate	0.84	0.83
Education expenditure, somoni	428.06	359.99
Household size	7.28	8.31
Number of children aged 7–17	3.69	3.81
Of which: Children aged 7–15	2.26	2.26
Number of children under 7	0.96	1.09
Number of adults	3.78	4.73
Number of elderly	0.29	0.23

Note: Survey mean estimates. Household characteristics are for those who have school-age children.

Source: Author's estimations based on the TJSMS 2013.

The data show that poorer households are more likely to have members that have migrated abroad and receive remittances (Table 3). The share of households with migrants and receiving remittances consistently declines with wealth. The consumption quintile also seems to affect the school enrollment and education expenditure.

Table 3: Household Characteristics and School Enrollment by Consumption Quintile Group

Indicators	Poorest	Quintile 2	Quintile 3	Quintile 4	Richest
Enrollment rate	0.74	0.83	0.85	0.88	0.86
Education expenditure, somoni	182.64	296.13	308.87	493.97	701.88
Household size	9.21	8.10	7.67	7.19	6.70
Number of children aged 7–17	4.57	3.85	3.66	3.41	3.25
Of which: Children aged 7–15	2.73	2.28	2.24	2.05	1.98
Number of children under 7	1.47	1.15	0.89	0.85	0.74
Number of adults	4.64	4.38	4.34	4.07	3.75
Number of elderly	0.35	0.29	0.21	0.22	0.23
Households with migrants	0.54	0.53	0.47	0.47	0.42
Remittance-receiving households	0.43	0.42	0.40	0.43	0.34

Note: Survey mean estimates. Household characteristics are for those who have school-age children.
Source: Author's estimations based on the TJSMS 2013.

There are also substantial age and gender differences in enrollment rates (Table 4). The enrollment rate at primary level is relatively lower than the higher levels. This is generally attributed to late enrollments by seven-year-old children according to the UNICEF (2013) report. About 5% of seven-year-old children are not enrolled in school. While enrollment reaches near universal coverage at the lower secondary level, the enrollment rate falls back markedly at the upper secondary level. The enrollment rate for girls drops significantly at the upper secondary level due to it being noncompulsory as well as traditional gender norms that expect women to stay at home and support household members.

Table 4: Enrollment Rate by Gender and School Level

	Male	Female	Total
Primary	0.69	0.73	0.71
Lower secondary	0.95	0.94	0.95
Upper secondary	0.89	0.82	0.85

Note: Survey mean estimates.
Source: Author's estimations based on the TJSMS 2013.

3.2 Summary Statistics

Our analysis is restricted to the sample of school-age or 7- to 17-year-old children in the TJSMS 2013. There are 4,511 school-age children in the data. Table 5 summarizes the descriptive statistics for variables used in this study. The nature of the analysis is multilevel due to the data structure, with individuals and household heads being nested in households, which in turn are nested in districts and regions. While most of the variables are self-explanatory, key variables are explained below.

Table 5: Summary Statistics of Variables

Variables	Mean	Std Dev	Min	Max
Households with migrant/s	0.43	0.50	0.00	1.00
Parental migrant households	0.29	0.45	0.00	1.00
Remittance-receiving households	0.35	0.48	0.00	1.00
Remittances from parents	0.24	0.43	0.00	1.00
School enrollment	0.85	0.36	0.00	1.00
Age	12.15	3.17	7.00	17.00
Male	0.52	0.50	0.00	1.00
Female	0.48	0.50	0.00	1.00
Relationship to head:				
Child	0.71	0.45	0.00	1.00
Grandchild	0.26	0.44	0.00	1.00
Niece/nephew	0.01	0.12	0.00	1.00
Brother/sister	0.01	0.08	0.00	1.00
Other	0.00	0.06	0.00	1.00
Native language:				
Tajik	0.81	0.39	0.00	1.00
Other	0.19	0.39	0.00	1.00
Number of children aged 7–17	3.57	1.71	1.00	10.00
Of which: Children aged 7–15	2.17	1.22	0.00	7.00
Number of children aged under 7	0.93	1.13	0.00	6.00
Number of adults	4.06	2.07	0.00	15.00
Household size	7.40	3.15	2.00	19.00
Head's age	49.87	12.73	16.00	95.00
Male head	0.79	0.40	0.00	1.00
Female head	0.21	0.40	0.00	1.00
Head's marital status:				
Married	0.80	0.40	0.00	1.00
Divorced	0.04	0.19	0.00	1.00
Widowed	0.13	0.34	0.00	1.00
Not married	0.03	0.17	0.00	1.00
Head's education:				
Lower secondary and less	0.16	0.37	0.00	1.00
Upper secondary	0.38	0.49	0.00	1.00
Technical and vocational	0.21	0.41	0.00	1.00
Higher education	0.25	0.43	0.00	1.00
Regions:				
Dushanbe	0.40	0.49	0.00	1.00
GBAO	0.05	0.21	0.00	1.00
Sogd	0.18	0.38	0.00	1.00
Khatlon	0.22	0.41	0.00	1.00
RRS	0.16	0.36	0.00	1.00
Share of migrants in community	0.10	0.04	0.01	0.25
Number of observations	4,511			

Note: GBAO = Gorno-Badakhshan Autonomous Region, RRS = Region of Republican Subordination, Std Dev = standard deviations, Min = minimum, Max = maximum.

Source: Author's computations based on the TJSMS 2013.

In order to analyze the impact of migration on school enrollment of children left behind, I constructed a binary variable for households with at least one person who migrated

abroad during the survey reference period, the last 12 months prior to the interview in July 2013. For the purpose of the paper, a migrant is defined as someone who was away for at least one month to work or to find work abroad during the reference period. The data show that 43% of households with school-age children have at least one migrant member. To estimate the effect of parental migration, the sample is restricted to the household head, his/her spouse, and children aged 7–17, because the TJSMS data track only the relationship to the head, and children of nonhead members cannot be matched with their parents. There are 3039 children who are sons or daughters of household heads, and about 29% of their parents have migrated abroad for work. Parental migrations are predominated by fathers and there are only about 30 cases where mothers migrated. Due to the small sample size, the parental migration impact could not be distinguished between mothers and fathers.

The remittance variable was generated as taking the value 1 if households received any remittances from abroad during the survey reference period. Remittance from parents is a binary variable if the remittance was received from parents who were abroad. In the respective samples, 35% of households received remittances from any migrant household member and 24% received remittances from migrant parents.

The dependent variable in this analysis is school enrollment, which is a binary variable that takes the value 1 if a school-age child is currently enrolled in any level of school and 0 otherwise. The mean value of school enrollment rate for the sample is 84%.

The independent variables include children's characteristics (age, gender, relationship to the household head, and native language), household characteristics (number of children and adults in the household, household size, household head's age, gender, marital status, and educational level), and regional dummy variables. In addition, the share of international migrants in a district is used as an instrumental variable for migration to improve the identification.

4. METHODOLOGY

To estimate the impacts of migration and remittances on school enrollment of children left behind, the possibility of self-selection, endogeneity, reverse causality, and omitted variable biases should be addressed. Unobserved household characteristics might affect not only the likelihood of belonging to a migrant-sending and remittance-receiving household but also that of attending school. There could also be reverse causality between migration, remittances, and school enrollment. Without taking into account self-selection and endogeneity, estimated results of migration effects on school enrollment could be biased and unreliable.

In order to address this, I apply switching probit models (Lokshin and Sajaia 2011) with endogenous regime switchers, which are migration, remittances, parental migration, and parental remittances. The switching probit model proposed by Lokshin and Sajaia (2011) has a number of advantages over competing approaches. First, it takes into account both observable and unobservable heterogeneities arising from the above methodological problems, and efficiently estimates binary selection and the binary outcome equations simultaneously through the full-information maximum likelihood method, while relying on an assumption of joint normality of the error terms in the selection and outcome equations. The resulting estimations produce efficient coefficients with consistent standard errors. Second, it is more efficient than the instrumental variable regression or the binary probit model in that it relaxes the assumption of equality of outcome equation coefficients in two regimes. Lastly, the switching probit model enables the effect of migration on children's schooling

decision to be measured in terms of impact evaluation and average treatment effects to be derived.

Impacts of migration, remittances, and those of parents on children's school enrollment are estimated by four separate switching probit models. In each switching probit model, school-age children are sorted into two distinct regimes: belonging to migrant households and nonmigrant households, belonging to remittance-receiving households and nonreceiving households, belonging to parental migration households and nonparental migration households, and belonging to households that received remittances from parents and those that did not receive remittances from parents. Each model estimates two binary-choice output equations for school-age children, belonging to the criterion function that determines the regime that the children face.

Consider a household's decision to send a migrant (M_i^*) expressed in a linearized form as:

$$M_i^* = Z_i\alpha + \varepsilon_i \tag{1}$$

where M_i^* is a latent variable for the propensity of a household *i* to send a migrant, Z_i is a vector of independent variables that determine the decision to send a migrant for household *i*, α is a vector of parameters to be estimated, and ε_i is an error term. The observed migration status of household *i* can be expressed as:

$$M_i = I(M_i^* > 0) = I(Z_i\alpha + \varepsilon_i) > 0 \tag{2}$$

where $\mathrm{I}(\cdot)$ is an indicator function. Let the probability of school enrollment for a child be given by a linearized form as:

$$E_{ij}^* = X_i\beta_j + \epsilon_{ij}, j = 0{,}1 \tag{3}$$

where β_j is a regime-specific vector of parameters. The subscript *j* denotes the regimes: 1 for migrant (remittance-receiving) and 0 for nonmigrant (nonremittance-receiving) households. E_{ij}^* is a latent variable that determines the propensity of a child to enroll in school from household *i* in regime *j*. X_i is a vector of characteristics for the child, household, and community that determine the school enrollment decision for the household *i*.

Then, the observed enrollment status of a child is expressed as:

$$E_{i1} = I(E_{i1}^* = X_i\beta_1 + \epsilon_{i1} > 0) \text{ if } M_i = 1 \tag{4}$$

$$E_{i0} = I(E_{i0}^* = X_i\beta_0 + \epsilon_{i0} > 0) \text{ if } M_i = 0 \tag{5}$$

Assume that ε_i, ϵ_{i1}, and ϵ_{i0} are jointly normally distributed with a mean-zero vector and a correlation matrix:

$$\Omega = \begin{pmatrix} 1 & \rho_0 & \rho_1 \\ & 1 & \rho_{10} \\ & & 1 \end{pmatrix} \tag{6}$$

where ρ_0 and ρ_1 are the correlations between ϵ_{i0}, ε_i and ϵ_{i1}, ε_i, respectively, and ρ_{10} is the correlation between ϵ_{i0} and ϵ_{i1} . Because E_{i1} and E_{i0} are never observed simultaneously, the joint distribution of $(\epsilon_{i0}, \epsilon_{i1})$ or ρ_{10} cannot be estimated.

The system of equations (2), (4), and (5) is simultaneously estimated to determine the impact of international migration on school enrollment. The model is identified by nonlinearity even if all explanatory variables in the output and selection equations completely overlap. Including instrumental variables that affect the household's migration decision but do not directly influence school enrollment makes the estimations more robust to alternative functional assumptions. Thus, a share of international migrants in a district during the survey reference period is constructed from the TJSMS 2013 data as an instrumental variable for a household's migration decision. Based on migration network literature, the share of migrants in a district is believed to influence the household's migration decision, but not to affect the children's school enrollment.

The switching probit model of the system of equations (2), (4), and (5) can be used to generate counterfactual probabilities for children in different regimes of migration and school enrollment. Following the methodology developed by Aakvik, Heckman, and Vytlacil (2000), the impact of migration on school enrollment is defined as a treatment effect and calculated from the estimated parameters of the switching probit model as:

$$\begin{aligned} \mathrm{TT}(x) &= \Pr(E_1 = 1|\mathrm{M} = 1, X = x) - \Pr(E_0 = 1|\mathrm{M} = 1, X = x) \\ &= \frac{\Phi(X_1\beta_1, Z\alpha, \rho_1) - \Phi(X_0\beta_0, Z\alpha, \rho_0)}{F(Z\alpha)} \end{aligned} \tag{7}$$

where Φ is the cumulative function of a bivariate normal distribution, and F is the cumulative function of a univariate normal distribution. Then, the impact of migration on school enrollment of a child with characteristics *x* in migrant-sending households can be interpreted as the effect of treatment on the treated (TT). TT is the difference between the predicted probability of the school enrollment for a child currently living in a migrant-sending household and the predicted probability of school enrollment for that child if the household did not send a migrant. The average treatment effect on the treated (ATT) is obtained by averaging TT(x) over the sample of children living in migrant households. ATT is calculated as:

$$\mathrm{ATT} = \frac{1}{N_M}\sum_{i=1}^{N_M} TT(x_i) \tag{8}$$

where N_M is the number of children in the treatment group (migrant households or remittance-receiving households).

The effect of migration on the probability of school enrollment of a child randomly drawn from the population of school-age children with a characteristic *x* is determined by the treatment effect as:

$$\mathrm{TE}(x) = \Pr(\mathrm{E} = 1|X = x) - \Pr(\mathrm{E} = 0|X = x) = \mathrm{F}(X\beta_1) - \mathrm{F}(X\beta_0) \tag{9}$$

The average treatment effect (ATE) is the sample average of TE(x) over the total population of school-age children.

$$\mathrm{ATE} = \frac{1}{N}\sum_{i=1}^{N} TE(x_i) \tag{10}$$

5. RESULTS AND DISCUSSION

The system of equations (2), (4), and (5) is simultaneously estimated by the full-information maximum likelihood estimation. First, the system was estimated for the school enrollment decision with respect to the migration decision of any household member and the remittance decision of these migrated household members, respectively. The likelihood ratio (LR) test for the null hypothesis of the joint independence of error terms in equations (4) and (5) is rejected in favor of the full-information maximum likelihood estimation in both models. Estimated results are reported in Table 6.

Overall, the estimated parameters are consistent with the findings of the migration literature and the descriptive analysis in Section 2. In general, the individual and household characteristics are major determinants of school enrollment for children in both migrant-sending and nonsending households.

The age of a child has a significant and inverse parabolic relationship with the enrollment rate for children in all migration and remittance regimes. The descriptive statistics presented in Section 2 also support the finding that the enrollment rate starts very low at primary level, increases dramatically at lower secondary school, and drops back at upper secondary school. The low enrollment rate at primary school is attributed to the late enrollment, mostly of children aged seven (UNICEF 2013). The UNICEF report indicates that about 5% of all seven-year-old children are not in school. The enrollment reaches the highest rate at lower-secondary school ages and starts to decrease at upper-secondary level. The upper-secondary education is free but not compulsory, unlike the education up to lower-secondary school. Therefore, more children, especially more girls, start to drop out of school at this level.

The gender of a child has a significant impact on school enrollment for children belonging to nonmigrant and nonremittance-receiving households, but not for children in migrant and remittance-receiving households. Girls from nonmigrant and nonremittance-receiving households are more likely to be out of school than boys who belong to the same households. Since its independence, conservative and religious norms concerning traditional gender roles have been revived in Tajikistan. Young women are expected to take care of the household rather than attending school. The cultural norm also forbids girls to go outside alone after they reach puberty. Therefore, many girls stop their education at the level provided by their village schools rather than traveling to neighboring villages to attend higher-level schools.

For all types of households, children from ethnic minorities are less likely to be enrolled in school than the majority of Tajiks. There are additional hardships for children of minorities. In particular, shortages of textbooks in ethnic minority languages and qualified teachers who can teach in ethnic languages result in a poor education quality and a lack of incentives to go to school for ethnic minorities. At the same time, ethnic minorities whose native language is not Tajik tend to migrate and send remittances.

While most migrants are household heads or spouses of household heads, school-age children in remittance-receiving households tend to be sons or daughters of household heads. If the child is the household head's child, he/she is more likely to be enrolled in school than children with a different relationship with the head in remittance-receiving households. For nonmigrant and nonremittance-receiving households, the child's relationship does not seem to affect his/her school enrollment.

Table 1: Endogenous Switching Probit Model Estimation of the Probability of Enrolling in School for Children Aged 7–17

	Migrant Household	Nonmigrant Household	Migration Decision
Age	2.00***	1.66***	–0.04
	(0.14)	(0.12)	(0.06)
Age squared	–0.08***	–0.06***	0.00
	(0.01)	(0.00)	(0.00)
Female	0.10	–0.14**	0.00
	(0.08)	(0.07)	(0.04)
Relationship to head: (Ref=Child)			
Grandchild	–0.01	0.18	–0.16*
	(0.16)	(0.14)	(0.09)
Niece/nephew	–0.44	–0.23	–0.57***
	(0.35)	(0.26)	(0.19)
Brother/sister	–1.17**	0.79	0.38
	(0.51)	(0.59)	(0.27)
Native language: (Ref=Tajik)			
Other	–0.39***	–0.19**	0.10*
	(0.10)	(0.09)	(0.05)
No. of children aged 7–15 in the HH	0.04	–0.17	–0.04
	(0.13)	(0.12)	(0.06)
No. of children under 6 in the HH	0.10	–0.27**	–0.06
	(0.13)	(0.12)	(0.07)
No. of adults	0.11	–0.20*	0.12**
	(0.12)	(0.12)	(0.06)
Household size	–0.13	0.18*	0.05
	(0.12)	(0.12)	(0.06)
Head's age	–0.06*	0.05***	0.01
	(0.03)	(0.02)	(0.01)
Head's age squared	0.00*	0.00***	0.00
	(0.00)	(0.00)	(0.00)
Female head	0.19	0.33**	0.26***
	(0.14)	(0.15)	(0.08)
Head's marital status: (Ref=Married)			
Divorced	–0.57*	–0.46**	–1.00***
	(0.40)	(0.21)	(0.15)
Widowed	0.19	–0.27*	–0.28***
	(0.20)	(0.17)	(0.10)
Not married	0.00	–0.14	0.00
	(0.30)	(0.20)	(0.13)
Head's education: (Ref: Lower secondary and less)			
Upper secondary	0.61***	0.33***	0.03
	(0.12)	(0.11)	(0.06)
Technical and vocational	0.51***	0.48***	–0.02
	(0.13)	(0.13)	(0.07)
Higher education	0.71***	0.51***	–0.26***
	(0.16)	(0.13)	(0.07)

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Table 6 *continued*

	Migrant Household	Nonmigrant Household	Migration Decision
Regions (Ref: Dushanbe)			
GBAO	0.45**	0.09	–0.23**
	(0.23)	(0.18)	(0.10)
Sogd	0.30**	0.23*	0.21***
	(0.14)	(0.12)	(0.06)
Khatlon	0.19*	0.00	0.04
	(0.12)	(0.10)	(0.06)
RRS	0.19*	–0.17*	0.00
	(0.13)	(0.10)	(0.06)
Share of migrants in community			9.69***
			(0.61)
Constant	–9.73***	–9.98***	–1.70***
	(1.01)	(0.88)	(0.46)
rho1	0.35		
	(0.17)		
rho0	0.53		
	(0.19)		
Number of observations	4,511		
Log likelihood	–3,994.78		
	Remittance Receiving	**Nonremittance Receiving**	**Remittance Decision**
Age	2.18***	1.68***	0.01
	(0.18)	(0.12)	(0.06)
Age squared	–0.09***	–0.07***	0.00
	(0.01)	(0.00)	(0.00)
Female	0.18*	–0.11*	0.03
	(0.09)	(0.06)	(0.04)
Relationship to head: (Ref=Child)			
Grandchild	0.29*	–0.01	–0.22***
	(0.19)	(0.13)	(0.09)
Niece/nephew	–0.54*	–0.20	–0.37**
	(0.37)	(0.25)	(0.18)
Brother/sister	–1.82***	0.61	0.11
	(0.54)	(0.46)	(0.27)
Native language: (Ref=Tajik)			
Other	–0.47***	–0.25***	0.02
	(0.12)	(0.08)	(0.05)
No. of children aged 7–15 in the HH	–0.07	–0.09	–0.04
	(0.16)	(0.10)	(0.06)
No. of children under 6 in the HH	0.05	–0.18*	–0.07
	(0.15)	(0.10)	(0.06)

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Table 6 *continued*

	Remittance Receiving	Nonremittance Receiving	Remittance Decision
No. of adults	–0.01	–0.10	0.11*
	(0.15)	(0.10)	(0.06)
Household size	–0.01	0.07	0.05
	(0.15)	(0.10)	(0.06)
Head's age	–0.06*	0.04**	0.01
	(0.04)	(0.02)	(0.01)
Head's age squared	0.00*	0.00*	0.00
	(0.00)	(0.00)	(0.00)
Female head	0.19	0.16*	0.07
	(0.13)	(0.09)	(0.06)
Head's marital status: (Ref=Married)			
Divorced			
Widowed			
Not married			
Head's education: (Ref: Lower secondary and less)			
Upper secondary	0.46***	0.48***	0.19***
	(0.15)	(0.09)	(0.07)
Technical and vocational	0.42***	0.56***	0.13*
	(0.16)	(0.11)	(0.07)
Higher education	0.74***	0.60***	–0.10
	(0.19)	(0.12)	(0.08)
Regions (Ref: Dushanbe)			
GBAO	0.38*	0.23	–0.07
	(0.25)	(0.18)	(0.10)
Sogd	0.34**	0.26**	0.38***
	(0.17)	(0.12)	(0.06)
Khatlon	0.09	0.12	0.12**
	(0.15)	(0.09)	(0.06)
RRS	0.16	–0.09	0.03
	(0.16)	(0.09)	(0.06)
Share of migrants in community			9.15***
			(0.62)
Constant	–10.69***	–9.90***	–2.37***
	(1.19)	(0.82)	(0.48)
rho1	0.41		
	(0.18)		
rho0	0.51		
	(0.24)		
Number of observations	4,511		
Log likelihood	–3,879.88		

Note: *, **, and *** indicate statistical significance at 10, 5 and 1 % levels, respectively.

The likelihood ratio test for joint independence of the migration equations rejected the null of rho1=rho2=0 at Prob > chi2=0.0097 and that of the remittance equations rejected the null at Prob > chi2=0.0198.

Standard errors are in parentheses.

Source: Author's estimations.

In terms of the household head's characteristics, female-headed households are more likely to send their children to school in all regimes. For nonmigrant and nonremittance-receiving households, older female-headed households are more likely to have their children enrolled in school. This could be the case for households living with extended family, including grandparents, as household heads. Moreover, older generations tend to have a higher level of education than younger generations in Tajikistan. UNICEF (2013) reports that adults in their 20s and early 30s have a much lower education level than those over 40 due to the disruption of the education system and civil wars since Tajikistan's independence. Literature on educational attainment suggests that individuals who are educated appreciate the benefits of education more and are more likely to send their children to school. My finding is also consistent with previous studies and shows that the household head's education is an important determinant of children's school enrollment in both regimes. The higher the educational level of the household head, the higher the probability of children attending school, compared with household heads with no education. Finally, households with married household heads tend to have a higher probability of sending their children to school than those with heads with other marital statuses. In particular, children in households with divorced heads are less likely to enroll in school.

After obtaining the estimated parameters of the switching probit models above, it is possible to construct counterfactual probabilities for children's enrollment in different migration and remittance regimes. Applying equations (7)–(10), Table 7 presents the ATE and ATT of the impacts of migration and remittances for children with characteristics *x*.

The estimated ATE is -0.098, implying that a randomly selected school-age child had a 9.8% lower probability of enrolling in school if he/she had a migrant in his/her household. When we restrict our sample to those who actually belong to migrant households, the treatment effect (ATT) is quite large at –0.103. The ATT suggests that school-age children living in migrant households had a 10.3% lower probability of enrolling in school compared with the counterfactual scenario of children living in nonmigrant households. The ATT and ATE of remittances are –0.081 and –0.085, respectively, suggesting that the adverse impact of migration on children's school enrollment slightly decreased if they received remittances from migrants. However, the degree of reduction is far from offsetting.

By observing characteristics, the most adverse impact of migration on school enrollment is found for children at either primary-school age or upper-secondary-school age. For younger children, a possible explanation could be that outmigration of an adult household member results in less supervision and parental neglect, leading to delayed enrollment in primary school. For older children, it could be the case that they need to take up household duties that were previously provided by the adult member who migrated abroad. In addition, upper-secondary school is not compulsory. Receiving remittance only reduces the adverse impact of migration by approximately 1–3 percentage points.

Table 7: Mean Treatment Effects of Migration and Remittances on School Enrollment

	Impact of Migration		Impact of Remittances	
	ATT	ATE	ATT	ATE
Average				
ATT/ATE	–0.103***	–0.098***	–0.081***	–0.085***
	(0.003)	(0.002)	(0.002)	(0.002)
Gender				
Male	–0.118***	–0.116***	–0.097***	–0.110***
	(0.005)	(0.002)	(0.004)	(0.002)
Female	–0.087***	–0.079***	–0.065***	–0.058***
	(0.004)	(0.002)	(0.004)	(0.003)
Age				
Primary school: Ages 7–10	–0.170***	–0.138***	–0.136***	–0.123***
	(0.005)	(0.003)	(0.005)	(0.003)
Lower secondary: 11–15	–0.027***	–0.037***	–0.016***	–0.025***
	(0.001)	(0.001)	(0.001)	(0.001)
Upper secondary: 16–17	–0.158***	–0.174***	–0.136***	–0.161***
	(0.006)	(0.004)	(0.006)	(0.004)
Head's age				
16–25	–0.176**	–0.069*	–0.240*	–0.135**
	(0.068)	(0.037)	(0.131)	(0.053)
26–35	–0.101***	–0.078***	–0.091***	–0.066***
	(0.016)	(0.006)	(0.015)	(0.008)
36–45	–0.088***	–0.092***	–0.077***	–0.089***
	(0.005)	(0.002)	(0.004)	(0.003)
46–59	–0.110***	–0.110***	–0.094***	–0.105***
	(0.005)	(0.003)	(0.005)	(0.003)
60+	–0.113***	–0.096***	–0.059***	–0.049***
	(0.006)	(0.003)	(0.004)	(0.004)
Head's education				
Lower secondary and less	–0.157***	–0.131***	–0.084***	–0.067***
	(0.006)	(0.004)	(0.008)	(0.004)
Upper secondary	–0.082***	–0.076***	–0.081***	–0.090***
	(0.003)	(0.002)	(0.004)	(0.003)
Technical and vocational	–0.109***	–0.118***	–0.093***	–0.113***
	(0.006)	(0.004)	(0.007)	(0.004)
Higher education	–0.094***	–0.094***	–0.061***	–0.065***
	(0.007)	(0.003)	(0.006)	(0.003)
Per capita real consumption quintile				
Poorest	–0.123***	–0.113***	–0.078***	–0.080***
	(0.006)	(0.004)	(0.006)	(0.004)
2	–0.108***	–0.096***	–0.085***	–0.085***
	(0.005)	(0.004)	(0.006)	(0.004)
3	–0.105***	–0.099***	–0.089***	–0.094***
	(0.006)	(0.003)	(0.008)	(0.004)
4	–0.077***	–0.086***	–0.069***	–0.079***
	(0.005)	(0.004)	(0.005)	(0.003)
Richest	–0.097***	–0.096***	–0.084***	–0.087***
	(0.006)	(0.004)	(0.006)	(0.004)
Number of children aged 7–17				
1 child	–0.086***	–0.095***	–0.088***	–0.108***
	(0.009)	(0.005)	(0.009)	(0.006)

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Table 7 *continued*

	Impact of Migration		Impact of Remittances	
	ATT	**ATE**	**ATT**	**ATE**
2–3 children	–0.092***	–0.092***	–0.090***	–0.094***
	(0.003)	(0.002)	(0.005)	(0.002)
4–5 children	–0.107***	–0.098***	–0.077***	–0.080***
	(0.005)	(0.003)	(0.005)	(0.003)
6–7 children	–0.126***	–0.114***	–0.066***	–0.059***
	(0.010)	(0.006)	(0.008)	(0.006)
8+ children	–0.153***	–0.136***	–0.045***	–0.024***
	(0.017)	(0.013)	(0.010)	(0.008)
Region				
Dushanbe	–0.114***	–0.111***	–0.083***	–0.088***
	(0.005)	(0.003)	(0.006)	(0.003)
GBAO	–0.044***	–0.041***	–0.057***	–0.064***
	(0.008)	(0.006)	(0.010)	(0.007)
Sogd	–0.109***	–0.111***	–0.074***	–0.076***
	(0.006)	(0.004)	(0.005)	(0.004)
Khatlon	–0.100***	–0.097***	–0.100***	–0.115***
	(0.006)	(0.003)	(0.006)	(0.004)
RRS	–0.094***	–0.067***	–0.066***	–0.052***
	(0.007)	(0.004)	(0.006)	(0.003)
Location				
Urban	–0.109***	–0.105***	–0.082***	–0.085***
	(0.004)	(0.003)	(0.004)	(0.002)
Rural	–0.098***	–0.089***	–0.080***	–0.085***
	(0.003)	(0.003)	(0.004)	(0.002)

Note: *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively, based on one-sample *t* test with a null hypothesis of mean(TE)=0 against and an alternative hypothesis of mean(TE)$\neq$0. In the case of ATT, the hypotheses are H_0: mean(TT)=0 and H_1: mean(TT) $\neq$0.

The standard errors are calculated by bootstrapping and are in parentheses.

Source: Author's computations.

While girls are more likely to never enroll in or drop out of school, the negative impact of migration on enrollment is slightly larger for boys than girls. Generally, the enrollment rate for boys is higher and parents prefer to invest in boys' education than girls' education. At the same time, boys are more at risk of being involved in child labor according to the ILO report. More than 85% of children working on streets in urban areas are boys. If migration of an adult member causes disturbance in family life, children may need to take up paid or unpaid work to support their households.

Households with younger and less educated heads are likely to experience a larger adverse effect of migration on their children's school enrollment. Moreover, poor households with many children aged 7–17 are likely to be most negatively impacted by migration. In terms of location, urban areas tend to experience a larger negative impact of migration. One possible reason could be due to more widespread child labor in urban areas than in rural areas. There is no major difference among regions, with the exception of GBAO, where the migration impact is the lowest. Official statistics show that GBAO is the region where the percentage of school dropouts is lowest, and girls' enrollment rate is higher than that of boys. In all other regions, girls' enrollment is lower and the gap increases with age.

Table 8: Endogenous Switching Probit Model Estimation of the Probability of Enrolling in School for Children Aged 7–17

	Migrant Parents	Nonmigrant Parents	Migration Decision
Age	2.46***	1.51***	-0.19***
	(0.22)	(0.10)	(0.07)
Age squared	–0.10***	–0.06***	0.01***
	(0.01)	(0.00)	(0.00)
Female	0.17	–0.11*	0.06
	(0.14)	(0.07)	(0.05)
Native language: (Ref=Tajik)			
Other	–0.79***	–0.28***	–0.02
	(0.17)	(0.09)	(0.07)
No. of children aged 7–15 in the HH	–0.13	–0.01	0.18***
	(0.09)	(0.04)	(0.03)
No. of children under 6 in the HH	0.04	–0.04	0.07*
	(0.11)	(0.05)	(0.04)
Household size	0.01	–0.03	–0.09***
	(0.07)	(0.03)	(0.02)
Mother's age	–0.02	–0.01	–0.01**
	(0.01)	(0.01)	(0.00)
Female head	0.38	–0.11	–0.33***
	(0.28)	(0.11)	(0.08)
Mother's education: (Ref: Lower secondary and less)			
Upper secondary	0.34**	0.22***	0.07
	(0.17)	(0.08)	(0.06)
Technical and vocational	0.14	0.47***	–0.07
	(0.27)	(0.15)	(0.10)
Higher education	0.66**	0.32**	0.02
	(0.34)	(0.15)	(0.10)
Regions (Ref: Dushanbe)			
Sogd	0.33	0.23**	0.29***
	(0.25)	(0.11)	(0.08)
Khatlon	0.04	–0.04	0.04
	(0.20)	(0.09)	(0.07)
RRS	–0.07	–0.12	0.00
	(0.21)	(0.10)	(0.08)
Share of migrants in community			7.46***
			(0.75)
Constant	–12.50 ***	–7.20***	0.14
	(1.18)	(0.57)	(0.44)
rho1	0.07		
	(0.34)		
rho0	0.96		
	(0.04)		
Number of observations	3,021		
Log likelihood	–2,500.06		

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Table 8 *continued*

	Remittances from Parents	No Remittances from Parents	Remittance Decision
Age	2.98***	1.52***	–0.19***
	(0.30)	(0.10)	(0.07)
Age squared	–0.12***	–0.06***	0.01***
	(0.01)	(0.00)	(0.00)
Female	0.17	–0.08	0.08*
	(0.16)	(0.07)	(0.05)
Native language: (Ref=Tajik)			
Other	–0.74***	–0.34***	–0.05
	(0.20)	(0.08)	(0.07)
No. of children aged 7–15 in the HH	–0.16*	–0.02	0.15***
	(0.11)	(0.04)	(0.03)
No. of children under 6 in the HH	0.04	–0.05	0.06
	(0.15)	(0.05)	(0.04)
Household size	0.07	–0.02	–0.09***
	(0.09)	(0.03)	(0.02)
Mother's age	–0.01	–0.01	–0.01*
	(0.01)	(0.01)	(0.00)
Female head	0.51	–0.06	–0.33***
	(0.36)	(0.11)	(0.09)
Mother's education: (Ref: Lower secondary and less)			
Upper secondary	0.10	0.28***	0.09
	(0.22)	(0.08)	(0.07)
Technical and vocational	0.03	0.51***	–0.01
	(0.32)	(0.15)	(0.10)
Higher education	0.19	0.41***	–0.01
	(0.39)	(0.15)	(0.11)
Regions (Ref: Dushanbe)			
Sogd	0.17	0.30***	0.34***
	(0.30)	(0.11)	(0.08)
Khatlon	–0.10	–0.04	0.05
	(0.25)	(0.09)	(0.07)
RRS	–0.01	–0.19**	–0.14*
	(0.30)	(0.10)	(0.08)
Share of migrants in community			7.71***
			(0.78)
Constant	–15.51***	–7.29***	–0.03
	(1.57)	(0.56)	(0.45)
rho1	0.13		
	(0.37)		
rho0	0.97		
	(0.05)		
Number of observations	3,021		
Log likelihood	–2,344.34		

Note: *, **, and *** indicate statistical significance at 10, 5 and 1 % levels, respectively.

The likelihood ratio test for joint independence of the migration and remittances equations rejected the null of rho1=rho2=0 at Prob > chi2=0.000.

Standard errors are in parentheses.

Source: Author's estimations.

It is assumed that parental migration has the largest impact on children's school enrollment. However, the structure of the TJSMS 2013 data does not allow children and parents' data to be matched except for the household head. Therefore, I restricted the sample to the household head's children only. Then, the switching probit models were estimated for parental migration and remittance-sending decisions. The results are in Tables 8–9.

Table 9: Mean Treatment Effects of Parental Migration and Remittances on Children's School Enrollment

	Impact of Parents' Migration		Impact of Remittances from Parents	
	ATT	**ATE**	**ATT**	**ATE**
Average				
ATT/ATE	–0.137***	–0.045 ***	–0.1297***	–0.0336***
	(0.006)	(0.002)	(0.008)	(0.002)
Gender				
Male	–0.160***	–0.065***	–0.146***	–0.052***
	(0.010)	(0.003)	(0.012)	(0.003)
Female	–0.114***	–0.023***	–0.114***	–0.014***
	(0.009)	(0.002)	(0.009)	(0.003)
Age				
Primary school: Ages 7–10	–0.285***	–0.086***	–0.285***	–0.087***
	(0.019)	(0.004)	(0.026)	(0.005)
Lower secondary: 11–15	–0.020***	0.002***	–0.009***	0.019***
	(0.001)	(0.001)	(0.001)	(0.001)
Upper secondary: 16–17	–0.176***	–0.094***	–0.166***	–0.080***
	(0.010)	(0.005)	(0.009)	(0.005)
Mother's age				
16–25	–0.274	–0.085*	–0.453	–0.090
	(0.164)	(0.038)	(0.209)	(0.059)
26–35	–0.166***	–0.050***	–0.165***	–0.043***
	(0.014)	(0.004)	(0.022)	(0.005)
36–45	–0.123***	–0.045***	–0.116***	–0.036***
	(0.008)	(0.003)	(0.011)	(0.003)
46–59	–0.114***	–0.037***	–0.093***	–0.019***
	(0.011)	(0.004)	(0.017)	(0.004)
60+	–0.253**	–0.055**	–0.233	–0.004
	(0.089)	(0.025)	(0.132)	(0.021)
Mother's education				
Lower secondary and less	–0.203***	–0.061***	–0.157***	–0.007
	(0.022)	(0.004)	(0.017)	(0.005)
Upper secondary	–0.119***	–0.036***	–0.122***	–0.035***
	(0.008)	(0.002)	(0.010)	(0.003)
Technical and vocational	–0.145***	–0.093***	–0.146***	–0.075***
	(0.025)	(0.008)	(0.027)	(0.008)
Higher education	–0.076***	–0.007*	–0.098***	–0.039***
	(0.015)	(0.004)	(0.022)	(0.006)

continued on next page

Table 9 *continued*

	Impact of Parents' Migration		Impact of Remittances from Parents	
	ATT	**ATE**	**ATT**	**ATE**
Per capita real consumption quintile				
Poorest	–0.153***	–0.043***	–0.144***	–0.025***
	(0.014)	(0.004)	(0.019)	(0.006)
2	–0.145***	–0.046***	–0.126***	–0.029***
	(0.018)	(0.005)	(0.014)	(0.003)
3	–0.148***	–0.051***	–0.137***	–0.038***
	(0.019)	(0.004)	(0.018)	(0.005)
4	–0.101***	–0.043***	–0.098***	–0.036***
	(0.010)	(0.004)	(0.016)	(0.004)
Richest	–0.138***	–0.040***	–0.146***	–0.036***
	(0.015)	(0.004)	(0.021)	(0.004)
Number of children aged 7–17				
1 child	–0.080***	–0.036***	–0.091***	–0.036***
	(0.014)	(0.005)	(0.021)	(0.005)
2–3 children	–0.140***	–0.046***	–0.140***	–0.042***
	(0.009)	(0.003)	(0.012)	(0.003)
4–5 children	–0.137***	–0.044***	–0.125***	–0.025***
	(0.013)	(0.003)	(0.014)	(0.004)
6–7 children	–0.178***	–0.057***	–0.148***	–0.019*
	(0.027)	(0.010)	(0.035)	(0.012)
8+ children	–0.138**	0.002	–0.074*	0.067***
	(0.052)	(0.015)	(0.033)	(0.012)
Region				
Dushanbe	–0.130***	–0.036***	–0.126***	–0.030***
	(0.012)	(0.002)	(0.013)	(0.003)
Sogd	–0.100***	–0.056***	–0.118***	–0.066***
	(0.012)	(0.004)	(0.017)	(0.006)
Khatlon	–0.164***	–0.052***	–0.146***	–0.042***
	(0.016)	(0.005)	(0.015)	(0.005)
RRS	–0.171***	–0.046***	–0.134***	0.003
	(0.019)	(0.005)	(0.024)	(0.005)
Location				
Urban	–0.132***	–0.037***	–0.132***	–0.032***
	(0.009)	(0.002)	(0.012)	(0.003)
Rural	–0.141***	–0.054***	–0.128***	–0.035***
	(0.010)	(0.003)	(0.010)	(0.003)

Note: *, **, and *** indicate statistical significance at 10, 5 and 1 % levels, respectively, based on one-sample *t* test with a null hypothesis of mean(TE)=0 against and an alternative hypothesis of mean(TE)≠0. In the case of ATT, the hypotheses are H_0: mean(TT)=0 and H_1: mean(TT)≠0.

The standard errors are calculated by bootstrapping and are in parentheses.

Source: Author's computations.

Generally, the results are consistent with those of the migration of any household members. However, the magnitude is much larger for children whose parents have actually migrated than for children whose parents are not migrants. The estimated ATT suggests that the impact of parental migration on children's school enrollment is 13.7 percentage points lower than that of similar households whose parents stay. However, the impact of parental migration is lower within a randomly sampled population of children. The offsetting effect of remittances is also negligible in the case of households with migrant parents.

6. CONCLUSION

This paper explores the impact of international migration and remittances on school enrollment of children left behind in Tajikistan. Common methodological problems, including endogeneity and selection bias, are addressed by applying a switching probit model to construct counterfactual probabilities for migrant and nonmigrant households, and remittance-receiving and nonreceiving households.

Our results show that the determinants of the probability of enrolling in school for children belonging to migrant and nonmigrant households do not differ substantially. In general, children's age, gender, ethnic background, and household characteristics are more detrimental than community characteristics to their educational enrollment for children in both regimes. Nonetheless, the estimates of average treatment effects suggest that controlling for selection appeared to be important in the data.

Migration was found to reduce school-age children's enrollment rate by 10%. The negative effect was highest for children of primary- and upper-secondary-school ages, and those belonging to households with younger and low-educated household heads. The number of children in the household was found to be negatively related to the enrollment rate. Wealth also affects the enrollment rate. The poorer the household, the less likely it is to send its children to school and the larger the adverse impact of migration. Receiving remittances only partially offsets the adverse impact of migration on school enrollment.

Parental migration has a much larger negative impact on children's school enrollment, suggesting that the lack of parental care and supervision is detrimental to children. Even if parents send back remittances, the offsetting effect is only negligible compared to that of migration of other household members.

Compared to its population and economic size, migration is high in Tajikistan and will likely continue to rise in response to economic incentives in neighboring countries and few job opportunities domestically. The findings here highlight the negative impact of migration and remittances on the long-run economic growth of the country, although migration currently promotes economic growth through massive remittance flows. As both migration and remittances seem not to be enhancing the human capital formation of the younger generation, labor migration cannot be regarded as an effective tool of sustainable economic development. Domestic job creation and investment in education are urgently needed if the country is to adopt more sustainable growth.

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