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## **Remittance and education in recipient countries: an interdependence**

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**Abstract:** This study examines simultaneous effects between remittance-inflow and education in recipient countries. We employ a three-stage least squares (3SLS) method and find that education and remittance have positive influences on each other. We also find that tertiary education has a higher impact on remittance than secondary education, and remittance has a higher influence on secondary education in recipient countries.

**Keywords:** remittance; education; migration; remittance recipient country; developed country; developing country; simultaneous effects.

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## **1 Introduction**

Remittances have been recognised as an important developmental tool associated with migration in recent years. From only around \$2 billion in 1970, total international remittances grew to \$131 billion in 2000 and, despite a drawn out global financial crisis, \$430 billion in 2010; in 2017, remittances reached the record level of \$613 billion (World Bank, 2018). More than 70% of global remittances in recent years have gone to developing countries, which rely on remittances more than on foreign direct investments (FDI) and foreign development assistance (FDA). According to the World Bank (2017), remittance inflows to low- and middle-income countries reached \$466 billion in 2017, an 8.5% increase from the \$429 billion in 2016. In recent years, remittances have become a more stable foreign income than private debt, portfolio equity flows, and international development aids (World Economic Forum, 2018).

International migration has become a significant economic phenomenon in the world. The total number of migrants across the globe has been increasing in recent years, reaching 258 million in 2017, increased from 220 million in 2010 and only 173 million in 2000 (United Nations, Department of Economic and Social Affairs, Population Division, 2017). The USA is the leading country in emigration, hosting 49.8 million migrants in 2017, which is 19% of the world's total migrants. Following the USA, Saudi Arabia and Germany host the second and third largest numbers of migrants, respectively. In addition, Spain and the UAE are reported as the largest relative increases in migrants between 2000 and 2017, which are 260% and 240%, respectively. Alternatively, in 2017, there are 16.6 million Indians living in foreign countries, making India the largest country in immigration. Mexico, with 13 million immigrants living foreign countries, is the second largest migrant origin country, followed by the Russia (10.6 million), China (10.0 million), Bangladesh (7.5 million), Syria (6.9 million), Pakistan (6.0 million), Ukraine (5.9 million), the Philippines (5.7 million), and the UK (4.9 million) (United Nations, Department of Economic and Social Affairs, Population Division, 2017). These statistics show that high-income countries, following the definition of World Bank, tend to be larger host countries or remittance-sending countries, whereas developing countries tend to be largest origin countries or remittance-receiving countries.

Migrants often send remittances to their families in their native countries, which positively impacts their family members' standard of livings and economic development in those recipient countries (Fajnzylber and Lopez, 2008; Singer, 2010; Huay and Bani, 2018; Ahmed et al., 2018; Namgha et al., 2019; Pal and Pal, 2019). Remittances increase

their recipients individuals' purchasing power and their investment opportunities (Acosta et al., 2009; Adams and Page, 2005; Calero et al., 2009; Shapiro and Mandelman, 2016). Unlike other foreign exchange sources – which depends on contractual obligation, policy restriction, and business relations – remittances are the most reliable source of foreign exchange in most developing countries (Ratha et al., 2005; Ratha, 2013). Bouoiyour et al. (2016) and Acharya and Leon-Gonzalez (2014) argued that remittances also reduce the budget constraints in poor families and allow parents to invest in their children's education. Kanaiaupuni and Donato (1999) argued that remittances have direct and indirect impacts on educational out-comes that can benefit the community as a whole. For example, remittances can be used to build schools as private initiatives (direct effect) or can be used to create new employment opportunities for individuals who depend on public transfers (indirect effect).

There have been many studies that conclude remittances have positive and significant effects on education investment in recipient countries (Adams and Cuecuecha, 2010; Gyimah-Brempong and Asiedu, 2015; Fajnzylber and Lopez, 2008; Di Maria and Lazarova, 2012; Guzmán et al., 2008; Vogel and Korinek, 2012; Dustmann and Mestres, 2010; Bansak and Chezum, 2009; Mansour et al., 2011; Akanda, 2018). Alcaraz et al. (2012) argued that whether studies used household-, regional-, and national-level data, and whether these studies examined the periods of increased remittances or periods of decreased remittances, the effects of remittances on education is equally strong. In addition, Gupta et al. (2009) and Adams and Page (2005) argued that the impact of remittances on education in recipient countries is more likely to be stronger among poor and rural households than in urban areas. However, the effects of remittances on education sometimes differ according to the gender composition for students in recipient country. For example, educational investments from remittances tend to favour boys at the expense of girls (Vogel and Korinek, 2012; Bansak et al., 2015). Conversely, Gibson and McKenzie (2012) found that female-headed households are more likely than male-headed households to use remittances they received in their children's education. Recently, Azizi (2018) found that remittances improve educational attainment in developing countries.

Beyond the influences of remittances on education, education also influences remittance inflows to developing countries. For example, the recent wave of economic globalisation has continuously opened employment opportunities for educated and skilled individuals. In addition, immigration policies in host countries are increasingly tilted in favour of skilled migrants (Kerr et al., 2017; Docquier and Marfouk, 2006; Beine et al., 2001). Dodani and LaPorte (2005) argued that these skilled migrants are likely to earn more money in host countries than they would earn in their native countries and send remittances to their families living in their origin countries. Because education makes individuals more highly skilled and trained labour force and thereby more likely to immigrate to developed countries (Bhagwati and Hamada, 1974; Beine et al., 2008), and because these individuals are likely to earn and send more money to developing countries, education positively influences remittance inflows to developing countries.<sup>1</sup> Therefore, remittances do not only affect education in the recipient countries but also education influences remittances to the recipient countries. Previous studies have examined only the effect of remittances on education in the recipient countries. In this study, we examine the simultaneous relationship between remittances and education in these countries. Considering remittance as a ratio of gross domestic product (GDP) on

120 recipient countries, we find that remittance has positive impacts on education, and education has also a positive impact on education.

This study makes at least two contributions in the literature. First, we examine joint causality between remittances and education. Developed countries often attract educated and skilled individuals across the globe by offering a handsome monetary benefit. For example, Dodani and LaPorte (2005) and Faini (2007) argued that brain drain occurs because educated and skilled individuals in the developing countries are continuously looking for a better standard of living and quality of life, higher salaries, access to advanced technology, and more stable political conditions in different places worldwide. If educated and skilled individuals move from the developing countries to developed countries, this may cause a great loss for the developing countries because the marginal benefits of these skilled individuals in their native countries are much higher than the marginal benefits in the developing countries (Mayda and Rodrik, 2005; Mayda, 2006). However, skilled migrants can also help their native countries by sending remittances to their families to become educated (De Arcangelis et al., 2015; Page and Plaza, 2006; Namgha et al., 2019). Additionally, employment opportunity creates at home countries when skilled emigration occurs, and educated native-individuals can also occupy these vacancies. This implies that migration opportunity or remittance flow does not only cause the harm in its recipient countries but also offer incentives in its recipient countries. Unlike previous studies, the results of our study show that education has positive impacts on remittance inflows to the developing countries. Second, similar to the previous studies, our results show that remittances have positive impact on education in the recipient countries. These results imply that remittance-recipient countries could use these financial inflows to create more human capital. Individuals with increased human capital can work for their own country as well as can work as a migrant. This opportunity thus increases the total welfare across the globe and reduce poverty and other adverse economic consequences. In addition, a continuous migration flow could make the developing countries and developing countries more connected.

The relationship between remittance and education would be a circular flow across the world. Education of a country would improve the level of human capital, which thus increases the supply of skilled and educated migrants to the host countries. Immigrants usually send a portion of income to their native countries as remittance, which also has positive impacts on education in recipient countries. Some of these educated people may go abroad as an immigrant to have a better career and quality of life. These emigrants can send remittances that improve the level of education in their recipient countries. This implies that remittance and education circulate as a flow. Therefore, a potential policy recommendation is to reduce the barriers of remittance movement between home and host countries. This will offer an opportunity to improve human capital, and thereby everyone across the world would be benefited.<sup>2</sup>

After the introductory statement, Section 2 represents data and variable definition; Section 3 outlines the methodology used; Section 4 chalks out the estimation procedures to show simultaneous effects between education and remittance; Section 5 explains the robustness check; Section 6 acknowledges the limitations; and finally, Section 7 concludes the study.

## 2 Data

We use the data on 120 countries from World Development Indicators (WDI), and the sample period is 1990–2017. Following the definition of the World Bank (2018), we measure remittance as the ratio of personal transfers and compensations received from the domestic people to the GDP. Personal transfers are all types of financial transfers in cash or in-kind between resident and non-resident individuals. Compensation of employees is the income of workers who are employed in an economy where they are not residents and of residents employed by non-resident entities. Compensation of employees has three main components: wages and salaries in cash, wages, and salaries in kind, and employers' social contributions. Compensation of employees is recorded gross and includes amounts paid by the employee as taxes or for other purposes in the economy where work is performed.

We consider school enrolment and completion rates at secondary and tertiary levels as a measure of educational achievement to capture the potential effects that remittances might have on families in the recipient country. For this reason, we do not consider other indicators, such as the literacy rate. We use the following indicators: gross enrolment rate at secondary and tertiary levels. As these indicators are typically measured for individuals aged over 15, they can capture the long-term effects of education.

Instead of nominal exchange rate or bilateral exchange rate, we use the real effective exchange rate (REER) for the exchange rate. The REER is a measure of the value of a currency against a weighted average of several foreign currencies divided by a price deflator or index of costs. An increase in REER implies that exports become more expensive and imports become cheaper; therefore, an increase indicates a loss in trade competitiveness.<sup>3</sup> Unlike nominal or real exchange rates, REER considers the trade-weighted average of the bilateral exchange rate of the trading partners, adjusting with relative price levels between two-trading partner-countries. We use labour force participation as the proportion of the population ages 15 and older that is economically active: all people who supply labour for the production of goods and services during a specified period. The government expenditures on education is the expenditure as percentage of GDP.

The main challenge is to examine the effect of remittance on education in developing countries is endogeneity, which may result from reverse causality between remittance and income in its recipient countries. To send money to native country, migrants have macro incentives such as altruism and self-interests (Lim and Morshed, 2015), and they also have microeconomic incentives, such as altruism and investment in their native countries.<sup>4</sup>

The relation between remittance and home income is positive as well as negative. A negative relation implies that remittance inflow to recipient country is altruistically motivated. In addition, Calero et al. (2009) argued that remittance increases the reservation wage of its recipient, and thus discourages them to work in the labour market, and thereby reduces the aggregate income in the recipient country.<sup>5</sup> Conversely, a positive relation implies supports the self-interest motivation implying that income in the recipient country will be boosted through an improved health status, financial depth, and financial institutional improvement. To address the endogeneity between remittance and income in its recipient country, Lim and Morshed (2015) use two instruments: distance from the equator and the damage caused by drought, flood or extreme weather as

instrument for the cross-sectional analysis, and they use temperature and rainfall along with other disaster damage variables as instrument for the pooled cross sectioned analysis.

Following Ratha and Shaw (2007), Azizi (2018) used a weighted indicator as an instrument for bilateral remittances. Using bilateral migrant stock from United Nations (UN), he assumed that the average amount of remittance sent by a migrant is at least as much as the average income of their native country even though individual migrates to a lower-income country from a relatively higher-income country. The rationale of this assumption is that individual migrates to another country too. If they could earn a higher income in the host country than earnings in their native countries, they migrate. In this case, household survey data is required. Because of unavailability of micro-level data, Ratha and Shaw (2007) suggested to use average per capita gross national income (GNI) in the host country as a proxy for migrant's income and per capita GNI in their income in the home country as a proxy of their income in the home country.

If per capita GNI in the host country is higher than home country, individual usually migrates to a host country. In addition, they use an average parameter  $\beta$ , which is equal to 0.75 across the developing countries, to calculate the bilateral remittances for all countries. However, they admit that it is impossible to verify the accuracy of these weighted bilateral remittance.

**Table 1** Summary statistics

<i>Variable</i>	<i>Mean</i>	<i>Std. dev.</i>	<i>Min.</i>	<i>Max.</i>	<i>N</i>
Remittance	4.427	6.246	0.000	49.290	512
Interest rate	6.687	20.600	-97.616	789.799	512
Gross enrolment rate at tertiary	18.630	13.723	0.000	63.376	512
Gross enrolment rate at secondary	58.210	30.220	5.10	129.000	512
REER	148.614	978.156	0.382	56,242.739	512
Government expenditure	4.133	2.630	0.050	44.300	512
Labour force participation overall	60.600	12.150	37.20	90.600	512

Note: The REER indicates the REER, and N indicates the number of observation.

Following Ratha and Shaw (2007) and Azizi (2018) used bilateral migration stock data from UN for the period of 1990, 1995, 2000, 2005, 2010, 2013, and 2015. He then used a linear interpolation method to estimate a comprehensive bilateral remittance for the remaining year. However, this linear interpolation methodology may not represent a better approximation for the remaining years. For example, Jha et al. (2010) argued that remittance inflows to the Asian countries is plunged during 1997–1998 Asian Financial Crisis but this decrease was temporary and started to increase in the following year. In this case, a linear interpolation between 1995 and 2000 shows an upward estimate of remittance and migration flows than the actual inflows in 1998. Similarly, using the household survey data, Sirkeci et al. (2012) found that Bangladesh experienced around 7% decline in migration outflows and around 18% decline in remittance inflows during 2007–2008 because of financial crisis. This situation is even worse in some specific region, such as a southern district of Hobigong experienced a 58% decline in their remittance inflows. Sirkeci et al. (2012) also argued the world started to recovery from this crisis in 2009. Therefore, a linear interpolation between 2005 and 2010 does not

reflect a better approximate for remittances. To overcome this limitation, this study uses the remittance to GDP ratio as a measure of total foreign currency sent by migrants.

Table 1 shows the descriptive statistics of the variables. The average remittance flows are 4.43% of the GDP, and the average ratio of government expenditure on education to the GDP is 4.13. The average labour force participation rate is 60.60. The average gross enrolment rates are 18.63 and 58.21 at tertiary and secondary levels, respectively. The average of the REER is 148.61 with a huge variation across the countries.

### 3 Methodology

To examine the simultaneous effects between remittances and education, we employ a two-variables simultaneous model as follows:

$$Rem_{it} = \alpha_1 + \alpha_1 Educ_{it} + \alpha_2 ER_{it} + \alpha_3 IR_{it} + u_{1t} \quad (1)$$

$$Educ_{it} = \beta_1 + \beta_1 Rem_{it} + \beta_2 Gov_{it} + \beta_3 LP_{it} + u_{2t} \quad (2)$$

where  $Rem_{it}$  is the remittances of country  $i$  at time  $t$ ,  $Educ_{it}$  is the educational achievement of country  $i$  at time  $t$ ,  $ER_{it}$  is the exchange rate of country  $i$  at time  $t$ ,  $IR_{it}$  is the interest rate of country  $i$  at time  $t$ ,  $Gov_{it}$  is the government expenditure of country  $i$  at time  $t$ , and  $LP_{it}$  is the labour force participation country  $i$  at time  $t$ . The  $u_{1t}$  and  $u_{2t}$  are the error terms of remittances and education equations, respectively.

The system of equations (1) and (2) can be written as follows:

$$\begin{bmatrix} 1 & -\alpha_2 \\ -\beta_2 & 1 \end{bmatrix} \begin{bmatrix} Rem_{it} \\ Educ_{it} \end{bmatrix} + \begin{bmatrix} -\alpha_1 & -\alpha_3 & -\alpha_4 & 0 & 0 \\ -\beta_1 & 0 & 0 & -\beta_3 & -\beta_4 \end{bmatrix} \begin{bmatrix} 1 \\ ER_{it} \\ IR_{it} \\ Gov_{it} \\ LP_{it} \end{bmatrix} = \begin{bmatrix} u_{1t} \\ u_{2t} \end{bmatrix} \quad (3)$$

Equation (3) is the structural form of a simultaneous system, which corresponds to relationship among the variables within an economic system. The coefficients in this system will typically contain zeros or other restrictions corresponding to assumptions in the economic model. For example, government expenditures on education do not directly impact on remittances, domestic labour force participation does not affect its remittances, domestic interest rate does not influence educational enrolment, and the exchange rate does not directly impact on education. Therefore, a general form of this structural form can be written as follows:

$$By_t + Dz_t = u_t \quad (4)$$

where  $y_t$  is a vector of endogenous variables at  $t$  period, and  $z_t$  is a vector of predetermined variables, and  $u_t$  is the vector of stochastic terms.  $B$  and  $D$  are the matrix of the coefficients on the endogenous and predetermined variables, respectively. It is assumed that  $E(u_t) = 0$  and  $var(u_t) = \Sigma$ , where  $\Sigma$  is the positive definite matrix. It is also assumed that stochastic terms in the same period  $t$  are correlated, but not correlated in different periods so that  $cov(u_t, u_s) = 0$  for all  $t \neq s$ .

Equation (4) can be rewritten as follows:

$$y_t = B^{-1}Dz_t + B^{-1}u_t \quad (5)$$

which is equivalently written as follows:

$$y_t = \pi z_t + v_t \quad (6)$$

where  $-B^{-1}D = \pi$  and  $B^{-1}u_t = v_t$ . Equation (6) is known as the reduced form of the system, where the endogenous variables ( $y_t$ ) solely depend on the predetermined variables ( $z_t$ ), removing the simultaneity in the structural form. In this formulation, the economic assumptions in the model are embodied in the restriction on  $\pi$ , which ultimately on  $\pi = -B^{-1}D$ . In this case, disturbances ( $v_t$ ) in the reduced form are no longer related to disturbances on particular behavioural equations.

### 3.1 Identification in simultaneous equations

To identify the equations in the model, we follow the conventional form of restrictions, namely zero restrictions on  $B$  and  $D$ . This approach corresponds to the exclusion of variables from a particular equation and these restrictions are known as exclusion restrictions. It is possible that some equations in a model may be identified while others are not. A model is identified only if all equations in the model are identified. Therefore, identification needs to be checked separately for each equation in a model.

To explain the identification procedure, we denote the total number of variables excluded from the  $j^{\text{th}}$  equation by  $r_j$  and the number of endogenous variables in the system by  $m$ . The order condition for identification satisfies when the exclusion restrictions ( $r_j$ ) in  $j^{\text{th}}$  equation are greater than or equal to  $(m - 1)$ , that is  $r_j \geq (m - 1)$ . When  $r_j > (m - 1)$  for  $j^{\text{th}}$  equation then equation  $j$  is said to be over-identified, and when  $r_j = (m - 1)$ , equation  $j$  is said to be exactly identified. In the structural model in equation (3), both equations satisfy order condition. However, order condition is a necessary condition, but it is not a sufficient condition.

To identify equation  $j$ , both the necessary and sufficient is the rank condition should be satisfied. This considers the rank of a matrix formed from the columns of the matrices  $B$  and  $D$ , corresponding to the excluded variables in the  $j$  equation, but excluding the  $j^{\text{th}}$  row. When the rank of this matrix for equation  $j$  must be greater than or equal to  $m - 1$ , then equation  $j$  is identified.

In the structural model in equation (3), the corresponding matrix for the first equation would be  $[-\beta_3$  and  $-\beta_4]$  with rank 1. Similarly, the corresponding matrix for the second equation, would be  $[-\alpha_3$  and  $\alpha_4]$  with rank 1. Both equations satisfy the rank conditions. Therefore, Equations 1 and 2 are exactly identified.

To examine the simultaneous effects between remittance and education, we first use a simple ordinary least square (OLS) model to show the effects of education on remittance, and use another OLS model to show the effects of remittance on education. Second, we employ a three-stage least squares (3SLS) method to show the simultaneous effects between remittance and education. The 3SLS method allows to estimate all parameters at the same time by considering probable correlations among error terms of the structural model. The 3SLS model starts with an estimation of each equation by two separate model, and then recover the residuals of the first step to estimate the relationship between error terms of different equations and finally use GMM method for estimating overall

methods taking into account this information. In such way, this 3SLS method can capture the simultaneous effects between education and remittance.

#### **4 Results analysis**

Table 2 shows results of joint causal relationship between remittance and education. In this case, educational achievement, referred as education, is considered as the gross enrolment rate at tertiary level. We also consider enrolment rate for male and female at the same level. Therefore, the dependent variables are remittance and education. In Table 2, column 1 in panels A and B show the estimated effects of education on remittance on remittance inflows in recipient countries using an OLS method. The estimated effect of education on remittance is 0.067 which is positive and statistically significant. This implies that an average increase in remittance improves gross enrolment at tertiary level. We also do not find that government expenditure and labour force participation influence the remittance flows in recipient countries. Similarly, the estimate of remittance on educational achievement at tertiary level is 0.059, which is positive and statistically significant. This implies that an average increase in remittance flow increases enrolment. In this case, government expenditure and labour force participation have positive influences on educational achievement. However, domestic interest rate and exchange rate do not have any effects on educational achievement.

Column 2 in Table 2 shows the simultaneous effects between remittance and educational achievement at tertiary level. The results are obtained from a 3SLS methodology. To check the identification, we employ the Sargent-Hansen over identification test and find that null hypothesis for over identification is rejected at 5% level. We also employ Kleilbergen-Paap Lagrange multiplier (LM) test statistics for under identification and find that the null hypothesis is rejected.

In panel A of Table 2, the estimated effects of education on remittance is positive and statistically significant. This implies that an average increase in enrolment at tertiary level increases remittance inflows. We also find that estimated effects of exchange rate on remittance is negative and statistically significant. A lower REER implies domestic currency would be less valuable.

In other words, foreign currency would be more valuable in recipient countries, which may encourage to send more remittances. Therefore, remittance inflow increases. The estimated effects of interest rate are positive and statistically significant. This implies that a higher domestic interest rate encourages emigrants to send more remittance in their native countries.

Panel B in Table 2 shows the effects of remittance on education at tertiary level. The estimated effects are 0.059, which is positive and statistically significant. This implies that remittance inflow improves the educational achievement in recipient countries. We also find that the effects of government expenditure and labour force participation are positive and statistically significant. These indicate that a higher government expenditure on education and domestic labour force participation improve the educational achievement. We also examine the effects for male and female educational achievements and find similar results that remittance inflows and education positively affect each other in recipient countries.

**Table 2** Remittance and education at tertiary level

	<i>Overall</i>		<i>Male</i>		<i>Female</i>	
	<i>(1)</i>	<i>(2)</i>	<i>(3)</i>	<i>(4)</i>	<i>(5)</i>	<i>(6)</i>
	<i>OLS</i>	<i>3SLS</i>	<i>OLS</i>	<i>3SLS</i>	<i>OLS</i>	<i>3SLS</i>
<i>Panel A: Effects of education on remittance</i>						
Education	0.067*** (0.031)	0.073** (0.035)	0.057*** (0.026)	0.069** (0.041)	0.085*** (0.032)	0.089** (0.041)
Exchange rate	-0.079*** (0.012)	-0.091** (0.039)	-0.083** (0.022)	-0.092*** (0.042)	-0.071*** (0.021)	-0.098*** (0.042)
Interest rate	0.022*** (0.009)	0.026*** (0.011)	0.032*** (0.013)	0.039*** (0.009)	0.033*** (0.012)	0.039*** (0.010)
Government expenditure	0.056 (0.045)		0.045 (0.076)		0.042 (0.086)	
Labour force	0.432 (0.321)		0.931 (0.822)		0.432 (0.443)	
R square	0.450	0.340	0.450	0.340	0.450	0.340
No. of countries	120	120	120	120	120	120
No. of observation	512	512	512	512	512	512
<i>Panel B: Effects of remittance on education</i>						
Remittance	0.059*** (0.029)	0.075*** (0.035)	0.051*** (0.018)	0.072*** (0.031)	0.070*** (0.029)	0.086*** (0.034)
Exchange rate	0.012 (0.025)		0.279 (0.215)		0.331 (0.177)	
Interest rate	0.551 (0.421)		0.231 (0.322)		0.812 (0.980)	
Government expenditure	0.089*** (0.012)	0.780*** (0.090)	0.059*** (0.003)	0.620*** (0.080)	0.093*** (0.003)	0.262*** (0.120)
Labour force	0.240*** (0.111)	0.500*** (0.201)	0.340*** (0.020)	0.410*** (0.023)	0.724*** (0.312)	0.621*** (0.019)
R square	0.310	0.390	0.310	0.390	0.310	0.390
No. of countries	120	120	120	120	120	120
No. of observation	512	512	512	512	512	512

Notes: HAC standard errors are in parenthesis.

\*\*\*significant at 1% level; \*\* significant at 5% level; \*significant at 10% level.

Table 2 shows that remittance and education in recipient countries are mutually dependent. One of the potential reasons of the effect of remittance on education is that remittance allows to address the financial constrains for education. For example, Stark (1991) and Lu and Treiman (2011) argue that remittance might have a long-term effect on the next generational education because they now have more financial ability to receive education. On the other hand, when educated and skilled labour force work as a

migrant, it is highly likely to get a job with a higher salary in the host countries (World Economic Forum, 2018). This higher income allows them to send remittance into their home countries, and thereby remittance increases.<sup>6</sup> For example, according to the World Economic Forum (2018), an estimated 800 million people worldwide are directly supported by remittances from relatives and loved ones abroad, and remittances lift families out of poverty and increase education opportunities for children.

**Table 3** Remittance and education at secondary level

	<i>Overall</i>		<i>Male</i>		<i>Female</i>	
	<i>(1)</i>	<i>(2)</i>	<i>(3)</i>	<i>(4)</i>	<i>(5)</i>	<i>(6)</i>
	<i>OLS</i>	<i>3SLS</i>	<i>OLS</i>	<i>3SLS</i>	<i>OLS</i>	<i>3SLS</i>
<i>Panel A: Effects of education on remittance</i>						
Education	0.080*** (0.039)	0.089** (0.041)	0.070*** (0.033)	0.078** (0.010)	0.091*** (0.020)	0.097** (0.026)
Exchange rate	-0.070*** (0.010)	-0.098** (0.028)	-0.091** (0.042)	-0.094*** (0.042)	-0.082*** (0.033)	-0.090*** (0.031)
Interest rare	0.041*** (0.010)	0.060*** (0.021)	0.046*** (0.019)	0.058*** (0.020)	0.063*** (0.022)	0.079*** (0.021)
Government exp	0.065 (0.055)		0.051 (0.060)		0.021 (0.076)	
Labour force	0.531 (0.423)		0.811 (0.723)		0.812 (0.777)	
R square	0.550	0.401	0.519	0.457	0.511	0.441
No. of countries	120	120	120	120	120	120
N	512	512	512	512	512	512
<i>Panel B: Effects of remittance on education</i>						
Remittance	0.053*** (0.031)	0.069*** (0.023)	0.071*** (0.021)	0.069*** (0.039)	0.065*** (0.035)	0.075*** (0.041)
Exchange rate	0.192 (0.511)		-0.317 (0.289)		0.651 (0.770)	
interest rare	0.199 (0.361)		0.830 (0.412)		0.829 (1.80)	
Government exp	0.094*** (0.020)	0.680*** (0.009)	0.097*** (0.010)	0.722*** (0.034)	0.089*** (0.013)	0.660*** (0.020)
Labour force	0.401*** (0.010)	0.509*** (0.100)	0.441*** (0.201)	0.540*** (0.230)	0.840*** (0.302)	0.720*** (0.190)
R square	0.519	0.560	0.409	0.411	0.450	0.409
No. of countries	120	120	120	120	120	120
N	512	512	512	512	512	512

Notes: HAC standard errors are in parentheses.

\*\*\*significant at 1% level; \*\* significant at 5% level; \*significant at 10% level.

Table 3 shows the simultaneous effects of remittance and education at secondary level, in which case we consider the enrolment rate as education. Similar to results at tertiary level, we find that education and remittance have positive impacts on each other. That is, a higher educational attainment at secondary level increases remittance inflows, and a higher inflow of remittances improves educational attainments at secondary level. In Table 3, we also observe the similar results for male and female categories.

Comparing the effects of remittance and educational attainments between tertiary and secondary levels, we find that remittance has a greater impact on secondary level of education. In contrast, the educational achievements at tertiary level have a greater influence on remittance inflows than secondary level. One of the potential reasons is that higher education would offer an improved human capital than secondary education. Education increases the level education, and thus improves the human capital. Some of these individuals may work in their native countries, and some other may work abroad as migrants. As individuals with higher education can earn more income than their secondary counterpart, immigrants with education can send a higher proportion of income to their native countries.

Individuals in developing countries consider secondary education as their necessities, and tertiary education is less necessary than secondary level. In other words, most countries consider secondary education as the foundation of building a nation and offer compulsory education until secondary level. A higher flow of income, remittance, encourages individuals to spend on their necessary goods. The estimated effects of remittance on educational attainments at both level also reflects the scenario. The estimated effects of remittance on education at secondary level is higher than the tertiary level.

Overall, remittance has a positive impact on education in recipient countries. Previous studies, such as Azizi (2018) and Adams and Cuecuecha (2010), find the same results. We also find that remittance inflows have a greater impact on the level of secondary education than tertiary level in recipient countries. As the levels of secondary education are the suppliers of students to tertiary level, an increase in education in secondary level would offer an opportunity to improve the tertiary level. We find that improved tertiary sectors will lead to receive a higher remittance inflow in recipient countries.

## **5 Robustness check**

To check the robustness of our results, we consider other types of indicators for educational attainments: primary enrolment rate, out of school rate-primary age, and secondary completion rate. Table 4 shows the simultaneous effects between education and remittance flows. Panel A shows that the effects of education on remittance. We find that primary enrolment rate and secondary completion rate is positive, indicating that education increases remittance inflows. We also find that the estimated effect of out of school-primary age is negative and statistically significant.

That is, an increases rate in out of school-primary age decrease remittance flows in developing countries. In other words, a higher rate of dropping out at primary level decreases remittance inflows in developing countries. In panel B, we also find that remittance inflows have positive impacts on educational attainments at different level. This implies that the results are robust to the results in Section 4.

**Table 4** Remittance and education different levels

	<i>Primary enrolment rate</i>		<i>Out of school rate-primary age</i>		<i>Secondary completion rate</i>	
	<i>(1)</i>	<i>(2)</i>	<i>(3)</i>	<i>(4)</i>	<i>(5)</i>	<i>(6)</i>
	<i>OLS</i>	<i>3SLS</i>	<i>OLS</i>	<i>3SLS</i>	<i>OLS</i>	<i>3SLS</i>
<i>Panel A: Effects of education on remittance</i>						
Educ	0.160*** (0.045)	0.190** (0.044)	-0.176*** (0.040)	-0.658** (0.029)	0.191*** (0.019)	0.187** (0.033)
Exchange rate	-0.081*** (0.021)	-0.088** (0.033)	-0.071** (0.035)	-0.078*** (0.041)	-0.084*** (0.048)	-0.089*** (0.039)
Interest rare	0.051*** (0.031)	0.069*** (0.030)	0.060*** (0.027)	0.080*** (0.019)	0.073*** (0.018)	0.090*** (0.056)
Government exp	0.050 (0.062)		0.051 (0.056)		0.080 (0.066)	
Labour force	0.442 (0.821)		0.498 (0.771)		0.617 (0.979)	
R square	0.509	0.431	0.550	0.489	0.501	0.419
No. of countries	120	120	120	120	120	120
N	512	512	512	512	512	512
<i>Panel B: Effects of remittance on education</i>						
Remittance	0.081*** (0.023)	0.097*** (0.041)	-0.091*** (0.010)	-0.078*** (0.009)	0.087*** (0.015)	0.105*** (0.041)
Exchange rate	0.222 (0.612)		0.414 (0.385)		0.812 (0.900)	
Interest rare	0.201 (0.301)		0.910 (0.401)		0.923 (1.300)	
Government exp	0.194*** (0.020)	0.680*** (0.009)	-0.297*** (0.010)	-0.922*** (0.034)	1.089*** (0.013)	0.660*** (0.020)
Labour force	0.401*** (0.010)	0.509*** (0.100)	-0.441*** (0.201)	-0.540*** (0.230)	0.840*** (0.302)	0.720*** (0.190)
R square	0.519	0.560	0.409	0.411	0.450	0.409
No. of countries	120	120	120	120	120	120
N	512	512	512	512	512	512

Notes: HAC standard errors are in parentheses.

\*\*\*significant at 1% level; \*\* significant at 5% level; \*significant at 10% level.

## **6 Limitation and further research for policy development**

Pattern of emigrants is two in nature as identified by Alam and Hoque (2010). One of them labelled as ‘body drain’, and the other is ‘brain drain’. While the ‘body drain’ group contributes increasing the remittances for the country of origin, the ‘brain drain’ group has become the economic part of hosts (Alam and Hoque, 2010). Further argument is made by Alam in the British Council Report that exporting manpower “apparently looks rosy’ in earning foreign currency, but this is an ever-inhuman task to be considered” (British Council, 2014). Referring Alam (2013), the report of British Council identified that exporting manpower neither contributes for economic nor social development in the long run. “Therefore, exporting goods produced by the skilled manpower is profitable but exporting manpower is not at all acceptable” [British Council, (2014), p.27]. We confess that this is a well-regarded argument that deserves international policy attention. Since this agenda would not be aimed to be executed so early, we wanted to see if education could support the existing pattern of global skills supply benefiting both countries of host and origin.

## **7 Conclusions**

Remittance has a positive impact on educational attainments and education has also positive impacts on remittance in recipient countries. This implies that the relationship between education and remittance is simultaneous. This study examines a mutual relationship between remittance and education and find that they both have positive impacts on each other. This study also finds that impacts of remittance on education is higher at secondary level than tertiary level. However, the impacts of education at tertiary level on remittance inflows is higher than secondary level. Nowadays developing countries are highly depended on their remittance inflows, and developed countries are highly depended on the immigrants’ flows that are mainly coming from developing countries. However, there are many difficulties and barriers for such remittance and migration flows. If policies taken to improve educational sector in terms of both quantitative and qualitative aspects and to improve migration flows across the world, developed and developing countries would be mutually benefited.

The findings are that remittance and education in recipient countries significantly affect each other. However, this study is subject to the following limitations. First, this study considers only the gross remittance inflows because of micro-level data unavailability for remittance and migration movements for a longer period. If the micro-level data is available, it would be interesting to examine the intensity of remittance inflows and its source countries on education in the recipient countries, and vice versa. In such case, a more comprehensive, but specific policy recommendation can be made for a specific country to improve remittance and education flows. Second, previous studies, such as Alam and Hoque (2010), argue that low skilled and educated people are more likely to send their whole income to their home countries compared to their high educated counterpart. The macro-level data used in this study does not allow to distinguish the effects.

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**Notes**

- 1 Studies, such as Alam and Hoque (2010) and Bredtmann et al. (2019), argue about the brain drain. In this study, we consider gross remittance received from all external sources, which might be different for developing and developed countries. Additionally, remittance or migration movement might also vary for high- or low-skilled workers, which is beyond the scope of our study.
- 2 There might be an argument against movement of the skilled labour force, who are mostly educated by the state funding. In such case, a cost-benefit analysis can be done for these highly educated and skilled labour force. However, this is beyond of the scope of our study.
- 3 See the International Monetary Fund [online] <http://datahelp.imf.org/knowledgebase/articles/537472-what-is-real-effective-exchange-rate-reer>.
- 3 Microeconomic motivations to send remittances are altruism, insurance, loan repayment, and investment (Lucas and Stark, 1985; Rapoport and Docquier, 2006; Yang, 2011; Pal and Pal, 2019; Namgha et al., 2019).
- 4 Studies also argued that remittances sometimes adversely affect the growth in the recipient countries. For example, remittance inflow may intensify the moral hazard problem on its recipients because it may increase their reservation wage and thus discourage to work. As a result, overall economic growth falls. For details, see Acosta et al. (2009), Catrinescu et al. (2009), and Siddique et al. (2012).
- 5 However, there might have a debate on brain drain. Our study does not focus on the brain drain, rather focusing on how remittance and education are mutually dependent.