



**ADB Working Paper Series**

**INTERNATIONAL REMITTANCES  
AND POVERTY REDUCTION:  
EVIDENCE FROM ASIAN  
DEVELOPING COUNTRIES**

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Naoyuki Yoshino,  
Farhad Taghizadeh-Hesary,  
and Miyu Otsuka

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Naoyuki Yoshino is dean of the ADB Institute and professor emeritus at Keio University, Tokyo, Japan. Farhad Taghizadeh-Hesary is assistant professor of economics, and Miyu Otsuka is a graduate student, both at Keio University, Tokyo, Japan.

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Please contact the authors for information about this paper.

Email: [nyoshino@adbi.org](mailto:nyoshino@adbi.org), [farhadth@keio.jp](mailto:farhadth@keio.jp), [miyu1430025@keio.jp](mailto:miyu1430025@keio.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](http://www.adbi.org)  
E-mail: [info@adbi.org](mailto:info@adbi.org)

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**Abstract**

International remittances represent the second-most-important source of external funding for developing countries after foreign direct investment (FDI). This paper examines the impact of international remittances on poverty reduction using the panel data of 10 Asian developing countries. In terms of the dependent variables, this paper sets 3 poverty indicators: the poverty headcount ratio, poverty gap ratio, and poverty severity ratio. The results show that international remittances have a statistically significant impact on the reduction of the poverty gap ratio and poverty severity ratio using the random-effect model of ordinary least squares (OLS) estimates. A 1% increase in international remittances as a percentage of the GDP can lead to a 22.6% decline in the poverty gap ratio and a 16.0% decline in the poverty severity ratio in the sample of 10 Asian developing countries from 1981 to 2014. In addition, the results indicate that a per capita GDP increase and trade openness can decrease the poverty measures and that higher inflation rates may be one of the causes of poverty.

**Keywords:** remittances, poverty reduction, developing Asia

**JEL Classification:** I31, I32, I38

## **1. Introduction**

International remittance flows into developing countries are attracting considerable interest because of their rising volume and impact on origin countries. The international remittances to developing countries are estimated to have reached \$436 billion in 2014 according to the World Bank (2014). Remittances to the East Asia and Pacific (EAP) region<sup>1</sup> and the South Asia region (SAR)<sup>2</sup> account for the first- and second-largest portions in the world. Although a number of studies have investigated the effect of international remittances on poverty reduction in specific countries or villages, very little attention has been paid to the impact of international remittances on poverty reduction using the data set of Asian developing countries as a whole and on different indicators of poverty.

The aim of this paper is to investigate whether international remittances contribute to reducing different indicators of poverty in Asian developing countries using more recent data. This data set includes 10 Asian countries: Bangladesh, India, Nepal, Pakistan, and Sri Lanka from the SAR and the People's Republic of China (PRC), Indonesia, Malaysia, the Philippines, and Thailand from the EAP region. The survey years are from 1981 to 2014. This research will contribute to a deeper understanding of the effects of international remittances on poverty reduction in Asian developing countries, especially migrant-sending countries.

The remaining parts of this paper are organized as follows. Section 2 briefly explains the recent trends of international remittances and poverty in Asian developing countries using official data. Section 3 reviews the previous research about the relationship between international remittances and poverty reduction at the country level and the cross-national level. Section 4 presents the model and data analysis. In Section 5, the empirical work regarding the relationship between international remittances and poverty reduction is discussed. Finally, Section 6 presents concluding remarks and policy implications, focusing on suggestions for increasing the effectiveness of international remittances in Asia.

## **2. International Remittances and Poverty Reduction in Developing Asia**

### **2-1. Recent Trends in Remittances to Asia**

Recently, there has been growing interest in international migration. According to data released by the United Nations, in 2013 there were 232 million international migrants, who accounted for 3.2% of the world population, representing an increase from 175 million in 2010 and 154 million in 1990 (United Nations 2013). The number of labor migrants is also increasing. According to the ADBI, OECD, and ILO (2017), the year 2015 was a peak year

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<sup>1</sup> The EAP region includes Japan, the People's Republic of China, Cambodia, Indonesia, the Republic of Korea, Lao PDR, Malaysia, Mongolia, Myanmar, the Pacific Islands, Papua New Guinea, the Philippines, Singapore, Thailand, Timor-Leste, and Viet Nam (World Bank 2016a).

<sup>2</sup> The SAR region includes Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan, and Sri Lanka.

for labor migration from Asian countries both within the region and towards OECD countries outside of Asia.

When we consider the linkage between migration and development, international remittances are thought to be one of the most important elements that contribute to the development of labor-sending countries. International remittances refer to the money and goods that are transmitted to households by migrant workers working outside of their origin countries (Adams 2007).

**Table 1: Remittance Flows to Developing Countries and the Growth Rate**

	2010	2011	2012	2013	2014	2015	2016
(\$ billions)							
All developing countries	333	373	392	404	436	473	516
East Asia and Pacific	95	107	107	112	123	135	148
Europe and Central Asia	32	38	39	43	45	49	54
Latin America and Caribbean	56	59	60	61	66	73	81
Middle East and North Africa	40	42	47	46	49	52	55
South Asia	82	96	108	111	118	127	136
Sub-Saharan Africa	29	31	31	32	35	38	41
World	453	507	521	542	581	628	681
Low-income countries	24	28	32	34	37	40	44
Middle-income countries	310	345	359	371	399	433	472
High-income countries	120	133	130	137	145	155	165
(Growth rate, %)							
All developing countries	10.3	12.1	4.9	3.3	7.8	8.6	8.9
East Asia and Pacific	20.2	13	0.1	4.8	9	9.9	10.1
Europe and Central Asia	-0.8	17	2.7	10	6.7	8.4	9.4
Latin America and Caribbean	1.1	5.9	0.9	1.9	9.4	10.4	10.6
Middle East and North Africa	18	6.5	11.8	-2	5.6	6.2	6.3
South Asia	9.4	17.7	12.1	2.3	6.6	7.3	7.5
Sub-Saharan Africa	7	6.8	0.1	3.5	8.7	9.1	9.4
World	8.7	11.7	2.9	3.9	7.3	8.1	8.4
Low-income countries	10.9	19.3	15.2	4.1	8.6	9.5	9.9
Middle-income countries	10.3	11.5	4.1	3.2	7.7	8.5	8.9
High-income countries	4.5	10.7	-2.5	5.9	5.7	6.5	6.8

Source: World Bank calculations based on data from the IMF's *Balance of Payments Statistics Yearbooks* (2014).

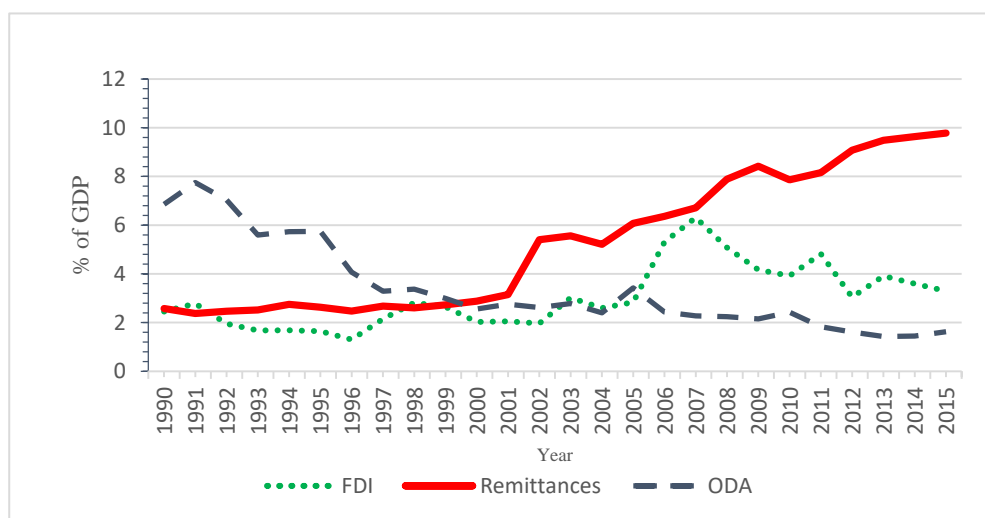
\* The data from 2015 and 2016 are predicted.

Table 1 shows a comparison of estimates for remittance flows to developing countries. International remittances to developing countries are estimated to have reached \$436 billion in 2014 according to the World Bank (2014). Remittances to the East Asia and Pacific (EAP) region account for the largest portion in the world and are estimated to have increased by 9.9% from 2014 to reach \$135 billion in 2015 (Table 1). The Philippines, for instance,

received \$29 billion in remittance flows in 2014, which was equivalent to about 10% of its GDP. As for the South Asia Region (SAR), the international remittance flows are estimated to have reached \$127 billion in 2015 (Table 1). The economic effects caused by remittances in the SAR are quite robust. International remittances are the largest source of external resource flows in the SAR, and they have been increasing steadily compared with other factors, such as FDI and official development assistance (ODA) (Figure 1). Remittance flows account for a large portion of the external resources in the SAR, especially from the beginning of the twenty-first century. Looking at the respective data of the SAR, the international remittance flows in Nepal, for example, were equivalent to 25% of the GDP and to 98% of the international reserves in 2013 (World Bank 2014). As regards Pakistan, the international remittance flows in 2013 were equivalent to 284% of the international reserves (World Bank 2014).

The growth rate of remittance flows fell around 2012 and 2013 in almost all regions. However, in recent years, such as 2014 and 2015, their growth rate has increased again, especially in the EAP region, Latin America, and the Caribbean. In all developing countries as a whole, the growth rate of remittance flows peaked at 12.2% in 2011, decreased to around 5% and 3% in 2012 and 2013, and recovered to 8% and 9% in 2014 and 2015.

**Figure 1: External Resource Flows in the SAR (% of GDP)**



Source: Author's compilation based on World Bank (2016a). Notes: FDI: foreign direct investment, ODA: official development assistance; the data include Bangladesh, India, the Maldives, Nepal, Pakistan, and Sri Lanka.

SAR = South Asia Region.

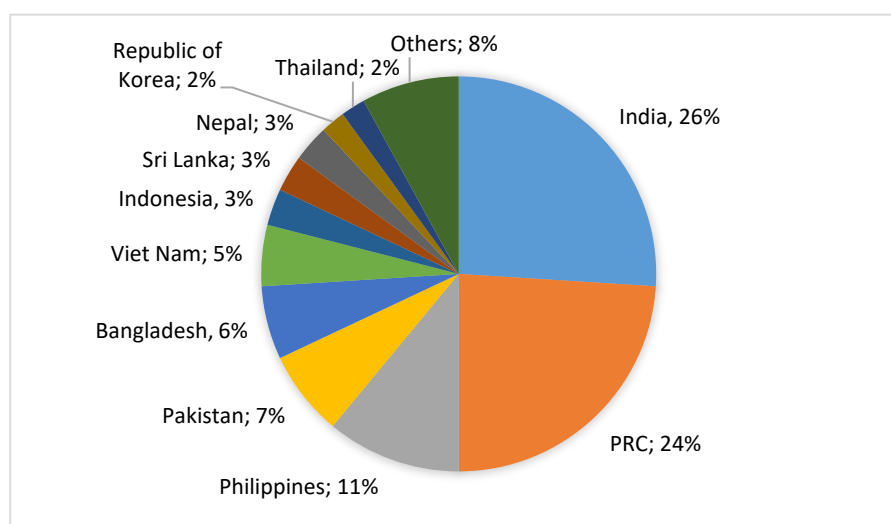
**Table 2: Remittances by Receiving Countries, 2005–2014 (\$ billion)**

Country	2005	2010	2011	2012	2013	2014
India	22.1	53.5	62.5	68.8	70	70.4
China, People’s Rep. of	23.6	52.5	61.6	58	59.5	62.3
Philippines	13.7	20.6	21.9	23.4	25.4	27.3
Pakistan	4.3	9.7	12.3	14	14.6	17.1
Bangladesh	4.6	10.9	12.1	10	11	12
Indonesia	5.4	6.9	6.9	7.2	7.6	8.6
Sri Lanka	2	4.1	5.2	6	6.4	7
Nepal	1.2	3.5	4.2	4.8	5.6	5.8
Thailand	1.2	3.6	4.6	4.7	5.7	5.7
Malaysia	1.1	1.1	1.2	1.3	1.4	1.6

Source: Author’s compilation based on the ADBI, OECD, and ILO (2017).

Table 2 shows the amount of remittance inflows into the Asian developing countries on which this paper will focus. All the countries experienced a drastic increase in the remittances received from 2005 to 2014. For Nepal and Thailand, the amount of remittance inflows in 2014 was about five times as large as that in 2005. India and the PRC are the two Asian countries with the largest emigrant populations in the world, and they received the largest amount of remittances (Table 2). India alone accounts for more than a quarter of all remittances to Asia, and the PRC follows it closely (Figure 2). The Philippines is currently the third-largest remittance-receiving country in Asia.

**Figure 2: Share of Asian Remittances by Receiving Country, 2015**



Source: Author’s compilation based on the ADBI, OECD, and ILO (2017).

## 2-2. Recent Trends of Poverty Reduction in Asia

According to the ADB (2015), there has been spectacular progress in reducing poverty in the Asian developing regions owing to the Millennium Development Goals (MDGs).<sup>3</sup> The target of the MDGs was to halve the poverty headcount, which indicates the proportion of people whose income is below the poverty line. The poverty headcount ratio is the percentage of the population living on less than \$1.90 a day at 2011 international prices (World Bank 2016b). According to the World Bank (2016c), 10.7% of the world's population lived on less than \$1.90 a day in 2013 compared with 12.4% in 2012, which is also a drop from 35% in 1990. This means that 767 million people lived on less than \$1.90 a day in 2013, a fall from 881 million in 2012 and 1.85 billion in 1990. Figure 3 shows the proportion of the population below the poverty line in Asian developing countries. It can be said that almost all Asian developing countries – notably the PRC, Nepal, and Viet Nam – have succeeded in reducing extreme poverty, although there is a difference in the scale of progress depending on the country.

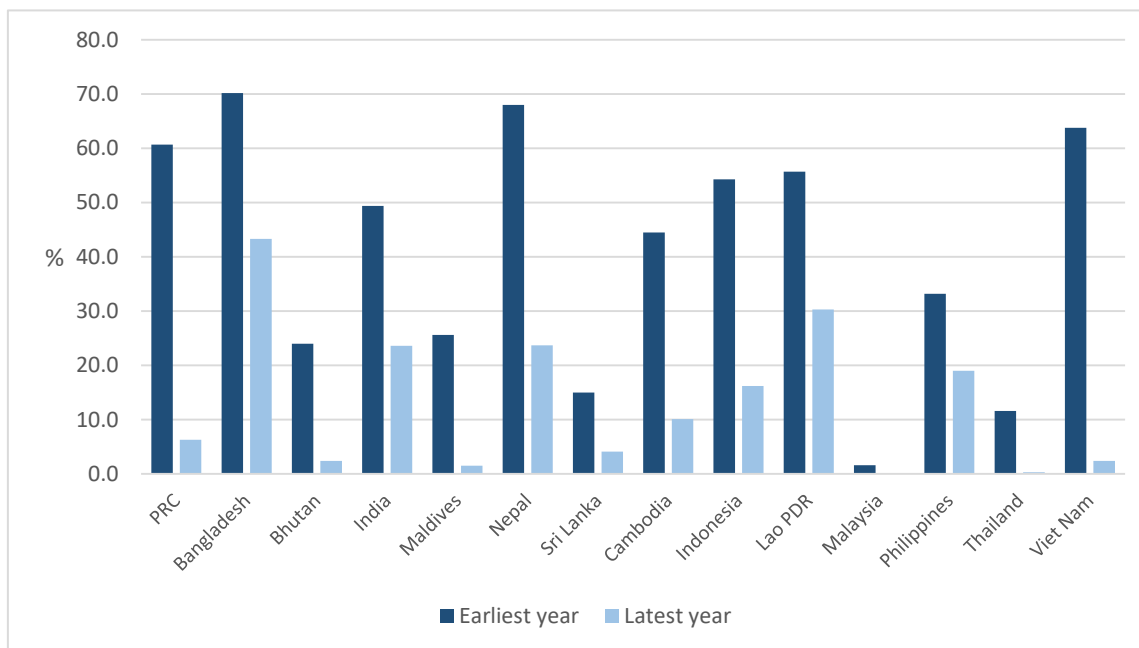
Although the poverty headcount is the most common tool for measuring poverty, there are two other factors to consider: poverty depth and poverty severity. Poverty depth is also described as the poverty gap and indicates how far, on average, the poor are from the poverty line. According to the World Bank (2016c), the poverty gap at \$1.90 a day (2011 PPP) is the mean shortfall in income or consumption from the poverty line of \$1.90 a day (counting the non-poor as having zero shortfall), expressed as a percentage of the poverty line. Poverty severity, which is shown as the squared poverty gap, represents the mean of the squared distance below the poverty line as a proportion of the poverty line (World Bank 2016c).

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<sup>3</sup> The United Nations Millennium Development Goals are 8 goals that all 191 UN Member States have agreed to try to achieve by the year 2015. The United Nations Millennium Declaration, signed in September 2000, commits world leaders to combating poverty, hunger, disease, illiteracy, environmental degradation, and discrimination against women. The MDGs are derived from this Declaration, and they all have specific targets and indicators. The Eight Millennium Development Goals are: to eradicate extreme poverty and hunger; to achieve universal primary education; to promote gender equality and empower women; to reduce child mortality; to improve maternal health; to combat HIV/AIDS, malaria, and other diseases; to ensure environmental sustainability; and to develop a global partnership for development. (Source: [www.who.int/topics/millennium\\_development\\_goals/about/en/](http://www.who.int/topics/millennium_development_goals/about/en/). Accessed December 25, 2017.)



**Figure 3: Population Ratio below the Poverty Line (\$1.90 a day)**  
(Earliest Year and Latest Year)



Source: ADB (2015).

Note: The “earliest year and latest year” depend on each country: PRC (1990, 2011), Bangladesh (1991, 2010), Bhutan (2003, 2012), India (1993, 2011), the Maldives (1998, 2004), Nepal (1995, 2010), Sri Lanka (1990, 2009), Cambodia (1994, 2011), Indonesia (1990, 2011), Lao PDR (1992, 2012), Malaysia (1992, 2009), the Philippines (1991, 2012), Thailand (1990, 2010), and Viet Nam (1993, 2012).

Another of the MDG targets was to halve the proportion of people who suffer from hunger between 1990 and 2015. One way to measure hunger and malnutrition is to calculate the percentage of children under 5 years of age who are underweight. As Table 3 shows, progress in reducing the hunger ratio was achieved in almost all of the developing Asian countries, particularly in the PRC, where the ratio of underweight children decreased from 12.6% in 1990 to 3.4% in 2010. Viet Nam also experienced a drastic decrease in this ratio: from 36.9% in 1993 to 12.1% in 2013. However, malnutrition remained high in some countries, such as India (29.4%), Nepal (30.1%), and Bangladesh (32.6%). Compared with the progress in reducing extreme poverty, the Asian developing region made much slower progress in reaching the hunger target.

The ADB (2015) mentioned that one of the recent characteristics of poverty in developing Asian countries is the higher poverty ratio in rural areas than in urban areas. The rural population is significantly more at risk of being poor than the urban population, and those who have managed to exit poverty can face various risks of returning to it, such as the loss of a job and harmful effects on their livelihood from price volatility, conflicts, and natural disasters.

**Table 3: Proportion of People Who Suffer from Hunger**

Prevalence of Underweight Children under 5 Years of Age (%)				
	Earliest Year		Latest Year	
<b>East Asia</b>				
China, People's Rep. of	12.6	(1990)	3.4	(2010)
Korea, Rep. of	0.9	(2003)	0.7	(2010)
Mongolia	11.8	(1992)	1.6	(2013)
<b>South Asia</b>				
Bangladesh	61.5	(1990)	32.6	(2014)
Bhutan	14.1	(1999)	12.8	(2010)
India	52.8	(1992)	29.4	(2014)
Maldives	32.5	(1994)	17.8	(2009)
Nepal	42.6	(1995)	30.1	(2014)
Sri Lanka	33.8	(1993)	26.3	(2012)
<b>Southeast Asia</b>				
Brunei Darussalam			9.6	(2009)
Cambodia	42.6	(1996)	23.9	(2014)
Indonesia	29.8	(1992)	19.9	(2013)
Lao PDR	39.8	(1993)	26.5	(2011)
Malaysia	22.1	(1990)	12.9	(2006)
Myanmar	32.5	(1990)	22.6	(2009)
Philippines	29.9	(1990)	19.9	(2013)
Singapore			3.3	(2000)
Thailand	16.3	(1993)	9.2	(2012)
Viet Nam	36.9	(1993)	12.1	(2013)

Source: Millennium Development Goals, ADB (2015).

### 3. Literature Survey

Several studies have found that an increase in remittances affects not only consumption but also savings and investment in physical capital. Recipient households often consider remittances to be transitory income. Therefore, they save a significant proportion of their remittance receipts (often in the form of investment in real estate) compared with other income. In addition, remittances ease liquidity constraints and serve as insurance for many recipient households, inducing them to invest in business ventures and take entrepreneurial risks and generating more income (Adams 1991, 1998, 2002; Brown and Walker 1995; Brown and Leeves 2007; Ang, Sugiyarto, and Jha 2009).

The empirical and theoretical evidence on whether international remittances have an impact on reducing poverty in developing countries is mixed. Adams and Page (2005) analyzed the data set on international remittances and poverty from 71 developing countries and showed that remittances can significantly reduce the level, depth, and severity of poverty in the developing world. Imai et al. (2014) examined the effects of remittances on the growth of the GDP per capita using annual panel data for 24 Asia and Pacific countries and found that, in tandem with

both the theoretical and the empirical literature, remittances could have a positive effect on growth and poverty reduction. Anyanwu and Erhijakpor (2010) examined the impact of international remittances on poverty reduction in African countries using panel data of 33 countries over the period from 1990 to 2005. They concluded that international remittances have a strong and statistically significant impact on reducing poverty in Africa. From a microeconomic perspective, Taylor et al. (2005) investigated the relationship between remittances and poverty and inequality in Mexico. They collected data from 1,782 households in 14 Mexican states in January and February 2003 to explore the impacts of remittances on rural inequality and poverty. The results show that remittances from international migrants come closer to being equal as well as more effective in reducing poverty as the prevalence of migration increases.

On the other hand, Hein's (2005) qualitative investigation found that migrant remittances do not necessarily contribute to an improvement in the living conditions in receiving countries, because unattractive investment environments and restrictive immigration policies that interrupt circular migration patterns prevent the high development potential of migration from being fully realized. Chami, Fullenkamp, and Jahjah (2005) also examined a model of remittances based on the economy of 113 countries for which worker remittances were reported over the period 1970–1998. They found that remittances are not profit-driven but compensatory transfers and should have a negative correlation with GDP growth. Azam and Gubert (2006) investigated the microeconomic evidence concerning migration and remittances in Africa and reached two main conclusions. First, migration from Africa is regarded as a collective decision made by families or regions and remittance flows are thought to be a way of diversifying their income sources and supporting the families' consumption. Second, on the other hand, remittance flows may cause some moral hazard problems within Africa. Those who remain behind in Africa tend to make less effort to work for a lower wage than overseas migrants, because they know that the migrants will compensate for their income shortfalls through international remittance flows. The World Bank's (2006) International Migration and Development Research Program shows that international remittances reduce the level and depth of poverty. For example, a 10% increase in international remittances will lead to a 3.5% decline in the share of people living in poor conditions. However, at the same time, countries with higher levels of poverty do not necessarily receive more remittances. The countries with the highest level of poverty, such as the Sub-Saharan African countries, do not produce many international migrants and therefore receive fewer remittances. Moreover, this research program suggests that the largest effect of remittances on poverty is observed in countries that are located close to labor-receiving areas. This means that developing countries close to the United States or Europe receive more remittances, which are usually spread evenly among the population.

#### 4. Theoretical Model

Before setting the empirical model, this section theoretically demonstrates the impact of remittances on poverty reduction. It shows that the flow of remittances has a greater impact on the low-income group than the high-income group; therefore, it has a poverty reduction impact. First, we start from the utility function of the country consisting of a low-income group and a high-income group.

$$U = U (C_L, C_H, L_L, L_H) = C_L C_H - L_L L_H \quad (1)$$

Eq. 1 shows the utility ( $U$ ) function of a country consisting of a low-income group and a high-income group. The utility function consists of the consumption of goods of the low-income group ( $C_L$ ) and high-income group ( $C_H$ ) subtracting the labor supply of the low-income group ( $L_L$ ) and high-income group ( $L_H$ ), which shows the level of satisfaction or happiness in the country. In this function, for simplicity, we assume that the absolute values of the impact of the consumption of both groups and the labor supply of both groups on the country utility are equal.

Next we write the budget constraints for both income groups.

$$PC_L = W_L L_L + \alpha(\text{remit}) \quad (2)$$

$$PC_H = W_H L_H + (1 - \alpha)(\text{remit}) \quad (3)$$

The income of both groups comes from two sources: the first source is the wage income, which depends on the wage rate and labor supply of each group, and the second source is the inflow of remittances of workers from their group who went abroad to work and send money to their families. Each group consumes the full income for the purchase and consumption of goods and services; hence, we assume that there is no saving in this model.  $P$  denotes the general price level of goods and services,  $W_L$  denotes the wage rate of the low-income group,  $W_H$  denotes the wage rate of the high-income group,  $\alpha$  is share of the low-income group in the total inflow of remittances to the country, and  $\text{remit}$  denotes the total inflow of remittances to the country.

To find the optimal level of consumption and labor supply for each income group, we need to develop a Lagrange function, which is defined as:

$$\Gamma = (C_L C_H - L_L L_H) - \lambda_L \{ PC_L - W_L L_L - \alpha(\text{remit}) \} - \lambda_H \{ PC_H - W_H L_H - (1 - \alpha)(\text{remit}) \} \quad (4)$$

Obtaining the first-order conditions with respect to the consumption and labor supply of both groups and  $\lambda_L$  and  $\lambda_H$  results in:

$$\frac{\partial \Gamma}{\partial C_L} = C_H - \lambda_L P = 0 \quad (5)$$

$$\frac{\partial \Gamma}{\partial C_H} = C_L - \lambda_H P = 0 \quad (6)$$

$$\frac{\partial \Gamma}{\partial L_L} = -L_H + \lambda_L W_L = 0 \rightarrow \lambda_L = \frac{L_H}{W_L} \quad (7)$$

$$\frac{\partial \Gamma}{\partial L_H} = -L_L + \lambda_H W_H = 0 \rightarrow \lambda_H = \frac{L_L}{W_H} \quad (8)$$

$$\frac{\partial \Gamma}{\partial \lambda_L} = PC_L - W_L L_L - \alpha(remit) = 0 \quad (9)$$

$$\frac{\partial \Gamma}{\partial \lambda_H} = PC_H - W_H L_H - (1 - \alpha)(remit) = 0 \quad (10)$$

Substituting  $\lambda_L$  from Eq. 7 into Eq. 5 and writing it for  $C_H$  results in:

$$C_H = \frac{L_H}{W_L} P \quad (11)$$

Substituting  $\lambda_H$  from Eq. 8 into Eq. 6 and writing it for  $C_L$  results in:

$$C_L = \frac{L_L}{W_H} P \quad (12)$$

Substituting  $C_L$  from Eq. 12 into Eq. 9 and writing it for  $L_L$  results in the labor supply equation for the low-income group:

$$L_L = \frac{\alpha(remit)}{\left(\frac{P^2}{W_H}\right) - W_L} \quad (13)$$

Substituting  $C_H$  from Eq. 11 into Eq. 10 and writing it for  $L_H$  produces the labor supply equation for the high-income group:

$$L_H = \frac{(1 - \alpha)(remit)}{\left(\frac{P^2}{W_L}\right) - W_H} \quad (14)$$

Substituting  $L_L$  from Eq. 13 into Eq. 12 results in the consumption equation for the low-income group:

$$C_L = \frac{(\alpha)(remit)}{\left(P - \frac{W_L W_H}{P}\right)} \quad (15)$$

$$\text{where: } \begin{pmatrix} P > W_H \\ P > W_L \end{pmatrix} \rightarrow P - \frac{W_L W_H}{P} > 0$$

Substituting  $L_H$  from Eq. 14 into Eq. 11 generates the consumption equation for the high-income group:

$$C_H = \frac{(1 - \alpha)(remit)}{\left(P - \frac{W_H W_L}{P}\right)} \quad (16)$$

$$where: \begin{pmatrix} P > W_L \\ P > W_H \end{pmatrix} \rightarrow P - \frac{W_H W_L}{P} > 0$$

From Eq. 15 and Eq. 16 it is clear that, when the remittance inflow to the country is increasing, the consumption of both income groups (high-income and low-income) will increase. This means that remittances affect low-income people's consumption positively and reduce poverty. However, this does not necessarily mean that remittances can reduce the income inequality, which is dependent on  $\alpha$ ; if  $\alpha \geq 0.5$ , this means that the low-income group is receiving more remittances, hence the income disparity is decreasing. At the community level, several papers have found that remittances affect the distribution of income. Ravanilla and Robleza (2003) applied decomposition analysis to investigate the contribution of remittances to the total income inequality. Dakila and Dakila (2006) analyzed the effect of remittances through a computable general equilibrium model and showed that the main beneficiaries of remittances are the middle class. Tullao, Cortes, and See (2007) showed that the proportion of employed workers in families that received remittances in the Philippines is smaller than the proportion that did not. They opined that the benefits of migration will be reaped by the more educated and families with the ability to pay. This will contribute to the widening of income inequality. Real data support this; for example, migrant households in the Philippines accounted for 23% of the total and some of them for more than one migrant. Fewer than 10% of low-income households receive remittances. The proportion of those receiving remittances increases as one moves to higher-income quintiles. This implies that remittances worsen income inequality in the Philippines. Alternatively, about 6% of households in Viet Nam receive remittances, and most of them are non-poor. The share of poor households receiving remittances is only 3% compared with more than 10% of rich households (the top quintile in the distribution). This might be due to the high cost of migration for Vietnamese people given their main destination (the USA: 51%, France: 13%, Australia: 9%, Canada 7%, and other countries, including neighboring countries in Asia). Urban households tend to receive more remittances than their rural counterparts. Richer households receive more than poorer households (ADB, 2012).

## 5. Model and Data Analysis

### 5-1. Empirical Model

This paper uses a cross-country model to analyze international remittances' effect on poverty in Asian developing countries. The model is an updated version of the model of Anyanwu and Erhijakpor (2010) and Banga and Sahu (2010); the empirical model of this paper can be written as:

$$\begin{aligned} \text{Log}V_{it} = \beta_0 + \beta_1\text{Log}(y_{it}) + \beta_2\text{Log}(remit_{it}) + \beta_3\text{Log}(X_{it}) + \varepsilon_{it} \quad (17) \\ (i = 1, \dots, N; t = 1, \dots, T) \end{aligned}$$

In this model (Eq. 17), the dependent variable  $V_{it}$  is the measure of poverty in country  $i$  at time  $t$ .  $\beta_0$  is the constant;  $\beta_1$  is the economic growth elasticity of poverty with respect to the real per capita GDP given by  $y$ .  $\beta_2$  is the elasticity of poverty with respect to international remittances (as a percentage of the GDP) given by  $remit$ .  $X_{it}$  includes the control variables, which are inflation (as the annual percentage change in the consumer price index) and trade openness, represented by (imports + exports)/GDP. Finally,  $\varepsilon$  is an error term that includes the error terms in the poverty measure.

The dependent variable, which is poverty, can be measured using three poverty indices: i) the incidence of poverty, ii) the depth of poverty, and iii) the severity of poverty (Foster, Greer, and Thorbecke 2013). The PovcalNet database<sup>4</sup> of the World Bank offers data on the headcount ratio (the poverty incidence), the poverty gap ratio (the depth of poverty), and the squared poverty gap ratio (the severity of poverty), respectively.

First, the poverty headcount ratio is a measure of poverty that refers to the proportion of the population living beneath the poverty line. This paper uses \$1.90 per day in 2011 PPP as the poverty line. The poverty headcount measure is thought to be the most commonly calculated poverty measure. The poverty headcount ( $V_0$ ) is expressed as  $V_0 = n_p/n_t$ , where  $n_p$  means the number of people who lived on under \$1.90 per day in 2011 PPP and  $n_t$  means the total population. Second, the *poverty gap* ratio indicates how far below the poverty line the average poor household's income or expenditure falls. For example, a poverty gap of 10% means that the average poor person's income or expenditure is 90% of the poverty line. This situation can be written as Eq. 18.

$$y_p = (1 - V_1)\bar{y}_{povertyline} \quad (18)$$

$y_p$  means the income of a poor person,  $V_1$  is the poverty gap, and  $\bar{y}_{povertyline}$  means the poverty line indicated as \$1.90 per day in 2011 PPP. When we rearrange the equation, it can be written as Eq. 19:

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<sup>4</sup> PovcalNet is the source of the official globally, regionally, and internationally comparable country-level poverty estimates published in the World Development Indicators as well as the shared prosperity indices reported in the *Global Monitoring Report* (World Bank 2016b).

$$V_1 = \frac{\bar{y}_{povertyline} - y_p}{\bar{y}_{povertyline}} \quad (19)$$

The poverty gap measures the extent to which individuals fall below the poverty line as a proportion of the poverty line. The sum of these poverty gaps gives the minimum cost of eliminating poverty if the transfers are perfectly targeted. The measure does not reflect changes in inequality among the poor.

In Eq. 20,  $V_2$  denotes the squared poverty gap index, which is also known as the poverty severity index. The poverty severity index averages the squares of the poverty gaps relative to the poverty line (Eq. 20):

$$V_2 = \left( \frac{\bar{y}_{povertyline} - y_p}{\bar{y}_{povertyline}} \right)^2 \quad (20)$$

This is one of the Foster–Greer–Thorbecke (FGT) poverty measures that allow one to vary the amount of weight on the income (or expenditure) level of the poorest members of society. The FGT poverty measures are additively decomposable. It is also possible to separate changes in the FGT measures into a component resulting from rising average incomes and a component resulting from changes in the distribution of income.

The effect of squaring gives more weight to the poorest of the poor, drawing attention to the inequality between subpopulations of the poor. This can be illustrated by a simple example. Imagine two areas that both exhibit a poverty gap of 20%. In the first area, everyone is equally poor and must make up a 20% shortfall to reach the poverty line. In the second area, by contrast, half of the poor must only make up a 5% shortfall to reach the poverty line, while the other (poorer) half must contend with a much bigger 35% shortfall. In the first area, the severity index would be  $0.2 \times 0.2 = 0.04$  or 4%, whereas in the second area it would be  $((0.05 \times 0.05) + (0.35 \times 0.35))/2 = 0.0625$  or 6.25%. Thus, in spite of exhibiting the same poverty gap, the two example areas differ significantly in their severity index, the index being higher in the area exhibiting greater inequality between the poor and a larger number of very poor people (Wiesmann, Kiteme, and Mwangi 2014).

The first explanatory variable,  $y_{it}$ , is the real per capita GDP. The relationship between the real per capita GDP and poverty is expected to be negative ( $\beta_1$ ). This is because an increase in the per capita GDP can make people's life better through an increase in disposable income. The second variable,  $remit_{it}$ , is the inflow of international remittances (ratio of the GDP). The sign of  $\beta_2$  as the coefficient of this variable could be either positive or negative, as found in the literature review, and the objective of this paper is to assess this impact.  $X_{it}$  includes the control variables, inflation, and trade openness. Inflation brings a price increase or price instability, which can have a negative impact on welfare. Thus, a negative association between



inflation and poverty can be expected. Another variable, trade openness, can be correlated either positively or negatively with poverty, as we found in the literature. Trade liberalization could benefit the poor, because it could increase the relative wage of low-skilled workers and reduce monopoly rents or the connection to some bureaucratic and political powers (Anyanwu and Erhijakpor 2010). On the other hand, trade liberalization may worsen the income distribution by accelerating the skill-biased technical change in response to the increased competition with foreign countries. Therefore, trade liberalization may not necessarily be good for poverty reduction unless there are drastic per capita income growth and overall economic growth.

In this paper, the data set consists of 10 Asian countries: Bangladesh, the PRC, India, Indonesia, Malaysia, Nepal, Pakistan, the Philippines, Sri Lanka, and Thailand. All of these countries, except Malaysia and Thailand, are well-known migrant-sending countries of East and South Asia. Malaysia and Thailand have recently experienced a period of transition from being migrant-sending countries to being migrant-receiving countries. The survey years are from 1981 to 2014. Based on the survey years when the World Bank's PovcalNet database collected the data on poverty measures and inequality, this paper also collected data on other variables. Therefore, in the years for which the PovcalNet database does not have data about the dependent variables, this paper sets zero for the other data. This paper uses panel data.

## 5-2. Unit Root Tests

To evaluate the stationarity of all the series, we performed two-unit root tests on all the variables at levels and at first differences with the intercept and trend. The unit root tests are the augmented Dickey–Fuller (ADF) test and the Phillips–Perron (PP) test. The results are summarized in Table 4.

**Table 4: Unit Root Tests**

Variable	Augmented Dickey–Fuller (ADF)		Phillips–Perron (PP)	
	Levels (t-statistics)	First Differences (t-statistics)	Levels (t-statistics)	First Differences (t-statistics)
Poverty Headcount	63.59*	93.19*	69.65*	106.84*
Poverty Gap	285.82*	304.25*	141.16*	155.71*
Poverty Severity	40.25*	271.88*	188.21*	195.09*
Per Capita GDP	9.45	71.29*	9.32	71.09*
Remittance	14.11	42.10*	12.31	42.15*
Inflation Rate	53.13*	96.88*	62.92*	334.09*
Trade Openness	20.23	59.41*	17.59	66.09*

Notes: The per capita GDP is based on constant 2011 US\$, and the remittances are inflows of international remittances (ratio of GDP). \* indicates rejection of the null hypothesis of the presence of a unit root at the 1% level.

The results show that, according to both the augmented Dickey–Fuller (ADF) and the Phillips–Perron (PP) test, the per capita GDP, remittances, and trade openness contain a unit root. Hence, we need to test the series again in their first differences. For both tests, the results show that we can reject the null hypothesis of the presence of a unit root when applying the first difference, which means that the variables are integrated to the order one or I(1). Hence, the variables will appear in our empirical analysis in first-difference mode. When series are not integrated to the order one, we need to run the Johansen cointegration test to check for the presence of cointegration. The Johansson cointegration test results show that the series are not cointegrated.

## 6. Empirical Results

### 6-1. Pooled OLS Results

Table 5 shows the results of the empirical estimations for Eq. 17 using the ordinary least squares (OLS) of panel data analysis. In order to select the optimal lag length, we used The Akaike information criterion (AIC). Table 5 shows that the international remittance variable has a negative impact on all three of the poverty measures: the poverty headcount ratio ( $V_0$ ), poverty gap ratio ( $V_1$ ), and poverty severity ratio ( $V_2$ ). The t-statistics of the poverty gap and poverty severity are statistically significant. However, the t-statistics of the poverty headcount ratio are statistically insignificant. The results of the OLS test show that a 1% increase in the international remittance flows as a percentage of the GDP can lead to a decrease in the poverty gap ratio of 22.6% and a decrease in the poverty severity ratio of 18.3%.

**Table 5: Empirical Results of the Effects of International Remittances on Poverty Measures**

Variable	Poverty Headcount	Poverty Gap	Poverty Severity
Constant	0.019 (0.758)	0.016 (0.670)	0.012 (0.540)
Per Capita GDP (Constant 2011 US\$)	-0.007 (-0.335)	-0.192** (-8.816)	-0.25** (-13.216)
Inflow of International Remittances (Ratio of GDP)	-0.093 (-1.451)	-0.226** (-3.486)	-0.183** (-3.167)
Inflation Rate	1.394** (14.446)	1.362** (13.918)	1.214** (13.929)
Trade Openness	-0.025** (-3.496)	-0.032** (-4.467)	-0.037** (-5.783)
R-Squared	0.666	0.395	0.397
Adjusted R-Squared	0.651	0.387	0.386
Prob. (F-Statistics)	0.00	0.00	0.00
Observations	330	330	330

Notes: The numbers in parentheses are t-values. \*\* Significant at the 1% level.

The other explanatory variables, except for the inflation rate, all have a negative effect on the poverty measures. First, the per capita GDP has a negative association with the poverty measures, which means that an increase in the per capita GDP leads to a decline in poverty. As for the inflation rate and trade openness, they have a positive and a negative correlation with the poverty indicators, respectively. A continuing high inflation rate provokes a price hike and price instability, which can produce an adverse effect on people's life and expand poverty. In the case of inflation, stock prices and land and real estate prices will rise; on the other hand, the living expenditures, including housing, clothing, and food costs, will rise. This means that poor people have to spend more to survive. Although inflation affects different income groups (rich and poor), rich people can gain more from their financial assets and real estate price increases and poor people do not have those kind of assets; hence, they suffer. As regards trade openness, the results show that all the poverty measures have a negative correlation with the spread of trade openness. This means that, if the observed countries open themselves up to foreign countries by increasing the volume of trade against their GDP, poverty can decrease. This is because the relative wage of low-skilled workers can increase, monopoly rents and the connection to some bureaucratic or political powers can be reduced, and trade liberalization and international competition can stimulate the country's industry, especially with a comparative advantage.

## **6-2. Hausman Test**

Table 6 shows the results of the Hausman test to verify whether we should choose a fixed-effect model or a random-effect model.<sup>5</sup> Following the Hausman test, this paper adopts a random-effect model that considers the independence between fixed effects and explanatory variables. The results of the random-effect model are similar to those of the pooled OLS. International remittances have a statistically significant impact on the poverty gap ratio and poverty severity ratio reduction.

The results show that a 1% increase in the international remittance flows as a percentage of the GDP can lead to a decrease in the poverty gap ratio of 22.6% and a decrease in the poverty severity ratio of 16.0%. However, only the t-statistics of international remittances are statistically insignificant for the poverty headcount ratio. This may be because the poverty headcount ratio does not reflect the poverty gap among the poor. There might be people who live on \$1.90 per day, but, at the same time, there might be people who live on \$0.50 per day. Although remittances are distributed to people in developing countries, those who receive

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<sup>5</sup> A test of fixed vs. random effects can also be seen as a test of overidentifying restrictions. The fixed-effect estimator uses the orthogonality condition that the regressors are uncorrelated with the idiosyncratic error. The random-effect estimator uses the additional orthogonality condition that the regressors are uncorrelated with the group-specific error (the "random effect"). These additional orthogonality conditions are overidentifying restrictions. See Arellano (1993) and Wooldridge (2002, 290–291).

remittances might be from high-income families, because it costs a considerable amount to leave home countries and work abroad. This can lead to an expansion of the gap among the poor. Compared with the poverty headcount ratio, the poverty gap ratio and poverty severity ratio take into account the average poor household's income or expenditures against the poverty line. Therefore, these two variables can reflect a substantial reduction in poverty and a significant effect from international remittance inflows.

As regards the other variables, a per capita GDP increase of 1% can lead to a 19.2% decrease in the poverty gap ratio and a 24.3% decrease in the poverty severity ratio. However, a per capita GDP increase does not have a significant impact on the poverty headcount. This is because a per capita GDP increase for people who are far from the poverty line does not necessarily improve the poverty headcount ratio. High inflation can be a factor that accelerates poverty by expanding the gap between the rich and the poor. High-income people benefit from a wage hike due to increasing inflation, while poor people, who tend to experience difficulties in finding job opportunities, cannot enjoy such a benefit. Finally, trade openness can reduce all three poverty variables by increasing both the net exports and the country's GDP.

**Table 6: Hausman Test**

Variable	Poverty Headcount		Poverty Gap		Poverty Severity	
	Fixed	Random	Fixed	Random	Fixed	Random
Constant	0.013 (0.758)	0.018 (0.725)	0.013 (0.560)	0.017 (0.729)	0.017 (0.794)	0.015 (0.537)
Per Capita GDP	-0.044* (-2.069)	-0.001 (-0.072)	-0.140** (-6.429)	-0.192** (-9.580)	-0.228** (-11.493)	-0.243** (-12.795)
Inflow of International Remittances	-0.044 (-0.653)	-0.085 (-1.410)	-0.149* (-2.573)	-0.226** (-3.788)	-0.124* (-1.959)	-0.160** (-2.745)
Inflation Rate	1.143** (11.912)	1.353** (15.002)	1.090** (11.206)	1.362** (15.124)	1.027** (11.484)	1.133** (13.206)
Trade Openness	-0.025* (-2.587)	-0.024** (-3.586)	-0.025** (-3.642)	-0.032** (-4.854)	-0.031** (-4.983)	-0.035** (-5.586)
R-Squared	0.716	0.653	0.502	0.395	0.467	0.362
Adjusted R-Squared	0.704	0.648	0.481	0.387	0.449	0.354
Prob. (F-Statistics)	0.00	0.00	0.00	0.00	0.00	0.00
Observations	330	330	330	330	330	330

Notes: The numbers in parentheses are t-values. \*\* Significant at the 1% level; \* significant at the 5% level.

Finally, it is also important to mention that remittances are not the only solution for reducing the poverty in developing countries. There are many other issues that need to be considered. i) Tax compliance: in many developing countries, rich people avoid paying proper tax by hiding their wealth, and the tax rates are not progressive, which means that everybody pays similar tax rates; hence, the income disparity remains. ii) Lack of high-quality education: education is very costly, which means that poor people cannot send their children to higher education or high-

quality institutes, so they cannot be recruited for high-income jobs and the poverty and income disparity remain in the society. iii) Regional disparity: in most developing countries, the main job in rural areas is agriculture. Agricultural farmers in developing countries receive a lower income than urban people, because in urban areas there are many opportunities to enjoy the economic growth; however, the agricultural sector has very low productivity and the workers' income remains very low. iv) Fiscal subsidies: fiscal subsidies, such as unemployment compensation and a social welfare system, are not well developed in underdeveloped countries; therefore, poor people cannot receive fiscal transfers from the government. However, advanced countries, such as the Scandinavian countries, have higher tax rates but at the same time a very good social welfare system, making people much more equal. v) Lack of infrastructure: this makes the situation more difficult for micro, small, and medium-sized enterprises to sell their products to cities efficiently and to export overseas; therefore, their businesses cannot grow, which is another reason for the income disparity.

## **7. Concluding Remarks and Policy Implications**

This paper examined the impact of international remittances on poverty in Asia using a data set of 10 developing Asian countries. Some key findings and policy implications emerged. First, international remittances have a significant impact on reducing poverty in Asia, especially on reducing the poverty gap ratio and poverty severity ratio. The empirical results show that a 1% increase in international remittances as a percentage of the GDP can lead to a 22.6% decline in the poverty gap ratio and a 16.0% decline in the poverty severity ratio. Moreover, the per capita GDP and trade openness also appear to decrease all the poverty measures, and the inflation rate could be a factor that fuels them. Looking at the analysis overall, some policy implications can be offered in terms of the relationship between international remittances and poverty measures. One of the policies for increasing the positive impact of remittances on lowering poverty in the target countries is to reduce the transaction costs. Lowering the transaction costs of sending remittances in Asia can encourage an increasing share of remittances that flow through formal channels rather than unofficial ones. Appendix 1 shows the total average cost of sending a remittance transfer when a migrant remits US\$200. The data calculations are based on the World Bank's Remittance Prices Worldwide. The total cost includes the fee charged to senders plus the exchange rate margin. Although the World Bank (2014) stated that South–South migration is more extensive than South–North migration – 82.3 million migrants from developing countries live in another developing country and 81.9 million from developing countries live in a developed country – according to the tables, it is clear that people from all 10 Asian countries migrate to countries with higher incomes than their own country.

As regards the cost of sending remittance transfers, it tends to increase according to the income level of the migrant-receiving countries. For example, remittance transfers from the US, Japan, Germany, and the UK, which account for a large part of the total GDP in high-income countries as a whole, impose quite a high cost on people. In contrast, remittance transfers from India, Saudi Arabia, and the UAE, where the GDP is usually lower than in the former countries, impose a lower cost on people. Moreover, although Appendix 1 estimates the situation of sending US\$200, the average amount of remittances sent by most migrants in developing countries is in the range of US\$300, and the money is sent on average every month (De Luna Martinez 2005). In the situation in which people send less than US\$300 to their home countries, it is estimated that about 8 to 10% of remittance transfers can entail a fee. The fees increase when the amount of remittances decreases. To reduce the cost of sending remittances, one possible solution is to encourage a partnership between international banking services and remittance transfer operators. Although there are many channels, including unofficial ones, through which remittances can be made, creating a solid transfer system within the international banking services and encouraging migrants to use the official banking channels can lead to increased efficiency and equality for migrants in sending remittances.

Second, technological improvements are required in the remittance transfer systems through the use of financial technology (Fintech). While Appendix 1 shows the total average cost of remittance transfers using every payment instrument, Appendix 2 only focuses on Internet-based payments. Appendix 2 shows the total average cost of sending a remittance transfer when a migrant sends US\$200 using Internet payment media. We can say from Appendix 2 that in some cases using Internet payment systems reduces the transaction costs but in most cases the costs are higher when migrants use Internet payment systems. In today's world, where every economic activity is related to technology, it is essential to create a specific infrastructure to transfer remittances using Internet services with lower costs. By establishing solid banking technologies in the remittance transfer network, it may be possible to expedite check clearance and improve information disclosure. The two above policy implications to be taken into consideration are: 1) fostering official banking channels through cooperation between international banking services and remittance transfer operators and 2) creating a remittance transfer system (peer-to-peer or P2P) using Fintech to reduce the cost of sending remittances and to make good use of remittances in migrant-sending countries. Reducing the costs of sending remittances might increase the disposable income of migrants and their families, which may accelerate the reduction of poverty in migrant-sending countries.



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## Appendix 1: Total Average Cost of a Remittance Transfer of US\$200

Destination Countries	Top Origin Countries	Total Average Cost (US\$)
Bangladesh	India	8.4
	Saudi Arabia	7.57
	UAE	5.38
PRC	Hong Kong, China	No Data
	US	17.11
	Republic of Korea	11
India	UAE	5.67
	US	5.71
	Saudi Arabia	9.03
Indonesia	Malaysia	11.13
	Saudi Arabia	8.41
	UAE	12.25
Malaysia	Singapore	10.25
Nepal	India	6.3
	Malaysia	5.98
	Saudi Arabia	6.87
Pakistan	India	8.4
	UAE	6.42
	US	10.67
Philippines	Saudi Arabia	8.62
	Canada	12.44
	India	8.4
Sri Lanka	Saudi Arabia	8.04
	Germany	29.15
Thailand	Japan	21.43
	UK	19.72

Notes: The total average cost is calculated as the fee charged to senders plus the exchange rate margin.

Source: Author's compilation using World Bank (2015).

**Appendix 2. Total Average Cost of a Remittance Transfer of US\$200 (in the Case of Using Internet Payment Systems)**

Origin Countries	Top Destination Countries	Total Average Cost (US\$)
Bangladesh	India	15.04
	Saudi Arabia	No Internet Payment Systems
	UAE	9.12
PRC	Hong Kong, China	No Data
	US	20
	Republic of Korea	5.82 (Citibank), 6.18 (Korea Post Office)
India	UAE	No Internet Payment Systems
	US	6.5
Indonesia	Saudi Arabia	No Internet Payment Systems
	Malaysia	9.48
	Saudi Arabia	No Internet Payment Systems
Malaysia	UAE	9.62
	Singapore	14.92
Nepal	India	15.04
	Malaysia	5.58
Pakistan	Saudi Arabia	No Internet Payment Systems
	India	15.56
	UAE	12.22
Philippines	US	10.08 (Money Gram)
		20.1 (Philippines National Bank)
	Saudi Arabia	No Internet Payment Systems
	Canada	10.02 (WorldRemit)
		20.04 (Royal Bank of Canada)
Sri Lanka	India	15.04
	Saudi Arabia	No Internet Payment Systems
Thailand	Germany	6.01
	Japan	22.02 (Seven Bank), 42.7 (Bangkok Bank)
	UK	11.58 (WorldRemit), 31.17 (Bangkok Bank)

Source: Author's compilation using World Bank (2015).