



ADB Working Paper Series

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

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No.759
July 2017

Asian Development Bank Institute

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Suggested citation:

Yoshino, N., F. Taghizadeh-Hesary, and M. Otsuka. 2017. International Remittances and Poverty Reduction: Evidence from Asian Developing Countries. ADBI Working Paper 759. Tokyo: Asian Development Bank Institute. Available: <https://www.adb.org/publications/international-remittances-and-poverty-reduction>

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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 three poverty indicators: poverty headcount ratio, poverty gap ratio, and poverty severity ratio. Results show that international remittances have a statistically significant impact on the poverty gap ratio and poverty severity ratio under the random effect model of ordinary least squares (OLS) estimates. A 1% increase in international remittances as a percentage of 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, results show that a per capita GDP increase and trade openness can decrease poverty measures, and higher inflation rates may be one of the causes of the poverty.

Keywords: remittances, poverty reduction, developing Asia

JEL Classification: I31, I32, I38

Contents

1.	INTRODUCTION	1
2.	INTERNATIONAL REMITTANCES AND POVERTY REDUCTION IN ASIAN DEVELOPING COUNTRIES	1
2.1	Recent Trends in Remittances to Asia	1
2.2	Recent Trends of Poverty Reduction in Asia.....	4
3.	LITERATURE SURVEY	7
4.	THE THEORETICAL MODEL	8
5.	THE MODEL AND DATA ANALYSIS.....	9
5.1	The Empirical Model.....	9
5.2	Unit Root Tests.....	11
6.	EMPIRICAL RESULTS.....	12
6.1	Pooled OLS Results	12
6.2	Hausman Test	13
7.	CONCLUDING REMARKS AND POLICY IMPLICATIONS	14
	REFERENCES	17

1. INTRODUCTION

International remittance flows into developing countries are attracting much interest because of their rising volume and impact on origin countries. As for the international remittances to developing countries, they were estimated to have reached up to \$436 billion in 2014 according to the World Bank (2014). Remittances to the East Asia and Pacific (EAP) region¹ and South Asia Region (SAR)² 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 analyzing the impact of international remittances on poverty reduction under 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 researches about the relationship between international remittances and poverty reduction at the country level and cross-national level. Section 4 presents the model and data analysis. In Section 5, the empirical works about the relationship between international remittances and poverty reduction are shown. Finally, Section 6 presents concluding remarks and policy implications, focusing on suggestions on how to increase the effectiveness of international remittances in Asia.

2. INTERNATIONAL REMITTANCES AND POVERTY REDUCTION IN ASIAN DEVELOPING COUNTRIES

2.1 Recent Trends in Remittances to Asia

Recently, there has been a growing interest in international migration. According to data released by the United Nations, there were 232 million international migrants, which was 3.2% of the world population, in 2013, up from 175 million in 2010 and 154 million in 1990 (United Nations 2013). The number of labor migrants is also increasing. According to ADBI, OECD, and ILO (2017), the year 2015 was considered to be a peak year for labor migration from Asian countries, both within the region and toward OECD countries outside of Asia.

¹ 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 2016c).

² The SAR region includes Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan, and Sri Lanka (World Bank 2017).

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

* The data from 2015 and 2016 are predicted ones.

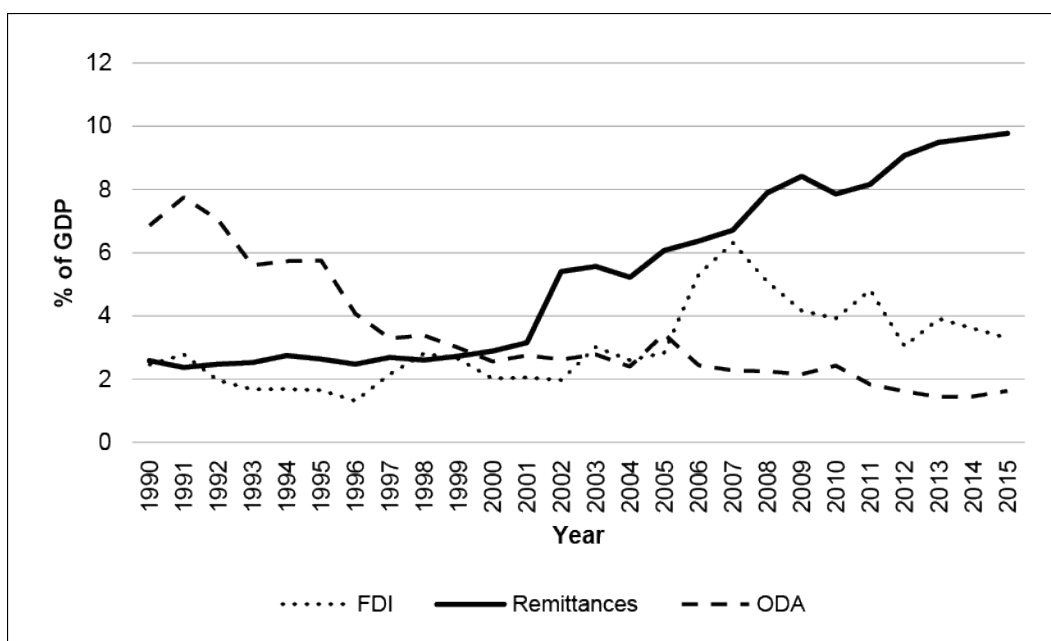
Source: World Bank calculations based on data from IMF Balance of Payments Statistics Yearbooks (2014).

Table 1 shows a comparison of estimates and projections for remittance flows to developing countries. In terms of international remittances to developing countries, they were estimated to have reached up to \$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), 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 have been stably increasing 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 21st century. Looking at the respective data of the SAR, the international remittance flows in Nepal, for example, were equivalent to 25% of GDP and to 98% of international reserves in 2013 (World Bank 2014). As for Pakistan, international remittance flows in 2013 were equivalent to 284% of international reserves (World Bank 2014).

The growth rate of remittance flows went down around 2012 and 2013 in almost all regions. However, in recent years, such as 2014 and 2015, the growth rate of remittance flows has increased again, especially in the EAP, 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 recently up to 8% and 9% in 2014 and 2015.

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



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

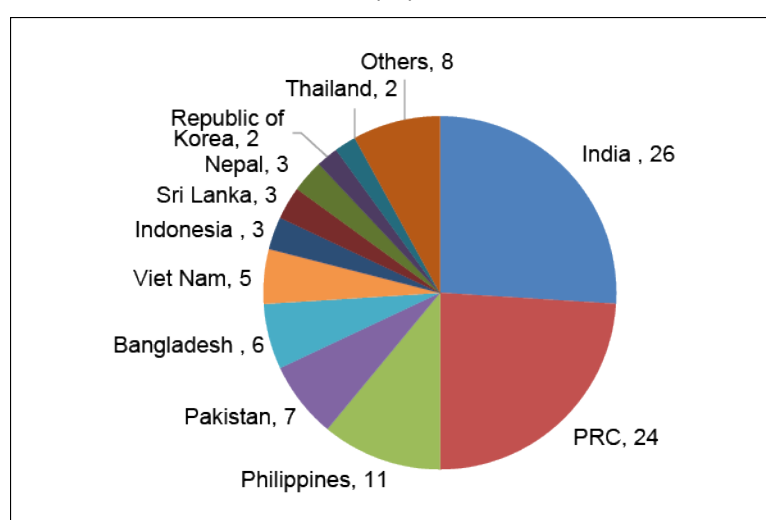
Table 2 shows the amount of remittance inflows into the Asian developing countries that this paper will focus on. All countries experienced a drastic increase in receiving remittances from 2005 to 2014. As for Nepal and Thailand, the amount of remittance inflows in 2014 was about five times as large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

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 ADBI, OECD, and ILO (2017).

Figure 2: Share of Asian Remittances by Receiving Country, 2015?
(%)



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

2.2 Recent Trends of Poverty Reduction in Asia

According to ADB (2015), there has been spectacular progress in reducing poverty owing to the Millennium Development Goals (MDGs)³ in the Asian developing regions⁴. As for the target of the MDGs, the aim was to halve the poverty headcount, which

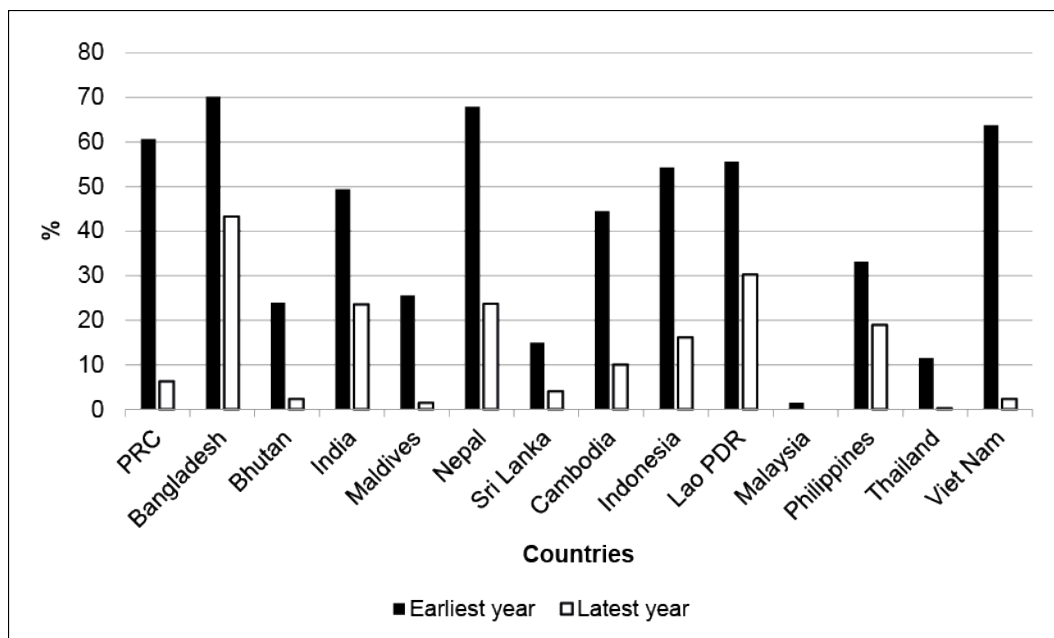
³ The MDGs are aimed at cutting the 1990 extreme poverty rate in half by 2015, as well as halting the spread of HIV/AIDS and providing universal primary education by the target date of 2015. The MDGs are agreed by all the world's countries and all the world's leading development institutions (United Nations 2000).

⁴ The target countries under the MDGs are Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyz Republic, Pakistan, Tajikistan, Turkmenistan, and Uzbekistan from Central and West Asia; the PRC; Hong Kong, China; the Republic of Korea; Mongolia; and Taipei, China from East Asia; Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, and Sri Lanka from South Asia; and Brunei, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam from Southeast Asia (ADB 2015).

indicated the proportion of people whose income was 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 2016a). According to the World Bank (2016b), in 2013, 10.7% of the world’s population lived on less than \$1.90 a day, compared to 12.4% in 2012, which is also down from 35% in 1990. This means that, in 2013, 767 million people lived on less than \$1.90 a day, down 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 – succeeded in reducing extreme poverty, although there was a difference in the scale of progress depending on the countries.

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 (2016a), 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 nonpoor as having zero shortfall), expressed as a percentage of the poverty line. Poverty severity, which is shown as a squared poverty gap, represents the mean of the squared distance below the poverty line as a proportion of the poverty line (World Bank 2016a).

Figure 3: Population Ratio below the Poverty Line (\$1.90 a day), Earliest Year and Latest Year⁵



Source: Millennium Development Goals (ADB 2015).

⁵ “Earliest year and Latest year” depends 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), 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 4 shows, progress in the reducing hunger ratio was achieved in almost all of the developing Asian countries, and 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 still 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.

ADB (2015) mentions that one of the recent characteristics of poverty in developing Asian countries is the higher poverty ratio in rural areas, compared to 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 poverty, such as the loss of a job and harmful effects on livelihood from price volatility, conflicts, and natural disasters.

Table 4: The Proportion of People Who Suffer from Hunger

Prevalence of Underweight Children under 5 Years of Age (%)				
	Earliest Year		Latest Year	
East Asia				
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)
South Asia				
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)
Southeast Asia				
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

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 GDP per capita using annual panel data for 24 Asia and Pacific countries and found that, in tandem with both the theoretical and 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 the data of 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 become more equal as well as more effective at reducing poverty, as the prevalence of migration increases. Semyonov and Gorodzeisky (2008) examined how international remittances sent by Filipino overseas workers affect the income and standard of living of households in the Philippines using the microdata of 2,346 households from 1990 to 2000. The results indicate that the money sent back by migrants is mostly used for families' consumption and to support education. This analysis also suggests that due to international remittance flows, there is an entire income gap and a gap in the standard of living between households with and without overseas workers, which can lead to increasing economic inequality among households in the Philippines.

On the other hand, Hein's (2005) qualitative investigation found that migrant remittances did not necessarily contribute to an improvement of the living conditions in receiving countries because unattractive investment environments and restrictive immigration policies that interrupt circular migration patterns prevented the high development potential of migration from being fully realized. Chami, Fullenkamp, and Jahjah (2005) also examined a model of remittances based on the economics of 113 countries for which worker remittances were reported over the period 1970–1998. They found that remittances were 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. The authors came to two main conclusions. First, migration from Africa is regarded as a collective decision made by families or the regions and remittance flows are thought to be a way of diversifying their income sources and of 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 with a lower wage than that of overseas migrants because they know that the migrants will compensate for their income shortfalls through international remittance flows. The World Bank (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. 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. THE THEORETICAL MODEL

Before setting the empirical model, this section will theoretically demonstrate the impact of remittances on the demand side and supply side of the economy. First, we start from the utility function of low-income people and high-income people.

$$\text{Max } U_l(C_l) \quad (1)$$

$$\text{Max } U_h(C_h) \quad (2)$$

Equation (1) shows the utility function of low-income people ($U_l(C_l)$) and equation (2) shows the utility function of high-income people $U_h(C_h)$. With regard to low-income people, their consumption (pC_l) is considered to come from their wage income (w_lL_l), which is shown in equation (3), where p denotes the general price level.

$$pC_l = wL_l \quad (3)$$

On the other hand, high-income people are considered to have the ability to use more sources for their consumption and saving; these sources are: their wages (w_hL_h), remittances ($(1 - \alpha)remit$), and also earnings on their financial assets, which here we assume to be only in the form of deposits (D_h), and the interest rate on deposits is r_D . The consumption (pC_h) and saving (S_h) of high-income people are shown in equation (4).

$$pC_h + S_h = w_hL_h + (1 - \alpha)remit + r_D D_h \quad (4)$$

Next, we will consider the situation of remittance flow into low-income people. Through getting remittances, low-income people are able to save (D_l), therefore equation (3) can be rewritten as:

$$pC_l + S_l = W_lL_l + \alpha remit \quad (5)$$

The aggregate saving (S_t) of low-income people and high-income people will be as shown below by assuming that savings will all go to bank deposits and from there will be lent to the corporate sector in the form of loans (L), which create capital (K):

$$S_t = S_l + S_h = D_l + D_h = L = K \quad (6)$$

Changes in capital stock create investment (I), hence from the perspective of the demand side of the economy, aggregate demand (y^d) is expressed as:

$$y^d = (C_l + C_h) + I + \bar{G} + (EX - IM) \quad (7)$$

where \bar{G} , EX , and IM are government expenditures, export, and import, respectively.

The above equations show that if remittances flow into one country, C_l, C_h , and I will increase as stated in equations (4), (5), and (6), which leads to the elevation of aggregate demand.

Moreover, on the supply side of the economy, the conventional production function is the function of total labor supply ($L_l + L_h$) and capital (K):

$$y^s = f(L_l, L_h, K) \quad (8)$$

If remittances flow into the country, K will increase because of the saving increase as shown in equation 6, and it will push up the amount of aggregate supply. To sum up, an increase in remittance inflows can be a factor in increasing both the aggregate demand and the aggregate supply (y^s), and in reaching a higher level of GDP.

5. THE MODEL AND DATA ANALYSIS

5.1 The Empirical Model

This paper uses a cross-country model to analyze how international remittances affect poverty in Asian developing countries. Modeling after Anyanwu and Erhijakpor (2010) and Banga and Sahu (2010), the empirical model in the paper can be written as:

$$\text{Log}P_{it} = \alpha_t + \beta_1 \log(y_{it}) + \beta_2 \log(\text{remit}_{it}) + \beta_3 \log(X_{it}) + \varepsilon_{it} \quad (9)$$

$$(i = 1, \dots, N; t = 1, \dots, T)$$

In this model, the dependent variable P is the measure of poverty in country i at time t . α_t is a fixed effect that reflects time differences among countries. β_1 is the economic growth elasticity of poverty with respect to the real per capita GDP given by y . β_2 is the elasticity of poverty with respect to international remittances (as % of GDP) given by remit . X includes the control variables, which are inflation (as the annual percentage change in the consumer price index) and trade openness, represented by $(\text{imports} + \text{exports})/\text{GDP}$. Finally, ε is an error term that includes error terms in the poverty measure.

The dependent variable, which is poverty, can be measured using three poverty indices: i) the poverty incidence, ii) the depth of poverty, and iii) the severity of poverty (Foster, Greer, and Thorbecke, 2013). The PovcalNet database⁶ of the World Bank offers the data of 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. Poverty headcount (P_0) is expressed as $P_0 = n_p/n_t$, where n_p means the number of people who lived 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 expenditures

⁶ PovcalNet is the source of the official global, regional, 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 2016a).

fall. For example, a poverty gap of 10% means that the average poor person's income or expenditures are 90% of the poverty line. This situation can be written as equation (10).

$$y_p = (1 - P_1)\bar{y}_{povertyline} \quad (10)$$

y_p means income of poor person, P_1 is poverty gap, and $\bar{y}_{povertyline}$ means the poverty line indicated as \$1.90 per day in 2011 PPP. When we rearrange equation (10), it can be written as:

$$P_1 = \frac{\bar{y}_{povertyline} - y_p}{\bar{y}_{povertyline}} \quad (11)$$

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 transfers are perfectly targeted. The measure does not reflect changes in inequality among the poor.

The squared poverty gap index (also known as the poverty severity index) P_2 averages the squares of the poverty gaps relative to the poverty line:

$$P_2 = \left(\frac{\bar{y}_{povertyline} - y_p}{\bar{y}_{povertyline}} \right)^2 \quad (12)$$

This is one of the Foster–Greer–Thorbecke (FGT) class of poverty measures that allow one to vary the amount of weight that one puts on the income (or expenditure) level of the poorest members in 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 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 bigger 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 (β_1). This is because an increase in 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 (ration of GDP). Sign of β_2 as the coefficient of this variable could be both positive and negative as we saw 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, the negative association between inflation and poverty can be expected. Another variable, trade openness, can be both positively and negatively

correlated with poverty as we found in the literature. Trade liberalization could benefit the poor because it can increase the relative wage of low-skilled workers and can 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 be necessarily 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 been in 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 of poverty measures and inequality, this paper also picked up the data of other variables. Therefore, in the years that 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

In order to evaluate the stationarity of all series, this paper performed two unit root tests on all variables at levels and at first differences with 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 5.

Table 5: 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*
Remittances	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: Per capita GDP is based on constant 2011 US\$ and Remittances are inflows of international remittances (ratio of GDP).

* indicates rejection of the null hypothesis of the presence of unit root at 1%.

The results show that, under both the augmented Dickey–Fuller (ADF) and the Phillips–Perron (PP) test, per capita GDP, remittance, 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 the variables are integrated to the order one. Hence variables will appear in our empirical analysis in first difference mode. When series are not integrated to order one, we need to run the Johansen cointegration test in order to check for the presence of cointegration. Johansson cointegration test results show that series are not cointegrated.

6. EMPIRICAL RESULTS

6.1 Pooled OLS Results

Table 6 shows the results of empirical estimations for equation (9) using ordinary least squares (OLS) of panel data analysis. The international remittance variable has a negative impact on all three of the poverty measures: poverty headcount ratio (P_0), poverty gap ratio (P_1), and poverty severity ratio (P_2). T-statistics of poverty gap and poverty severity are statistically significant. However, t-statistics of 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 GDP can lead to decreasing the poverty gap ratio by 22.6% and to decreasing the poverty severity ratio by 18.3%.

Table 6: Empirical Results of the Effects of International Remittances on Poverty Measures in Asia

Variable	Poverty Headcount	Poverty Gap	Poverty Severity
Constant	0.019 (-0.758)	0.016 (0.670)	0.012 (0.540)
Per Capita GDP (constant 2011US\$)	-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: Numbers in parenthesis are t-values.

* Significant at the 1% level.

Other explanatory variables except for the inflation rate all have a negative effect on poverty measures. First, per capita GDP has a negative association with poverty measures, which means that an increase in per capita GDP leads to a decline in poverty. As for inflation rate and trade openness, they have a positive and a negative correlation with poverty indicators, respectively. A continuing high inflation rate provokes a price hike and price instability, which can lead to having a bad effect on people's life and expanding poverty. Moreover, people in poverty tend to be out of work and they find it hard to enjoy the benefits of the income rise through inflation. As for trade openness, the results show that all poverty measures have a negative correlation with the spread of trade openness. This means that if the observed countries open up themselves 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 the comparative advantage.

6.2 Hausman Test

Table 7 shows the results of the Hausman test in order to verify whether we should choose a fixed-effect model or a random-effect model. Based on the Hausman test, this paper will adopt a random-effect model that considers the independence between fixed effects and explanatory variables. The results under the random-effect model are similar to those of the pooled OLS. The international remittance variable has a statistically significant impact on the poverty gap ratio and poverty severity ratio. The results show that a 1% increase in the international remittance flows as a percentage of GDP can lead to decreasing the poverty gap ratio by 22.6% and to decreasing the poverty severity ratio by 16.0%. However, only 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 remittances might be from high-income families because it costs quite a lot to leave home countries and work abroad. This can lead to expanding 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 can get a significant effect from international remittance inflows.

Table 7: 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 (constant 2011US\$)	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 (ratio of GDP)	-0.044 (-0.653)	-0.085 (1.410)	0.149* (13.918)	-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: Numbers in parenthesis are t-values.

** Significant at the 1% level.

* Significant at the 5% level.

As for 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 in accelerating poverty by expanding the gap between the rich and the

poor. High-income people receive a benefit from a wage hike due to inflation increasing, while poor people who tend to find it difficult to get job opportunities cannot enjoy such a benefit. Finally, in terms of trade openness, this can reduce all three poverty variables by increasing both net export and a country's GDP.

7. CONCLUDING REMARKS AND POLICY IMPLICATIONS

This paper examined the impact of international remittances on poverty in Asia using the data set of 10 developing countries in Asia. 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. A 1% increase in international remittances as a percentage of GDP can lead to a 22.6% decline in the poverty gap ratio, and a 16.0% decline in the poverty severity ratio. Moreover, per capita GDP and trade openness also appear to decrease all poverty measures, and the inflation rate can be a factor in fueling the poverty measures.

Looking at the analysis overall, some policy implications can be offered in terms of the relationship between international remittances and poverty measures. In the policy implication section below, this paper discusses how remittance-sending systems should be organized.

First, remittance-receiving countries in Asia need to reduce the cost of sending remittances for immigrants. Lowering the transaction costs of sending remittances can be a possible way to reduce poverty in developing countries in Asia and can encourage an increasing share of remittances that flow through formal channels, not unofficial ones. Table 8 shows how much the total average cost of sending a remittance transfer is when a migrant remits 200,000 US\$. 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. According to the tables, it is clear that people from all 10 Asian countries migrate to countries with higher incomes than their countries. Although the World Bank (2014) stated that South-South migration was larger than South-North migration – 82.3 million migrants from developing countries lived in another developing country and 81.9 million from developing countries lived in a developed country – the people from Asian developing countries used in this paper live in more developed countries.

As regards the cost of sending remittance transfers, the cost tends to increase according to the income level of migrant-receiving countries. For example, remittance transfers from the US, Japan, Germany, and the UK, which account for a large part of 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, whose GDP is usually lower than the countries above, impose a lower cost on people. Moreover, although Table 9 estimates the situation of sending 200,000 US\$, the average amount of remittances sent by most migrants in developing countries is in the range of 300 US\$ and the money is sent on average every month (Jose de Luna Martinez 2005). In the situation where people send less than 300 US\$ to their home countries, it is estimated that about 8 to 10 % of remittance transfers can cost a fee. Fees increase when the amount of remittance decreases. In order to reduce the cost of sending remittances, one possible solution is encouraging 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 increasing the efficiency and equality for migrants in sending remittances.

Table 8: Total Average Cost of a Remittance Transfer in Sending 200,000 US\$

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
Indonesia	Saudi Arabia	9.03
	Malaysia	11.13
	Saudi Arabia	8.41
Malaysia	UAE	12.25
	Singapore	10.25
	India	6.3
Nepal	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: Total average cost is calculated by the fee charged to senders plus the exchange rate margin.

Source: Author's compilation using World Bank, Remittance Prices Worldwide (2015).

Second, technological improvements are required in the remittance transfer systems through using financial technology. While Table 9 shows the total average cost of remittance transfers using every payment instrument, Table 10 only focuses on Internet-based payment. Table 10 shows how much the total average cost of sending a remittance transfer is when a migrant sends 200,000 US\$ by using Internet payment media. We can say from Table 10 that almost all costs are higher when migrants use Internet payment systems, especially national banking services, in sending remittance transfers. 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. By establishing solid banking technologies in the remittance transfer network, it may be possible to expedite check clearance and improve information disclosure. Taking the two policy implications above into consideration, 1) fostering official banking

channels through cooperation between international banking services and remittance transfer operators and 2) creating an Internet-based remittance transfer network are possible ways 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.

**Table 9 Total Average Cost of a Remittance Transfer in Sending 200,000 US\$
(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
	Saudi Arabia	No Internet Payment Systems
Indonesia	Malaysia	9.48
	Saudi Arabia	No Internet Payment Systems
	UAE	9.62
Malaysia	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, Remittance Prices Worldwide (2015).

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