EFFECTIVENESS OF THE INTERNATIONAL REMITTANCES ON POVERTY: EVIDENCE FROM CROSS-COUNTRY ANALYSIS[1]

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Abstract

This paper aims to examine the impact of international remittances on poverty in a data-rich environment. International remittances are considered in the literature as one of the poverty alleviation programmes, since they improve the welfare of family members left behind and promote the economic conditions of the recipient countries. After a careful review of the relevant literature, various pooled ordinary least squares (Pooled OLS), dummy variable least squares (DVLS), and three-stage least squares (3SLS) models are constructed to reveal the determinants of poverty and the existence of bi-directional relationship between poverty and international remittances. The empirical results show that gross domestic product per capita, inequality in income distribution, and international remittances have a statistically significant impact on poverty. A 10% increase in international remittances reduced the poverty level of the portion of the population whose cost of living is less than $1.90 per person per day by 0.7% to 1.7%. This paper broadens the existing literature on the relationship between international remittances and poverty in a more comprehensive framework by using a broader data set and different panel data regression models.

Keywords : *International Remittances, Panel Data Analysis, Poverty.*

JEL Classification : *C33, F24, I32.*

ULUSLARARASI HAVALELERİN YOKSULLUK ÜZERİNDEKİ ETKİNLİĞİ: ÜLKELERARASI ANALİZDEN KANITLAR

Öz

Bu makale, zengin bir veri ortamında uluslararası para transferlerinin yoksulluk üzerindeki etkisini incelemeteyi amaçlamaktadır. Uluslararası havaleler, geride kalan aile üyelerinin refahını iyileştirdiği ve alıcı ülkelerin ekonomik koşullarını iyileştirdiği için literatürde yoksulluğu azaltma programlarından biri olarak kabul edilmektedir. İlgili literatür dikkatlice incelendikten sonra, yoksulluğun belirleyicilerini ve yoksulluk ile uluslararası havaleler arasındaki çift yönlü ilişkiyi göstermek için havuzlanmış sıradan en küçük kareler (Havuzlanmış EKK), kukla değişkenli en küçük kareler (KDEKK) ve üç aşamalı en küçük kareler (3AEK) modelleri oluşturulmaktadır. Ampirik bulgular, kişi başı gayri safi yurt içi hasıla, gelir dağılımı eşitsizliği ve uluslararası havalelerin yoksulluk üzerinde istatistiksel olarak anlamlı bir etkiye sahip olduğunu ortaya koymaktadır. Uluslararası havalelerdeki %10'luk artış yaşam giderleri kişi başı günlük 1,90 ABD dolarının altında olan nüfusun yoksulluk düzeyini %0,7 ile %1,7 arasında azaltmaktadır. Bu çalışma, daha geniş veri setini ve çeşitli panel veri regresyon modellerini kullanarak uluslararası para transferleri ve yoksulluk bağına ilişkin mevcut literatürü daha kapsamlı bir çerçevede genişletmektedir.

Anahtar Kelimeler   : Uluslararası Havaleler, Panel Veri Analizi, Yoksulluk.

JEL Sınıflandırması   : C33, F24, I32.

INTRODUCTION

International remittances are an ancient phenomenon; however, one that has gained renewed interest in recent years, not only because of the size of the sums involved, but also because of the potential impact on migrants' communities of origin. International remittances would be the main channel through which migration affects the development of these communities (Gubert, 2005; Adams, 2011), as they appear to be more important than domestic savings and a more stable source of international funds (Guha, 2013; Meyer & Shera, 2017).

Although the international remittances data are scarce, their volume has increased steadily in recent years, from $31.1 billion in 1990 to $76.8 billion in 2000 and to $717 billion in 2019 (Chowdhury & Chakraborty, 2021). According to data in this paper, compiled from World Bank for 1990 to 2019, the degree, depth and severity of poverty in countries tend to decline over time. Moreover, the share of international remittances in gross domestic product tend to increase over time. This could be due to the evolution of the global financial system, as the development and diversification of the funds transfer systems, and the low transaction costs facilitate the international remittances (Freundand & Spatafora, 2008; Ahmed et al., 2021). It can be intuitively assumed that there is a negative relationship between international remittances and poverty. The average values of the variables for the selected periods are as follows[5].

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[5] For more information about the variables and the data set, see the next section.

Table 1. Descriptive Statistics

Variables	1990-99	2000-09	2010-19
HR ($1.90)	0.24	0.16	0.11
PG ($1.90)	0.10	0.06	0.04
SGP ($1.90)	0.06	0.03	0.02
HR ($3.20)	0.41	0.31	0.22
PG ($3.20)	0.19	0.13	0.09
HR ($5.50)	0.61	0.53	0.42
PG ($5.50)	0.33	0.25	0.19
GDP	6328.60	7757.92	9194.05
REM	142.28	345.10	470.95
REM/GDP	2.25%	4.45%	5.12%
GINI	0.47	0.43	0.41

This paper examines how and to what extent international remittances affect poverty. After a careful review of the relevant literature, a theoretical model is constructed that includes the relevant variables. To robust the interaction of the main variables, i.e. the poverty, international remittances, gross domestic product per capita and inequality in income distribution, several variables are included as control variables such as the government expenditure, trade openness, unemployment rate, health expenditure, school enrollment and inflation rate, which is assumed to affect international remittances and poverty. As for econometric methodology, various pooled ordinary least squares (Pooled OLS), dummy variable least squares (DVLS) and three-stage least squares (3SLS) models are constructed to reveal the interaction of the variables.

Following the simple growth model by Ravallion (1997), a baseline model is constructed that incorporates poverty, international remittance, gross domestic product, and inequality in income distribution. The aforementioned model is extended with additional control variables to perform consistent estimations. To test the endogeneity problem between poverty and international remittances, a three-stage least squares (3SLS) model is used, following by United Nations Conference on Trade and Development (UNCTAD, 2011). The empirical findings illustrate that international remittances have a negative and significant impact on poverty. In addition, the gross domestic product per capita and inequality in income distribution have an explanatory power on the poverty.

The remainder of this paper is organized as follows. Section 1 lays out the theoretical framework. Section 2 describes the data and econometric methodology in detail. Section 3 reveals the empirical results, followed by concluding remarks.

I. THEORETICAL FRAMEWORK

How and to what extent international remittances affect poverty is debated in the literature. The first viewpoint is that the international remittances lead to behavioral changes as households direct their spending toward consumption goods rather than education or investment. This behavior risks creating a dependence on the international remittances that leads recipient households to use these funds as a substitute for other sources of income, which has a short-term impact on poverty alleviation, but is not sustainable in the long-run (Taylor, 1999; Chami et al., 2005).

The second view assumes that international remittances have a long-lasting impact on poverty. Therefore, households tend to spend them mainly on the purchase of capital goods, i.e. investment in

human capital and physical capital, rather than on the purchase of consumption goods. This could contribute to economic development, which has a long-term and sustainable effect on poverty allevation (Adams, 1998).

The third view emphasizes that the international remittances can lead to a downward movement of the exchange rate in the labor-exporting country, increase the current account deficit, and exacerbate the poverty, i.e., cause the resource curse referred to in the literature as Dutch Disease. More specifically, an increase in the international remittances leads to an increase in household wealth and consumption and a short-term decrease in labor supply. Rising international remittances appreciate the domestic exchange rate and therefore lead to a current account deficit and a competitive disadvantage for the tradable sector (Bourdet & Falck, 2006; Acosta et al., 2009; Roy & Dixon, 2016).

The main determinants of international remittances are interest rates, unemployment rates, trade openness, basic needs such as health and education, and, most importantly, immigration (e.g., Adams & Page, 2005; Pekovic, 2017; Masron & Subramaniam, 2018; Tsaurai, 2018). The high rate of inflation and unemployment, as well as the inability to meet basic needs, force people to migrate abroad from their own country. If an immigrant has a family in his own country that depends on him, he sends them international remittances regularly. Stark and Lucas (1988), Rozelle et al. (1999), De Haas (2005), Bertoli and Marchetta (2014) reveal that migration is the main driver of international remittances.

Much of the literature examines the effectiveness of international remittances in alleviating poverty (e.g., Adams, 1991; Taylor, 1992; Adams & Page, 2003, 2005; Qayyum et al., 2008; Gupta et al., 2009; De la Fuente, 2010; Imai et al., 2014; Inoue, 2018). Adams and Page (2005) analyze the impact of international remittances and migration on poverty by using national accounts and household surveys in 71 developing countries. They show that international remittances have greatly reduced the level, depth and severity of poverty in developing countries. Anyanwu and Erhijakpor (2010) use panel data for 33 African countries from 1990 to 2005 and show that a 10% rise in the share of international remittances in gross domestic product brings about a 2.9%, 2.9%, and 2.8% decreases in the poverty gap, headcount ratio and squared poverty gap, respectively. Adams and Cuecuecha (2013) analyze the data compiled from a national representative survey in 2005 and reveal that international remittances are an effective tool for alleviating poverty among Ghanaian households. Akobeng (2016) highlights that international remittances reduce poverty and equalize income levels across the 41 Sub-Saharan Africa countries. Wagle and Devkota (2018) point out that international remittances incur a poverty-reducing and economic prosperity-enhancing impacts in Nepal. Kumar (2019) indicates that the poverty level of households that received remittances is significantly lower than that of others in Bangladesh.

II. DATA AND METHODOLOGY

II.I. The Data

For the empirical analysis, annual data from 1990 to 2019 is compiled from the World Bank database[6,7]. These unbalanced data, covering 107 countries, allow us to analyze the unit-specific effects of different income groups and regions. Brief information on the data can be found below.

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[6] Among the World Bank databases, PovcalNet provides the poverty data, and World Development Indicators provides the macroeconomic data.

[7] The Covid-19 pandemic, which occurs in 2020, causes the structural breaks in much of the data. Therefore, 2020 and beyond is not included in this paper.

Table 2. Definitions of the Variables

Variable Label	Code	Variable Definition
Headcount ratio	HR	Percent of population below the poverty line
Poverty gap	PG	The mean income shortfall from the poverty line
Squared poverty gap	SPG	The mean squared shortfall of income from the poverty line
GDP per capita	GDP	The division of the output of a country by its total population
International remittances	REM	Official international remittances per capita
Gini index	GINI	A measure of income distribution inequality
Government expenditure	GE	All government expenditure per capita
Unemployment rate	UR	The proportion of the unemployed to working age population
Trade openness	OPEN	The international trades normalized by GDP
Health expenditure	HE	All health spending per capita
School enrollment	SE	Taking up participation to a tertiary education
Inflation rate	INF	Percent of the price movement during a specified period

Estimating poverty data is quite problematic. Table 2 shows three different poverty indicators. First, the headcount ratio, set at $1.90, $3.20, and $5.50, estimates the percentage of the population living below the poverty line. Since this measure neglects the depth of poverty, the poverty gap rate, which indicates how far the average income of the poor is below the poverty line, is set at $1.90, $3.20, and $5.50. Considering the severity of poverty, squared poverty gap is so responsive to income distribution changes that it is only $1.90. For example, an income transfer among the poor can only be captured by the squared poverty gap[8].

Income can be represented by GDP per capita in purchasing power parity PPP units, which comes from national accounts data[9]. International remittances consist of personal transfers, widely known as workers' remittance, and compensation of employees. IMF (2009) defines the personal transfers as all current transfers in cash or in kind made or received by resident households to or from nonresident households, and the compensation of employees as the income of border, seasonal, and other short-term workers who are employed in an economy where they are not resident and of residents employed by nonresident entities. Similar to poverty data, data on international remittances are vulnerable because they are transmitted through informal channels. International remittances are assumed to be transmitted only through official channels, such as banking channel, therefore the specification of remittance data is quite forthright[10].

The Gini coefficient is an effective way to indicate the inequality in income distribution. It is a normalized measure that represents a particular quintile of the population. A higher degree of trade openness may facilitate the possibility of receiving remittances. Unemployment in the domestic economy is one of the main drivers of the migration. Health expenditure reflects a country's level of wealth and has a negative impact on poverty. Education is directly linked to employment, migration and international remittances according to human capital theory. Inflation is an important barometer indicating an extent of prosperity and poverty in a country.

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[8] All poverty data are calculated per person per day in 2011 PPP exchange rates.

[9] To calculate PPP, WB estimates the bundled cost of each country's goods with those of the United States.

[10] This assumption seems heroic, because Adams and Page (2005) suggest that unofficial international remittances may account for between one-third and one-half of total international remittances. However, an estimate of unofficial international remittances is beyond the scope of this paper.

To determine the unit-specific effects of the panel data, see the Appendix for country classifications[11]. As revealed in Table 7, countries are categorized by both geographic region and income group. Since the poverty is ignored in high-income countries, they are not included in this paper. It is worth noting that most countries in the Europe and Central Asia regions are also belong to the upper-middle income group. In addition, the countries in the Sub-Saharan regions predominantly belong to the low-income group.

II.II. Empirical Strategy

Following the simple growth model by Ravallion (1997), the baseline model is specified as follows.

$$log(P_{it}) = \alpha_i + \gamma_1 \, log(GDP_{it}) + \gamma_2 \, log(GINI_{it}) + \gamma_3 \, log(REM_{it}) + \mu_{it} \tag{1}$$

where P_{it} are the poverty variables (HR, PG and SPG), GDP_{it} is gross domestic product per capita, $GINI_{it}$ is the Gini index, REM_{it} is international remittances, α_i and μ_{it} are the vectors of unit-specific effects of countries and the error terms for $i = 1,2, \dots, N$ at time $t = 1,2, \dots, T$. γ_1, γ_2 and γ_3 are the elasticity of poverty with respect to GDP, GINI and REM, respectively. Pooled ordinary least squares (Pooled OLS) and dummy variable least squares (DVLS) are used to reveal the cross-country interactions and unit-specific effects. Equation (1) is adopted by a large number of researchers[12]. As can be seen in the literature, e.g., Adams and Page (2005) and Gupta et al. (2009), γ_1, γ_2 and γ_3 are expected to be negative, positive and negative, respectively.

Although there are many variables that can affect poverty and international remittances, the relevant variables are selected in accordance with the literature. The baseline model is extended to include government expenditure, inflation rate, school enrolment, and health expenditure, as suggested by Pekovic (2017), Masron and Subramaniam (2018) and Tsaurai (2018). The signs of the coefficients for government expenditure, inflation rate, enrolment rate and health expenditure are negative, positive, negative and negative, respectively, as expected.

Equation (1) assumes that poverty is an endogenous variable, implying that there is a one-directional relationship between the exogenous variables and endogenous variable. Equation (1) also implies that poverty decreases as the international remittances rise. However, the relationship between poverty and international remittances can be bi-directional. When poverty increases, domestic workers emigrate and international remittances rise. To test the endogeneity problem of these two variables, a three-stage least squares (3SLS) model is used to analyze the possible equations with different endogenous variables simultaneously, as proposed by Gupta et al. (2009) and UNCTAD (2011)[13]. Considering the relevant variables in the literature, the international remittances can be written as a function of poverty, trade openness and unemployment rate.

$$log(REM_{it}) = \vartheta_i + \varphi_1 \, log(P_{it}) + \varphi_2 \, log(OPEN_{it}) + \varphi_3 \, log(UR_{it}) + \varepsilon_{it} \tag{2}$$

[11] Countries are ranked according to World Bank classification methodology. For similar work and more detailed information on the data, see Adams and Page (2005).

[12] Ravallion and Chen (1997), Adam and Page (2005), Gupta et al. (2009) and Masron and Subramaniam (2018) are the exemplary papers using the same methodology.

[13] The alternative approach is instrumental variables (IV) that determine possible instruments for the endogenous variables, as suggested by Adams and Page (2005) and Yoshino et al. (2017). Determining the instrumental variables is a major problem, therefore 3SLS method is used in this paper.

where $OPEN_{it}$ is the degree of trade openness, UR_{it} is the unemployment rate, ϑ_i and ε_{it} are the vectors of the unit-specific effects of the countries and the error terms for $i = 1,2,…,N$ at time $t = 1,2,…,T$. φ_1, φ_2 and φ_3 are the elasticity of international remittances with respect to P, OPEN and UR, respectively. The sign of the coefficients of poverty, trade openness and unemployment rate are all positive, as expected.

III. EMPIRICAL FINDINGS

III.I. Preliminary Analysis

Numerous researchers have often estimated equations (1) and (2) in first differences due to potential correlation problems; however, in this paper, they are estimated with levels due to the compilation from various sources. While the poverty variables are obtained from household budget surveys, the other variables are collected from various official databases.

To determine the appropriate model in this paper, Hausman (1978) specification test and Breusch and Pagan (1979) LM test are used. While the Hausman test indicates that the unbalanced panel data in this paper must be estimated with a fixed effect model, Breusch and Pagan test shows that there is a significant difference for cross-country data[14]. Given these tests, the DVLS model may be appropriate to capture unit-specific effects. Therefore, five dummies are assigned for geographic regions, i.e., East Asia & Pacific, Europe & Central Asia, Latin America & Caribbean, Middle East & North Africa and South Asia, and two dummies are assigned for income groups, i.e., upper-middle income and lower-middle income, are assigned[15]. Since the variables are all in logarithmic form, the coefficients can be interpreted as elasticities.

III.II. Empirical Results

Tables 3, 4 and 5 presents the results of the Pooled OLS and DVLS estimations, respectively. In Tables 3 and 4, all poverty data are set at 1.90$. Table 3 reveals that GDP, REM, and GINI are statistically significant and consistent with expectations in all models. While a 10% increase in GDP and REM reduce poverty by an interval of 12.4–15.7% and 0.7–1.7%, respectively; a 1% increase in GINI results in a 3.22–5.18% decrease in the proportion of people living in poverty. The unit-specific effects of the income groups are meaningless to draw a conclusion. As for the unit-specific impacts of the geographic regions, the dummies for East Asia & Pacific and Middle East & North Africa are statistically significant in all three models. The overall conclusion from the baseline model is that equation (1) is appropriate to explain the relationship between international remittances and poverty and is consistent with a priori expectations. Moreover, the results in Table 3 comply with those of Adams and Page (2005) and Gupta et al. (2009).

Table 4 figures out that GDP, REM and GINI are statistically significant in all models and consistent with expectations. GE, HE and SE are also statistically significant and the signs of their coefficients are compatible to the expectations. A 10% rise in GE, HE and SE reduce the poverty by 1.6%, 4.5% and 1.6%, respectively. The inflation rate does not appear to be statistically significant, but it is economically significant. The reason may be that while the INF has followed a downward trajectory globally since 1980s, but poverty has not followed a similar trend, so INF has no explanatory power for poverty. In contrast to the baseline model, the unit-specific effects of the income groups appear to be statistically significant. As for the dummies for geographic regions, the dummies of the East Asia &

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[14] The χ^2 statistic of Breusch and Pagan (1979) Lagrange multiplier (LM) test is 528.37 (0.00). The χ^2 statistic of Hausman (1978) specification test is 99.08 (0.00). The null hypotheses can be rejected at the significance level indicated in parentheses.

[15] While Sub-Saharan Africa is the omitted dummy variable for geographic region, low income is also an omitted dummy variable for income group.

Pacific, Middle East & North Africa and South Asia regions are statistically significant. Table 5 illustrates that the exogenous variables are still statistically significant, but the values of their coefficients decrease as the dependent variables take on a larger value.

Table 3. Baseline model

Variables	Dependent variable: HR			Dependent variable: PG			Dependent variable: SPG		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
GDP	-1.34*	-1.51*	-1.24*	-1.43*	-1.57*	-1.35*	-1.41*	-1.52*	-1.36*
REM	-0.10*	-0.11*	-0.07*	-.014*	-0.14*	-0.11*	-0.17*	-0.16*	-0.14*
GINI	3.25*	3.22*	3.50*	4.36*	4.35*	4.24*	5.18*	5.18*	4.73*
Lower Middle Income		0.24**			0.06			-0.15	
Upper Middle Income		0.47			0.33			0.15	
East Asia & Pacific			-0.68*			-1.06*			-1.40*
Europe & Central Asia			-0.15			-0.17			-0.15
Latin America & Caribbean			-0.39*			-0.26***			-0.13
Middle East & North Africa			-1.13*			-1.39*			-1.66*
South Asia			0.43**			0.08			-0.26
Constant	1.89*	3.12*	0.23*	-2.59	-1.50	-2.66*	-6.43*	-5.59*	-5.07*
R^2_{adj}	0.68	0.68	0.70	0.69	0.69	0.72	0.66	0.67	0.71
F-stats	525.83*	318.46*	225.22*	551.61*	333.54*	243.00*	495.69*	300.48*	232.56*

(1) Pooled OLS

(2) LSDV with income group dummies

(3) LSDV with geographic region dummies

* Significant at the 1% level

** Significant at the 5% level

*** Significant at the 10% level

Table 4. Extended model

Dependent variable: HR

Variables	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
GDP	-1.20**	-1.43*	-1.16*	-1.24*	-1.43*	-1.24*	-1.18*	-1.48*	-1.14*	-1.36*	-1.54*	-1.27*
REM	-0.09*	-0.09*	-0.07*	-0.10*	-0.12*	-0.10*	-0.04***	-0.03	-0.03*	-0.11*	-0.11*	-0.08*
GINI	3.26*	3.22*	3.59*	3.41*	3.38*	3.87*	3.39*	3.33*	4.24*	3.28*	3.26*	3.44*
GE	-0.16**	-0.16**	-0.11									
HE				-0.45*	-0.45*	-0.45*						
SE							-0.16**	-0.18*	-0.22*			
INF										0.06***	0.05	0.04
Lower Middle Income		0.26***			0.39**			0.25			0.20**	
Upper Middle Income		0.60*			0.57**			0.80*			0.48	
East Asia & Pacific			-0.57*			-0.49*			-0.39***			-0.55*
Europe & Central Asia			-0.06			0.23			0.53*			-0.17
Latin America & Caribbean			-0.36*			-0.15			-0.16			-0.35*
Middle East & North Africa			-1.04*			-0.38			-0.88*			-1.10*
South Asia			0.42**			0.19			0.62*			0.40**
Constant	1.65**	3.35*	-0.16	0.81	2.20**	-0.85	-0.59	-1.66	-4.33*	1.88*	3.27*	0.63
R^2_{adj}	0.67	0.68	0.70	0.69	0.70	0.71	0.68	0.69	0.73	0.67	0.68	0.70
F-stats	366.97*	249.62*	182.90	310.12*	209.31*	148.24*	253.72*	178.28*	142.33*	349.77*	236.30*	174.59*

* Significant at the 1% level

** Significant at the 5% level

*** Significant at the 10% level

(1) Pooled OLS

(2) LSDV with income group dummies

(3) LSDV with geographic region dummies

Table 5. Robust model

Variables	Dependent variable: HR3.20$			Dependent variable: HR5.50$			Dependent variable: PG3.20$			Dependent variable: PG5.50$		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
GDP	-0.98*	-1.20*	-0.92*	-0.61*	-0.80*	-0.58*	-1.17*	-1.36*	-1.10*	-0.87*	-1.06*	-0.82*
REM	-0.04*	-0.06*	-0.02	-0.01	-0.02**	0.01	-0.09*	-0.10*	-0.06*	-0.04*	-0.05*	-0.02***
GINI	1.35*	1.31*	1.96*	0.32*	0.28*	0.83*	2.31*	2.28*	2.71*	1.02*	0.99*	1.55*
Lower Middle Income		0.47*			0.45*			0.35*			0.43*	
Upper Middle Income		0.68*			0.61*			0.56*			0.60*	
East Asia & Pacific			-0.11			0.07			-0.39*			-0.08
Europe & Central Asia			0.04			0.08			-0.06			0.01
Latin America & Caribbean			-0.34*			-0.22*			-0.36*			-0.31*
Middle East & North Africa			-0.46**			-0.088			-0.79*			-0.33*
South Asia			0.66*			0.43*			0.51*			0.49*
Constant	6.71*	8.28*	3.90*	7.91*	9.25*	5.71*	3.91*	5.26*	1.79**	6.85*	8.21*	4.40*
R^2_{adj}	0.63	0.64	0.66	0.5804	0.60	0.61	0.68	0.69	0.71	0.66	0.67	0.69
F-stats	425.39*	267.07*	184.51*	343.13*	227.12*	148.10*	545.79*	334.09*	231.46*	488.83*	308.61*	207.96*

* Significant at the 1% level

** Significant at the 5% level

*** Significant at the 10% level

(1) Pooled OLS

(2) LSDV with income group dummies

(3) LSDV with geographic region dummies

Table 6. 3SLS model

Variables	Dependent variable: HR				Dependent variable: PG				Dependent variable: SPG			
	HR		REM		HR		REM		HR		REM	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
GDP	-1.52*	-1.25*			-1.59*	-1.36*			-1.55*	-1.37*		
REM	-0.21*	-0.07***			-0.27*	-0.11***			-0.32*	-0.16**		
GINI	3.10*	3.45*			4.16*	4.12*			4.91*	4.55*		
P			-0.12**	0.07			-0.11**	0.06			-0.11**	0.04
OPEN			1.14*	1.43*			1.13*	1.43*			1.12*	1.43*
UR			0.04	0.15**			0.02	0.14***			-0.01	0.13
Lower Middle Income	0.44**		1.56*		0.32		1.56*		0.20		1.55*	
Upper Middle Income	0.66*		1.32*		0.61**		1.36*		0.52***		1.38*	
East Asia & Pacific		-0.71*		1.43*		-1.10*		1.43*		-1.40*		1.39*
Europe & Central Asia		-0.15		1.87*		-0.17		1.86*		-0.01		1.83*
Latin America & Caribbean		-0.38**		2.15*		-0.23		2.13*		-0.06		2.10*
Middle East & North Africa		-1.19*		2.29*		-1.45*		2.28*		-1.68*		2.26*
South Asia		0.36***		2.47*		-0.04		2.49*		-0.38		2.47*
Constant	4.01*	0.48	4.21*	3.36*	-0.18	-2.10***	4.07*	3.48*	-3.78*	-4.21*	4.01*	3.58*
R^2	0.66	0.70	0.26	0.34	0.67	0.71	0.26	0.34	0.64	0.71	0.26	0.34
X^2	1,388*	1,646*	240.5*	376.5*	1,441*	1,769*	242.4*	375.3*	1,290*	1,701*	242.6*	372.1*

(1) LSDV with income group dummies

(2) LSDV with geographic region dummies

* Significant at the 1% level

** Significant at the 5% level

*** Significant at the 10% level

Tables 3, 4 and 5 assume that the poverty are endogenous, and the other variables are exogenous. Table 6 provides information on this assumption. Endogeneity issues do not arise for unit-specific effects of geographic regions; but for those of income groups. OPEN is statistically significant and consistent with expectations in all estimates; however, UR is generally not statistically significant. This suggests that the unemployment rate in domestic country does not a statistically significant effect on the international remittances.

Combining all the results from Tables 3, 4 and 5, we conclude that equation (1) is suitable to represent the relationship between the variables. GDP, REM, GINI, GE, HE and SE have explanatory power for poverty. The dummies for East Asia & Pacific, Middle East & North Africa and South Asia are statistically significant, implying that these geographic regions differ from the general sample. When examining the relationship between international remittances and poverty for these geographic regions, it is important to note that their drifts differ from the general sample. Therefore, researchers can use panel data analysis techniques with dummy variables or heterogenous panel data models. Table 6 shows that the income group dummies are statistically significant, implying that there is an endogeneity problem between international remittances and poverty in the income group-based estimates. Poverty and OPEN have explanatory power for international remittances. In contrast, there is no endogeneity problem in the estimates based on geographic regions. These findings illustrate that equation (2) is appropriate to test the endogeneity problem; however, they contradict with the results of Adams and Page (2005) and Peković (2017). The reason could be that this paper covers a larger data set and more variables.

CONCLUDING REMARKS

This paper sheds light on the impact of international remittances on poverty using a broader data set of 107 countries. After reviewing the relevant literature, the pooled OLS and DVLS models are constructed as baseline, extended and robust models. Moreover, a 3SLS model is also implemented to address the endogeneity problem.

The findings of these model reveal that gross domestic product, international remittances and the Gini index have a statistically significant impact on poverty. A 10% rise in international remittances leads to a 0.7−1.7% decline in the proportion of people living on less than $1.90 per person per day in the baseline, extended and robust models; however, this ratio falls to 0.1−1.0% when the endogeneity problem is accounted for. Moreover, the endogeneity problem does not occur with geographic regions, but with income groups. However, the coefficients of the exogenous variables are consistent even in case of the endogeneity problem.

The policy recommendation is that governments and financial intermediaries must strive to reduce the high transaction costs for international remittances that result from a lack of regulation, low levels of financial sector performance, and competition. Reducing the transaction costs of international remittances enhances their poverty-reducing impact and ensures that the majority of remittances flow through official channels.

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APPENDIX

Table 7. Specification of the Countries

Income Group	Country[16]
Upper Middle Income[a] (431 observations)	Albania[I], Algeria[IV], Argentina[III], Armenia[I], Azerbaijan[I], Belarus[I], Belize[III], Bosnia and Herzegovina[I], Botswana[VI], Brazil[III], Bulgaria[I], Colombia[III], Costa Rica[III], Dominican Republic[III], Ecuador[III], Fiji[II], Gabon[VI], Georgia[I], Guatemala[III], Guyana[III], Indonesia[II], Iraq[IV], Jamaica[III], Jordan[IV], Kazakhstan[I], Kosovo[I], Malaysia[II], Maldives[V], Mauritius[VI], Mexico[III], Montenegro[I], Namibia[VI], North Macedonia[I], Paraguay[III], Peru[III], Romania[I], Russian Federation[I], Samoa[II], Serbia[I], South Africa[VI], Sri Lanka[V], St. Lucia[III], Suriname[III], Thailand[II], Tonga[II], Turkey[I], Tuvalu[II]
Lower Middle Income[b] (243 observations)	Angola[VI], Bangladesh[V], Bhutan[V], Bolivia[III], Cabo Verde[VI], Cameroon[VI], Comoros[VI], Côte d'Ivoire[VI], El Salvador[III], Estawini[VI], Ghana[VI], Honduras[III], Kenya[VI], Kiribati[II], Kyrgyz Republic[I], Lesotho[VI], Mauritania[VI], Moldova[I], Mongolia[II], Morocco[IV], Myanmar[II], Nicaragua[III], Nigeria[VI], Pakistan[V], Papua New Guinea[II], Philippines[II], São Tomé and Principe[VI], Senegal[VI], Solomon Islands[II], Sudan[VI], Timor-Leste[II], Tunisia[IV], Ukraine[I], Vanuatu[II], Vietnam[II], West Bank and Gaza[IV], Zambia[VI], Zimbabwe[VI]
Low Income[c] (84 observations)	Benin[VI], Burkina Faso[VI], Burundi[VI], Central African Republic[VI], Ethiopia[VI], Gambia[VI], Guinea[VI], Guinea-Bissau[VI], Haiti[III], Liberia[VI], Madagascar[VI], Malawi[VI], Mali[VI], Mozambique[VI], Nepal[V], Niger[VI], Rwanda[VI], Sierra Leone[VI], Tajikistan[I], Tanzania[VI], Togo[VI], Uganda[VI]

[a] 3996 USD ≤ GDP per capita of Upper Middle Income ≤ 12375 USD
[b] 1026 USD ≤ GDP per capita of Lower Middle Income ≤ 3995 USD
[c] GDP per capita of Low Income ≤ 1025 USD or less
[I] Europe & Central Asia (195 observations)
[II] East Asia & Pacific (63 observations)
[III] Latin America & Caribbean (298 observations)
[IV] Middle East & North Africa (28 observations)
[V] South Asia (32 observations)
[VI] Sub-Saharan Africa (142 observations)

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[16] The World Bank database does not include poverty data for some countries, such Afghanistan. In addition, the national distribution for some countries, such as India, is based on an aggregated Lorenz curve from original rural and urban distribution, making these data less reliable. The lack of data and its reliability limit the countries that are analyzed.