Cross-Border Remittances and Poverty Reduction in Developing Countries

Benjamin A. Endriga and Alyssa Cyrielle B. Villanueva
(Senior Researcher and Central Bank Associate, respectively, Bangko Sentral ng Pilipinas)
Correspondence: Bangko Sentral ng Pilipinas, Mabini St., Manila, Philippines.
Email: EndrigaBA@bsp.gov.ph, VillanuevaAB@bsp.gov.ph

Abstract

As a significant source of external funding for developing countries, international remittances have been widely studied for their impact on development, including its effects on economic growth, employment, foreign exchange, its links to consumption and investment, and its impacts on poverty and welfare. There are two opposing views on its impact on poverty. The more optimistic view notes that remittances reduce poverty through increased incomes, supports greater investments in physical assets, education, and health, and enables access to a larger pool of knowledge. The negative view observes that poor households have limited access to migrant labor markets due to liquidity constraints as well as high transport and entry costs of migration. If migration is costly and risky, then migrants may come from middle or upper segments of the rural income distribution rather than from the poorest households.

This study thus examines the impact of international remittances on poverty reduction in selected developing economies. The study also examines whether human capital is a channel through which remittances can reduce poverty. The study employs dynamic panel estimation techniques to estimate the results and address methodological issues of endogeneity and test for robustness. The study also uses three indicators of poverty, including poverty headcount, poverty gap, and poverty severity, across three international poverty lines ($3.00, $4.20, and $8.30), to capture the prevalence, depth, and intensity of poverty in the sample as well as to test for robustness. The results show robust results that remittances are significant in reducing poverty using these different poverty measures. The results also show that education, as proxy for human capital, has a moderating effect on remittances in reducing poverty, suggesting a substitution effect.

Keywords: remittances, poverty, endogeneity, developing countries

JEL codes: F24, I32, O15

The views expressed in this publication are solely those of the authors and do not necessarily reflect the official policy or position of the Bangko Sentral ng Pilipinas.

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I. INTRODUCTION

Remittances have become a major source of capital inflow to many developing countries, exceeding inflows of official development assistance and foreign direct investment. Remittances have grown more than 13-fold from $68.4 billion in 1990 to $905 billion in 2024, with an estimated 80% going to developing countries. This compares to FDI and ODA inflows to developing countries respectively reaching only $270 billion and $223 billion in 2023 (Migration Data Portal; UNCTAD, 2023; UN Focus 2030). In the last decade, remittances grew by 57% while FDI fell by 41%. Remittances account for at least 3% of GDP in more than 77 countries, and more than 10% of GDP in about 30 economies, highlighting their critical role in national development (IFAD 2025). Remittances can contribute to development through foreign exchange earnings, economic growth, macroeconomic stability, and poverty reduction.

There are two opposing views about the impact of remittances on poverty. The optimistic view posits that remittances make a positive impact by directly increasing household incomes and consumption especially on basic needs. Remittances also enable recipient households to make investments in education and health, helping to break the cycle of poverty and promote long-term well-being (Dhakal and Oli, 2020). Remittances can also enable spending on durable and nondurable goods, and can serve as capital for small businesses. Adams (2007) finds that households receiving international remittances spend less at the margin on consumption goods such as food, and more on investment goods like education and housing. These households also tend to invest more in entrepreneurial activities. Remittances also have a multiplier effect on the economy through consumption of domestically produced goods (Adams, 2011). The impact of remittances on poverty may also be indirectly amplified through investments in human capital (Garcia-Fuentes, et al. 2025)

Other authors however are more skeptical. The pessimistic view holds that poor households have limited access to migrant labor markets due to liquidity constraints as well as high transport and entry costs of migration. If migration is costly and risky, then migrants may come from middle or upper segments of the rural income distribution rather than from the poorest households. There are fewer migrants among the poor, and they travel to destinations with lower returns, resulting in less poverty reduction (Murrugarra, et al. 2011). Moreoever, despite receiving remittances, households may still remain in some level of poverty (Coon and College, 2012).

This paper examines whether cross-border remittances contribute to reducing three indicators of poverty in a panel of 62 developing countries from 1990–2024. These three indicators include the poverty headcount, poverty gap, and poverty severity. A second objective is to analyze if remittances are able to reduce poverty through human capital development. We use a System GMM method to address issues of endogeneity, unobserved heterogeneity, and autocorrelation which are commonly found in panel data analysis. Our empirical results provide support for a robust effect of remittances in reducing all three measures of poverty. Our estimations were further implemented across 3 different poverty thresholds based on the World Bank's 2025 update of international poverty lines (i.e. $3.00, $4.20, and $8.30). This was also estimated using different thresholds of remittances share to GDP (full sample, 3%, and 5% remittance share thresholds). Moreover, our study also finds that

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the poverty-reducing effects of remittances may be moderated by human capital, suggesting a substitution effect between remittances and human capital development.

Our study contributes to the literature in at least three ways. First, it adds to the limited literature on the interaction between remittances and human capital. One finding here is that human capital reinforces the poverty-reducing effects of remittances. Our results indicate a moderating or substitution effect, adding nuance to the literature. Second, we also add to robust findings in the literature that make use of panel estimation methods and address problems of endogeneity and cross-country correlations. Our study specifically finds larger elasticities or poverty-reducing effects of remittances compared to other papers. Third, we make use of the World Bank's (2025) latest estimates on poverty thresholds, while also implementing our model over three categories of remittance limits, including 3% and 5% remittance ratios to GDP, as well as the full sample.

The rest of the paper is organized as follows. Section II summarizes findings from the literature on remittances and poverty reduction. Section III discusses the data used and the model pursued to analyze the impact of remittances on poverty reduction. Section IV discusses the model diagnostic tests that justify the use of System GMM methodology. Section V provides and empirical results and Section VI concludes.

II. LITERATURE REVIEW

Empirical studies on the remittances-poverty nexus yield diverse results. A study by Adams and Page (2005) is probably the earliest macro-based analysis of the poverty-alleviating effects of remittances. The authors used a panel of 71 low- and middle-income countries and employed three measures of poverty including the poverty headcount at $1.08, poverty gap, and squared poverty gap. Employing ordinary least squares, the authors find that remittances (as well as international migration) significantly reduce all three measures of poverty in these countries, with only a marginal impact on poverty headcount and more significant impacts on the latter two poverty measures. Since then, various studies have emerged with different global or regional samples, control variables for poverty, and other econometric approaches that enhance robustness and address endogeneity issues. A recent study for example by Ojeyinka and Ibukun (2024) controls for endogeneity through a System GMM method. The authors employ poverty headcount and also add household consumption expenditure as measures of poverty, and estimate their model for the top 38 recipients of remittances globally during 1990-2021. Their results are consistent with the optimistic view for both measures of poverty. Tsaurai (2018) analyzes the remittances-poverty relationship using a fixed effects approach as well as pooled ordinary least squares. The former approach yields significant results such that a 1% increase in remittances reduces poverty by 24%, while the latter approach leads to a counterintuitive result of an increase in poverty levels. For the Asian region, Yoshino, et al. (2017) analyze the remittances-poverty nexus for 10 developing countries in Asia using a random effects model. The authors find that international remittances have a statistically significant impact on the reduction of the poverty gap ratio and poverty severity ratio: a 1% increase in international remittances as a share of GDP leads to a 22.6% decline in the poverty gap ratio and a 16.0% decline

in the poverty severity ratio. Using a sample of 24 Asian economies, Imai et al. (2014) find that remittances directly impacts poverty, and can complement broad-based development policies. The authors caution however that capital flows such as remittances and FDI are volatile and can be a source of output shocks with adverse effects on growth. Nahar (2025) estimates the remittances-poverty nexus using Southeast Asian countries as his sample. The author finds that an increase in remittances reduces the poverty headcount more than the poverty gap, while an instrumental variable approach results in larger elasticities compared to an OLS method. In a study using South Asian countries as a sample, which include major remittance recipients such as Bangladesh, India, Pakistan, and Sri Lanka, the World Bank (2005) finds that adding estimates of unofficial remittance inflows to official figures contributes to reducing poverty in the region. In a study of rural Mexico, Taylor, et al. (2005) find that remittances have an equalizing effect while also alleviating poverty as the share of households with access to remittances increases.

There are a few studies that examine the channels through which remittances reduce poverty such as through human capital development. Using a sample of 130 developing countries during 1990-2019, Garcia-Fuentes (2025) find that remittances decrease poverty through its direct effect and increase human capital which enhances the total effects of remittances on poverty. A study by Huay and Bani (2018), however, finds that while remittances reduce poverty, the impact is mitigated with the addition of a human capital variable. This latter finding is similar to the results in our study.

Other studies support the pessimistic view and find insignificant results or only marginal effects. Using a sample of 20 Asian countries during 1988-2007, Vargas-Silva, et al (2007) find that while remittances positively affect real per capita GDP growth, it has only marginal effects on the poverty rate. Imai et al. (2017) observed that remittance inflows are linked with both higher economic growth and notable declines in poverty, especially when poverty is assessed at the international poverty lines of USD 1.25 and USD 2.00 per day, but noted these transfers do not significantly influence income inequality. Inoue (2018) reported that economic growth, reflected in rising per capita GDP, remains a critical driver of poverty reduction, while greater income inequality, as measured by the Gini coefficient, is positively associated with higher poverty levels. Some micro-based studies also find support for the pessimistic view. In a study of Burkina Faso, Wouterse (2010) argues that remittances exclude the rural poor and thus only have a marginal effect on reducing poverty. In the Philippines, Dakila and Dakila (2006) find that across all regions, the major beneficiaries of remittances are the middle class while the second major beneficiaries are the lower-income class. This also compares to the national capital, where high income households are the second largest recipients of remittances.

III. DATA AND MODEL

The dataset uses key World Bank indicators covering the years 1990–2024, spanning 103 countries to provide a comprehensive view of poverty and development trends. Due to data constraints, however, the sample was reduced to 62 countries (see Appendix Table 1), as only those with complete datasets for all model variables were retained for analysis in the regression. **Table 1**

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summarizes variables such as the poverty headcount ratio, poverty gap, and poverty severity, all of which measure different aspects of how many people are poor and how deeply they experience deprivation, typically reported as ratios ranging from 0 to 1. Following the World Bank's revised poverty standards released in June 2025, the international poverty lines have been updated to USD 3.00, 4.20, and 8.30 per day. This study adopts the USD 3.00 line as its primary benchmark, with the higher thresholds used to test the robustness of the results. Additional important variables are personal remittances received (expressed as a percentage of GDP), GDP per capita growth (measured as a yearly percent change), and the Gini coefficient, a dimensionless index between 0 and 1 that captures income or consumption inequality. Finally, secondary education enrollment, given as a gross percentage, serves as a proxy for assessing human capital in the population.

Table 1. Data description

Variable	Definition	Unit
Poverty headcount	Refers to the proportion of the population living below the poverty line	Ratio (0 to 1)
Poverty Gap	Depth of poverty, which indicates how far below the poverty line the average poor household's income or expenditure falls	Ratio (0 to 1)
Poverty Severity	Squared poverty gap ratio, which gives more weight to poorest households, emphasizing depth of poverty and inequality among the poor	Ratio (0 to 1)
Remittances	Personal remittances received (% of GDP)	%
GDP per capita growth	US dollar (2010 constant price)	%
Gini coefficient	Measure of income or consumption inequality	Index (0 to 1)
Secondary education enrollment	Secondary (% gross), proxy for human capital	%

Source: World Bank Database.

The data are averaged over five-year intervals to address missing data and unavailability of annual frequency among certain variables. For econometric analysis, including diagnostic checks and regression modeling, the variables are subsequently transformed using natural logarithms to ensure comparability and improve the robustness of the regression estimates.

Given the panel dataset covering 62 countries over a span of more than twenty years, this study employs a dynamic panel model, as adapted from Chong (2018). This model is estimated to assess the impact of remittances and human capital on poverty reduction and whether remittances work through the human capital channel. The model is defined below:

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$$LogPOV_{i,t} = \alpha_i + \beta_0 logPOV_{i,t-1} + \beta_1 logGDP_{i,t} + \beta_2 logGini_{i,t} + \beta_2 logRemit_{i,t} + \beta_4 logEduc_{i,t} + \beta_5 \log (RemitxEduc)_{i,t}$$

where the dependent variable $LogPOV_{i,t}$ denotes the log transformation of the poverty measure (poverty headcount, poverty gap, and poverty severity) for country *i* at year *t*. The regressors are the log transformations of selected country-specific macroeconomic indicators which include the growth of GDP per capita ($logGDP_{i,t}$), Gini coefficient ($logGini_{i,t}$), remittance inflows ($logRemit_{i,t}$), and upper secondary school enrollment ($logEduc_{i,t}$). We also include an interaction variable between remittances and human capital $log(RemitxEduc)$ to determine if the relationship between poverty and remittance goes through or is strengthened or weakened by the human capital channel.

If the interaction term is positive, this indicates that remittances tend to reduce poverty more in countries with lower education levels, acting as an alternative means of support. Conversely, a negative interaction term means that when education levels are higher, remittances and education work together to strengthen poverty reduction efforts. This shows remittances can either substitute for or complement education in alleviating poverty.

This study employs the System Generalized Method Of Moments (GMM) technique developed by Arellano and Bover (1995) and Blundell and Bond (1998) to address the endogeneity of explanatory variables and capture unobserved country-specific effects. It achieves this by using both lagged levels and lagged differences as instruments, as well as including the lagged poverty variable to manage potential endogeneity with remittances. In this framework, the dependent variable is treated as predetermined, while macroeconomic regressors specific to each country are considered strictly exogenous. To ensure robust inference, standard errors are adjusted for serial correlation and heteroskedasticity using a two-step covariance matrix estimation. A finite-sample correction to the standard errors is applied to improve their accuracy particularly in this study with a limited number of observations (Roodman, 2009).

IV. MODEL DIAGNOSTIC TESTS

We performed model diagnostic tests to determine initial relationships among the variables and to test for endogeneity, unobserved country correlations, multicollinearity, and stationarity of variables. We used the Breusch-Pagan Lagrange Multiplier method to test for random effects, serial correlation tests to detect autocorrelation, and tests for panel homoscedasticity to verify variance consistency across observations. Finally, we conducted panel unit root tests to assess the stationarity of the variables, which all together validate the appropriateness and robustness of the System GMM approach for the data.

The descriptive statistics indicate substantial variation across the key variables included in the analysis (**Table 2**). The poverty headcount, poverty gap, and severity indicators in this study range from 0 to 1, reflecting proportions of the population affected with considerable variation across observations. Remittance inflows show high variability, with some countries reporting exceptionally

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large values. The dataset also reveals a wide spread in upper secondary educational attainment and real GDP growth rates, spanning both negative and exceptionally high outcomes. The Gini index suggests moderate to substantial inequality within the sample, as evidenced by its range and dispersion. Overall, these patterns underscore pronounced heterogeneity in socio-economic conditions across the observed sample.

Table 2. Description of variables

Variable	No. of Observations	Mean	Std. dev.	Min	Max
poverty_gap	2,175	0.044739	0.091145	0	0.653292
poverty_se~y	2,175	0.024535	0.056148	0	0.487222
headcount	2,175	0.113831	0.193818	0	0.948898
remit	3,162	4.731149	9.227134	0	167.4331
useceduc	1,035	41.88105	23.96087	0	98.2942
gdpc_gr	3,492	1.822636	6.720557	-64.4258	150.4315
gini	2,175	0.373878	0.086919	0.201866	0.710506

CORRELATION MATRIX AND VIF

We implemented a correlation matrix to have an initial understanding of variable relationships to poverty (**Table 3**). As expected, the poverty indicators show very strong positive correlations with each other, while remittances and upper secondary education are moderately negatively correlated with poverty measures. The different poverty indicators and GDP growth show little association, while the Gini index is positively correlated, supporting the expected relationships among variables. Lastly, all VIF values are well below common thresholds, indicating multicollinearity is not a concern.

Table 3. Correlation matrix

	poverty_gap	poverty_se~y	headcount	remit	useceduc	gdpc_gr	gini	vif
poverty_gap	1							
poverty_se~y	0.9857	1						
headcount	0.9613	0.9038	1					
remit	-0.0177	-0.0058	-0.0193	1				1.04
useceduc	-0.4168	-0.3764	-0.4535	0.0203	1			1.57
gdpc_gr	-0.0837	-0.0915	-0.0647	0.0426	0.0408	1		1.02
gini	0.3871	0.3932	0.3727	-0.1267	-0.4276	-0.1162	1	1.45

BREUSCH-PAGAN LAGRANGE MULTIPLIER TEST

The Breusch-Pagan Lagrange multiplier test results indicate highly significant evidence of panel effects for all three poverty indicators (all $p < 0.05$) (Table 4). This indicates that variation between

countries is substantial and justifies the use of panel or random effects models rather than pooled regressions in our empirical analysis.

Table 4. Results of BP-LM test

Model	chibar^2(01)
log_poverty_gap	151.10*
log_poverty_severity	161.15*
log_headcount	136.94*

* p<0.05

SERIAL CORRELATION TEST

The serial correlation test results show moderately high rho values for all three poverty measures, indicating significant positive serial correlation in the panel data (**Table 5**). This suggests that unobserved shocks or errors in poverty outcomes are correlated across years within countries, reinforcing the need for dynamic panel or autocorrelation-robust estimation methods to obtain valid inference in the analysis.

Table 5. Results of serial correlation test

Model	rho
log_poverty_gap	0.6
log_poverty_severity	0.52
log_headcount	0.691

PANEL HOMOSKEDASTICITY TEST

The panel homoskedasticity test yields extremely large and significant chi-squared statistics for all three poverty indicators (poverty gap, severity, and headcount), leading to rejection of the null hypothesis of homoskedasticity (constant error variance) at conventional significance levels (**Table 6**). This strongly indicates the presence of heteroskedasticity in the data, pointing to the use of robust standard errors or heteroskedasticity-consistent estimators for analysis.

Table 6. Results of panel homoscedasticity test

Model	chi^2
log_poverty_gap	7050.04*
log_poverty_severity	8083.08*
log_headcount	5852.02*

* p<0.05

PANEL UNIT ROOT TESTS

We also conducted panel unit root tests to gauge the stationarity of the variables. The results indicate significant ADF and PP statistics for most variables at the 5% level, suggesting that the majority of series are stationary in panel form (**Table 7**). This also suggests that some indicators such as the poverty headcount and educational attainment variables display mixed evidence depending on the test. Thus, the data largely satisfy the stationarity requirement for dynamic panel estimation, reducing concerns about spurious regression but indicating the need to check individual series for borderline cases.

Table 7. Results of ADF and PP panel unit root tests

Variable	Panels	ADF Statistic	PP Statistic
log_poverty_gap	97	166.286*	237.609*
log_poverty_severity	97	225.695*	347.692*
log_headcount	97	133.735	238.146*
log_remit	103	718.874*	910.628*
log_useceduc	102	74.194	730.030*
log_gdpc_gr	103	773.194*	751.669*
log_gini	97	349.159*	481.245*

* $p<0.05$

The results of all diagnostic tests conducted provide strong empirical support for the use of System GMM in this setting. Robust tests for panel heteroskedasticity indicated the presence of heteroskedasticity across panels, for which system GMM with robust standard errors is specifically designed. The Breusch-Pagan LM tests demonstrated the existence of significant panel effects, thereby justifying a panel estimator over pooled approaches. Moreover, unit root tests indicate that core variables are stationary in panel form or have sufficient stationarity for dynamic panel techniques. The weight of evidence from the diagnostics upholds the assumptions underpinning System GMM and supports the reliability of the estimates in this study.

V. EMPIRICAL FINDINGS

Our empirical results using the System GMM method reveal that estimated coefficients for GDP per capita growth, remittances, education, and income inequality on key poverty measures are not only statistically significant but also substantial in magnitude. The analysis was conducted on the full country sample as well as on two subsamples restricted to countries where remittances exceeded 3% and 5% of GDP, respectively, to assess the robustness of the main results across contexts with varying remittance intensity. We also apply this approach to test if we obtain results similar to Banga and Sahu (2013), whose study finds that the poverty-reducing effects of remittances are more reliable when remittances exceed 5% of GDP.

The results in Table 8 show that the elasticities of the poverty gap, severity, and headcount indices with respect to remittance inflows range from -2.3 to -3.2. These elasticities are on the higher end of the range reported in previous empirical studies (Vargas-Silva et al., 2009; Imai et al., 2014; Chong & Bani, 2018; Inoue, 2018; Saptono et al., 2022; Akinlo & Dada, 2025; Garcia-Fuentes et al., 2025). These studies however used different poverty thresholds. Our estimated elasticities however remain

consistent with established panel evidence indicating strong poverty-reducing effects of remittances. The negative coefficients for upper secondary educational attainment, with values around –1, similarly align with well-established findings (Chong & Bani, 2018; Garcia-Fuentes et al., 2025) that increased educational attainment exerts a notable downward influence on poverty, both in incidence and depth. The positive and significant elasticity estimates for the Gini coefficient, near 2 for the poverty gap, corroborate numerous prior studies that underscore the pivotal role of income distribution in shaping poverty outcomes. Taken together, these results demonstrate that while the estimated impacts in this sample are somewhat more pronounced than typical averages, they confirm and reinforce prevailing evidence that higher remittance inflows, greater educational attainment, and lower income inequality are each independently and robustly associated with significant reductions in poverty measures across developing economies.

In addition, the positive and significant coefficients estimated for the interaction between remittances and upper secondary education suggest that the poverty-reducing effects of remittances may be moderated by educational attainment, with the marginal benefit of remittances for poverty alleviation potentially being smaller in contexts where education levels are already high. This finding makes a novel contribution to the literature, as relatively few empirical studies (Chong & Bani, 2018) have explicitly modeled or quantified how human capital conditions may shape the impact of migrant remittances on poverty outcomes. By incorporating and highlighting this interaction, the present analysis provides new evidence of the heterogeneous effects of remittances, reinforcing the importance of considering both economic and social context in development policy and enriching the ongoing scholarly discussion about the conditional nature of poverty reduction dynamics in low- and middle-income countries.

Across all samples, the negative and significant elasticity estimates for remittances and upper secondary education, as well as the positive effect of income inequality, were maintained, demonstrating the stability of these relationships even among countries more heavily reliant on remittances. Importantly, the interaction term between remittances and educational attainment remained statistically significant and positive in these restricted samples, reinforcing the conclusion that the poverty-reducing impact of remittances is conditional on the prevailing level of human capital. By explicitly analyzing subsamples defined by remittance thresholds, this study provides further empirical support for the generalizability of the main findings and highlights the importance of both remittance flows and educational context for poverty alleviation.

The presence of significant AR(1) statistics in the Arellano-Bond tests is expected in dynamic panel settings with a lagged dependent variable and does not threaten the validity of the system GMM estimation. On the other hand, the Arellano-Bond AR(2) tests consistently failed to reject the null of no second-order serial correlation, satisfying a key requirement for valid GMM estimation. All models passed the Hansen test for overidentifying restrictions, confirming that the selected instruments are valid and uncorrelated with the error term.

Table 8. Regression Results ($3.00 poverty line)

VARIABLES	log_poverty_gap	log_poverty_severity	log_headcount

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Full sample	3% threshold	5% threshold	Full sample	3% threshold	5% threshold	Full sample	3% threshold	5% threshold
L.log_poverty_gap	0.766***	0.782***	0.776***						
	(0.151)	(0.162)	(0.174)						
L.log_poverty_severity				0.690***	0.775***	0.777***			
				(0.190)	(0.175)	(0.183)			
L.log_headcount							0.905***	0.849***	0.834***
							(0.119)	(0.160)	(0.173)
log_remit	-3.208*	-2.993*	-3.143*	-3.635	-3.739*	-3.936*	-2.309*	-2.342*	-2.456*
	(1.748)	(1.737)	(1.849)	(2.188)	(2.159)	(2.292)	(1.245)	(1.368)	(1.451)
log_useceduc	-1.057**	-1.032*	-1.093*	-1.211**	-1.168*	-1.220	-0.736**	-0.843**	-0.915*
	(0.441)	(0.513)	(0.631)	(0.560)	(0.652)	(0.802)	(0.291)	(0.382)	(0.460)
log_gdpc_gr	-0.128	-0.0447	-0.0683	-0.120	-0.0654	-0.103	-0.115	-0.0491	-0.0636
	(0.151)	(0.185)	(0.251)	(0.194)	(0.226)	(0.300)	(0.105)	(0.130)	(0.179)
log_gini	1.959**	1.858**	2.111**	2.585**	2.359**	2.661**	1.232**	1.340**	1.521**
	(0.768)	(0.843)	(0.922)	(1.054)	(1.043)	(1.158)	(0.537)	(0.638)	(0.670)
log_remit_educ	0.902*	0.811*	0.851*	1.018*	1.006*	1.057*	0.652*	0.637*	0.668*
	(0.473)	(0.453)	(0.479)	(0.591)	(0.565)	(0.597)	(0.334)	(0.352)	(0.372)
Constant	4.398**	4.491**	4.996*	4.940**	5.308*	5.885*	3.253**	3.752**	4.192**
	(1.831)	(2.156)	(2.499)	(2.328)	(2.712)	(3.139)	(1.227)	(1.661)	(1.912)
Obs.	161	116	106	161	116	106	161	116	106
AR(1)	0.041	0.078	0.084	0.087	0.082	0.087	0.042	0.076	0.083
AR(2)	0.71	0.317	0.315	0.539	0.395	0.384	0.619	0.138	0.146
Hansen Test	0.222	0.169	0.175	0.235	0.209	0.219	0.148	0.179	0.178
No. of instruments	9	9	9	9	9	9	9	9	9
No. of country_id	61	45	40	61	45	40	61	45	40

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

ROBUSTNESS CHECKS

The results in **Tables 9 and 10** show that robustness checks conducted at higher poverty thresholds (USD 4.20 and USD 8.30) demonstrate that the negative and statistically significant effects of remittance inflows and upper secondary education on poverty gap, severity, and headcount are sustained across all poverty lines and sample definitions, albeit with slightly reduced magnitudes at higher thresholds. This reflects their consistent role in poverty alleviation even as definitions of poverty become less restrictive. The positive coefficients for income inequality remain robust, reaffirming its detrimental impact on poverty outcomes in diverse contexts. The significance and

direction of the $RemitxEduc$ interaction term persists, confirming the nuanced relationship wherein the effectiveness of remittances in reducing poverty is conditional on educational attainment. These findings reinforce the validity and generalizability of the central results, providing compelling evidence that remittances, human capital, and income distribution exert enduring influences on poverty dynamics regardless of the poverty line employed, and affirming the methodological strength of the results through rigorous sensitivity analysis. Similar with the estimates at the lowest poverty threshold ($3.00), all models used for the robustness checks passed the AR(1), AR(2), and Hansen tests.

Table 9. Regression Results ($4.20 poverty line)

VARIABLES	log_poverty_gap			log_poverty_severity			log_headcount		
	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	Full sample	3% threshold	5% threshold	Full sample	3% threshold	5% threshold	Full sample	3% threshold	5% threshold
L.log_poverty_gap	0.899***	0.812***	0.793***						
	(0.111)	(0.169)	(0.198)						
L.log_poverty_severity				0.849***	0.821***	0.802***			
				(0.127)	(0.194)	(0.221)			
L.log_headcount							0.945***	0.840***	0.826***
							(0.110)	(0.177)	(0.208)
log_remit	-2.034**	-2.133**	-2.255	-2.738**	-2.709	-2.824	-1.289*	-1.427	-1.551
	(1.147)	(1.233)	(1.353)	(1.479)	(1.614)	(1.745)	(0.751)	(0.868)	(0.980)
log_useceduc	-0.662**	-0.813**	-0.893**	-0.844**	-0.934**	-1.036**	-0.483**	-0.639**	-0.706
	(0.270)	(0.371)	(0.480)	(0.347)	(0.483)	(0.612)	(0.213)	(0.317)	(0.426)
log_gdpc_gr	-0.115	-0.0496	-0.0689	-0.133	-0.067	-0.080	-0.0851	-0.0368	-0.0502
	(0.103)	(0.123)	(0.171)	(0.127)	(0.148)	(0.203)	(0.0781)	(0.0907)	(0.130)
log_gini	1.086**	1.221**	1.388**	1.473**	.672	.798	0.775**	0.830**	0.910**
	(0.457)	(0.536)	(0.577)	(0.584)	(0.354)	(0.790)	(0.370)	(0.430)	(0.466)
log_remit_educ	0.578**	0.588**	0.621**	0.772**	0.733**	0.764**	0.371**	0.403**	0.435**
	(0.309)	(0.320)	(0.349)	(0.400)	(0.420)	(0.451)	(0.201)	(0.225)	(0.252)
Constant	2.810**	3.323**	3.768**	3.539**	3.191	3.652	2.101**	2.554**	2.884**
	(1.134)	(1.537)	(1.881)	(1.446)	(2.016)	(2.443)	(0.886)	(1.234)	(1.579)
Obs.	162	117	106	162	117	106	162	117	106
AR(1)	0.046	0.078	0.089	0.056	0.084	0.094	0.038	0.062	0.07
AR(2)	0.426	0.209	0.212	0.704	0.303	0.3	0.122	0.119	0.122
Hansen Test	0.129	0.246	0.247	0.157	0.293	0.305	0.103	0.254	0.234
No. of instruments	9	9	9	9	9	9	9	9	9
No. of country_id	62	46	40	62	46	40	62	46	40

Classification: GENERAL

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10. Regression Results ($8.30 poverty line)

VARIABLES	log_poverty_gap			log_poverty_severity			log_headcount		
	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
	Full sample	3% threshold	5% threshold	Full sample	3% threshold	5% threshold	Full sample	3% threshold	5% threshold
L.log_poverty_gap	0.842***	0.753***	0.734***						
	(0.109)	(0.144)	(0.161)						
L.log_poverty_severity				0.846***	0.743***	0.720***			
				(0.109)	(0.161)	(0.182)			
L.log_headcount							0.859***	0.821***	0.771***
							(0.108)	(0.125)	(0.118)
log_remit	-1.262**	-1.398*	-1.547*	-1.443**	-1.551*	-1.688*	-1.244**	-1.347*	-1.438**
	(0.537)	(0.697)	(0.823)	(0.619)	(0.783)	(0.908)	(0.598)	(0.730)	(0.641)
log_useceduc	-0.513**	-0.657**	-0.751*	-0.560**	-0.722**	-0.816*	-0.482**	-0.558*	-0.611**
	(0.198)	(0.301)	(0.411)	(0.207)	(0.322)	(0.437)	(0.219)	(0.296)	(0.282)
log_gdpc_gr	-0.0771	-0.0527	-0.0716	-0.0861	-0.0472	-0.0640	-0.0718	-0.0622	-0.0877
	(0.0574)	(0.0675)	(0.0882)	(0.0710)	(0.0855)	(0.118)	(0.0456)	(0.0561)	(0.0613)
log_gini	0.631**	0.639**	0.668*	0.761**	0.806**	0.874**	0.510*	0.489*	0.770
	(0.275)	(0.313)	(0.336)	(0.306)	(0.357)	(0.379)	(0.263)	(0.286)	(0.494)
log_remit_educ	0.364**	0.401**	0.441*	0.416**	0.442**	0.479*	0.354**	0.380*	0.406**
	(0.145)	(0.187)	(0.218)	(0.167)	(0.206)	(0.237)	(0.165)	(0.202)	(0.172)
Constant	1.962***	2.332**	2.708*	2.128***	2.522**	2.913*	1.960**	2.204*	2.649**
	(0.730)	(1.091)	(1.456)	(0.776)	(1.181)	(1.557)	(0.862)	(1.123)	(1.133)
Obs.	162	117	106	162	117	106	162	117	106
AR(1)	0.037	0.063	0.069	0.033	0.059	0.067	0.059	0.088	0.093
AR(2)	0.215	0.23	0.237	0.224	0.209	0.215	0.296	0.282	0.351
Hansen Test	0.263	0.652	0.656	0.199	0.51	0.512	0.367	0.791	0.755
No. of instruments	9	9	9	9	9	9	9	9	9
No. of country_id	62	46	40	62	46	40	62	46	40

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VI. CONCLUSION

This study has attempted to estimate the poverty-reducing effects of remittances, along with its effects interacting with human capital. Using different measures of remittance thresholds, including 3% and 5% of GDP and the full sample, the study finds that under the World Bank's $3.00 a day poverty threshold, remittances can reduce the poverty gap, poverty severity, and poverty headcount by an average of 3.1%, 3.8%, and 2.3%, respectively. The results are also robust across the three poverty indicators when estimated using $4.20 and $8.30 poverty thresholds. Moreover, the results also show that remittances interacted with human capital have positive coefficients, indicating a mitigating or substituting effect between them.

The results suggest that policies that facilitate the inflow of remittances can help to reinforce the poverty-reducing effects of remittances. This can refer to the costs of remitting, as well as administrative costs that migrants bear with to obtain migration documents. The average cost of sending remittances was 6.4% in 2023, more than double the SDG target of 3%. However, mobile-to-mobile transfers now average a cost of 3.5%, highlighting the benefit of digital solutions. Migrant workers typically send between US$200–300 every 1–2 months, often making the difference between survival and stability for recipient families (IFAD 2025). The high cost of sending remittances has been attributed to limited competition among providers and inadequate cross-border interoperability (Ratha, et al. 2024).

Lowering the costs of migration also enables the poor to participate in international migration as a way of mitigating poverty. The monetary and time costs of obtaining a passport, a basic document in migration, can be significant. Higher passport costs have been found to be associated with lower migration rates (World Bank, 2011). Temporary migration programs and expanding opportunities for less-skilled, poor workers can also benefit the poor.

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APPENDIX

Table A1. List of countries

Albania	Armenia	Benin
Burkina Faso	Bangladesh	Bulgaria
Belarus	Bolivia	Brazil

Bhutan	Chile	Cote d'Ivoire
Cameroon	Colombia	Costa Rica
Dominican Rep.	Ecuador	Egypt, Arab Rep.
Fiji	Georgia	Ghana
Guinea	Gambia, The	Guinea-Bissau
Guatemala	Honduras	Hungary
Indonesia	Jamaica	Kenya
Kyrgyz Republic	Sri Lanka	Mexico
North Macedonia	Mali	Mongolia
Mozambique	Mauritania	Mauritius
Malaysia	Namibia	Niger
Pakistan	Panama	Peru
Philippines	Paraguay	Romania
Russian Fed.	Rwanda	Senegal
El Salvador	Arab Republic	Togo
Thailand	Tunisia	Turkiye
Tanzania	Uganda	Uruguay
Vanuatu	South Africa	