Journal of Applied Economic Sciences
Volume XXI, Special Issue, 1(91), 2026

Financial Inflows and Welfare: A Comparative Panel Analysis of Remittances and FDI in Latin America (1990–2023)

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Article's history:
Received 30th of November, 2025; *Revised* 19th of February, 2026; *Accepted* 1st of March, 2026; *Available online*: 15th of March, 2026. *Published* as article in the Volume XXI, Special Issue 1(91), 2026.

Suggested citation:
Bartokova, L., & Kovesdiova, V. (2026). Financial Inflows and Welfare: A Comparative Panel Analysis of Remittances and FDI in Latin America (1990–2023). *Journal of Applied Economic Sciences*, Volume XXI, Special Issue, 1(91), 29 – 48. https://doi.org/10.57017/jaes.v21.si.1(91).02

Abstract:

This study evaluates the comparative impact of personal remittances and Foreign Direct Investment (FDI) on the Human Development Index (HDI) across Latin American countries over a 33-year period (1990–2023). Using a robust panel data econometric framework, the research tests the hypothesis that different external financial flows yield divergent outcomes for social welfare and human capital accumulation.

The findings indicate that while both inflows contribute positively to development, remittances show a more direct correlation with immediate poverty reduction and household-level human capital investment (education and health), whereas FDI serves as a long-term driver of macroeconomic growth and structural transformation. The results highlight a regional "development duality" where remittance-dependent economies achieve different social milestones compared to FDI-driven ones. The study provides critical policy implications for Latin American governments, emphasising the need for structural reforms to improve productive absorption of remittances and social spillover effects of foreign capital.

Keywords: remittance; foreign direct investment (FDI); human development index (HDI); Latin America; panel data; economic growth; welfare economics.

JEL Classification: F21; F24; O15; O54; C23.

Introduction

The relationship between migration and human development has been discussed in social sciences for some time. The remittances, i.e., the money sent by migrants to their families, can be considered as one of the most prominent contributions of migrants to their home countries. As such, they also represent a significant part of international capital flows. Even though remittances do not lead to immediate development of the home economy, their overall impacts on income distribution, individual welfare, or poverty alleviation can bring about

positive changes in employment, productivity, and growth over the long term and, as such, improve economic and human development in the migrant's country of origin.

Our primary objective is to study and compare the impacts of remittance and foreign direct investment flows on human development in the region of Latin America. Our aim is to examine whether remittances and foreign direct investments contribute significantly to human development and how their impacts differ across countries' level of human development.

In general, literature tends to link human development to the evolution of remittance flows, foreign direct investments (FDI), and also official development assistance (ODA). That is why we would like to analyse these ties and investigate the impacts in more detail in the case of this region over the period 1990-2023. The analysis follows these questions:

Q1. How did remittance flows evolve in the Latin America region over the period 1990-2023?

Q2. What is the relationship between remittance flows and the level of human development in Latin American countries?

Q3. What is the impact of remittance flows on human development in comparison with FDI?

Q4. Does the impact of remittances and FDI vary across countries based on their HDI level?

Building on this, this paper aims to contribute to the topic by comparing the impacts of remittances and FDI across Latin American countries with different HDI levels over 1990–2023. It also provides evidence for country-specific policy strategies that can enhance human development. The structure of this paper is as follows: Introduction followed by the Literature Review, Methodology, Results and Discussions, and Conclusions.

1. Literature Review

Migration and Its Determinants

Migration, or the movement of people across countries, regions or even continents, has long been a fundamental means of human adaptation. (IOM, 2024) Migration can be driven by a wide range of economic, social, demographic, political, and environmental factors, which may vary from region to region. While migration may be considered a global phenomenon, these flows are particularly associated with developing countries, where individuals often face various difficulties in their everyday lives. In this context, migration can be seen as a means to escape economic insecurity and poverty or to gain access to better education. That is why these countries are very often the focus of migration studies.

One commonly used framework to explain migration decisions is the push-pull framework. Push factors, such as, e.g., unemployment, low wages, poverty, or political instability, drive individuals to leave their home countries, while pull factors, such as, e.g., better employment opportunities and higher wages, improved standard of living, or existing social migrants' networks, attract them to host countries (Ortega & Peri, 2013; Prieto Rosas & López Gay, 2015).

Other determinants include, e.g., geographical proximity between countries, existing transport infrastructure or cultural and linguistic ties, as well as various demographic characteristics, e.g., gender, age, and changes in population size, (Pitoski et al., 2024; Soto Nishimura & Czaika, 2024; Ruyssen et al., 2014; Janská et al., 2024).

Literature offers numerous analyses for various regions or particular countries (Latin America, India, and China) that confirm the central role of economic and social determinants, as societies with greater income inequality, social unrest, or low social cohesion have a greater tendency to migrate than countries where these differences are smaller. However, the particular importance of the studied factor may vary depending on the analysed context.

The authors Prieto Rosas & López Gay (2015) analysed the migration flows from 10 Latin American countries to Spain between the late 1990s and the 2010s. They identified income differentials, domestic economic shocks, inefficient labour markets, demographic structure and lacking educational opportunities as principal push factors, while the Spanish economic growth and favourable immigration policy were cited as the main pull factors. Similarly, a newer and wider study (23 Latin American and Caribbean countries, period 2000-2020) by Ochoa Moreno et al. (2025) confirmed that GDP per capita and unemployment can serve both as a push and a pull factor.

Studies for Asian countries equally stress macroeconomic and social causes as the principal push factors (lack of jobs, low wages, poor financial condition, family debts, social insecurity, and social discrimination), e.g., Khan et al. (2025), who studied migration push and pull factors for the Indian economy, or Feng et al. (2025), who used the concept of push and pull factors for the analysis of the interregional migration within China. Their findings confirm that push and pull factors are at the origin of migration even at the national level, though the impacts may be smaller than they are on the international scale. Overall, the evidence indicates that while migration causes and patterns are broadly similar worldwide, the relative weight of specific factors may vary depending on the regional context.

Remittances, Their Drivers and Impact on Human Development

Remittances, i.e., funds sent by migrants to their home countries, represent a significant share of international capital flows and thus play a prominent role in international migration. They can ease budgetary constraints for family members in the home country by financing education and healthcare and by serving as a form of insurance or risk diversification. (Millogo et al., 2025; Dutta & Saikia, 2024; Simpson & Sparber, 2020; McCracken et al., 2016) In this sense, remittances can be seen not only as outcomes of migration but also as its enablers, with significant economic and social impacts on the migrants' countries of origin. (Anwar et al., 2024) According to literature, remittances are determined by both microeconomic and macroeconomic factors. At the micro level, motives include altruism, self-interest, loan repayments, savings, and insurance. At the macro level, determinants include economic growth, inflation, interest and exchange rates, banking efficiency, political stability, and policy consistency. (Schiopu & Siegfried, 2006; Roy, 2024)

Numerous studies highlight the positive effects of remittances on human development, typically measured by the Human Development Index (HDI), which incorporates three fundamental dimensions of well-being (health, education, and income). (UNDP, 2025b) That is why HDI is often cited as a more complex measure than GDP. Recent research by Alvaredo et al. (2025) has also highlighted discrepancies between traditional macroeconomic indicators and household-level measures in Latin America, reinforcing the importance of using composite indices such as HDI when analysing the impacts of external financial flows.

Remittances affect human development through multiple economic and social channels. For instance, Meyer & Shera (2017) found that worker remittances positively and significantly contributed to economic growth in six high-remittance Balkan countries during 1999-2013. Similar results were reported also by Dutta & Saikia (2024), who analysed 17 Asian countries and identified remittances as one of the principal drivers of growth. Based on this, they recommended lowering the remittance transaction costs to boost these effects. Pan and Sun (2024) studied the joint effects of migration and remittances on economic development in China over the decade from 2000 to 2010. Their results confirmed that remittances improved welfare, reduced regional income inequality, and facilitated labour reallocation from agriculture to manufacturing and services.

Moreover, several studies highlight the role of remittances in financing human capital development. For example, Williams (2024) showed that in developing countries, higher remittance inflows are associated with increased government expenditures on education and health, strengthening the developmental effects of remittances. The impact of remittances on human capital and labour supply in 122 developing countries was analysed by Azizi (2018), who showed that remittances raise per capita health expenditures, reduce child malnourishment and mortality but also improve school enrolment and completion rates. A broader meta-analysis by Askarov & Doucouliagos (2020), covering 73 studies across 30 countries, quantified the effect of remittances on investment in education. Their findings highlight the importance of economic resources to educational choices and suggest that these effects are stronger for international remittances as compared to domestic migration.

While numerous studies discuss the positive contributions of remittances to economic growth, human capital, and welfare at both national and regional levels, it is also important to consider the broader context of external financial flows. Remittances, FDI, and ODA represent various forms of international financial flows, and examining their interactions and combined impacts provides further insight into countries' development. For example, Driffield and Jones (2013) investigated the relative contributions of FDI, ODA, and remittances to economic growth in developing countries, finding that all three forms of external capital contribute significantly and positively to economic growth, especially when institutional quality is considered.

Although remittances contribute positively to economic growth and other macroeconomic variables, their effects on income distribution and human development may be more nuanced. As an example, we can cite the study of Anwar et al. (2024), who examined the topic of remittances and inequality. Their comprehensive meta-analysis (45 studies) found that remittances generally reduce inequality, though these effects differ across regions – e.g., they might increase inequality in South Asia but decrease it in East Asia, Eastern Europe, and Latin America. For the Middle East or Africa, only marginal economic impacts were found. Bare et al. (2022) studied this relationship at the regional level, specifically for sub-Saharan Africa during the period of 1996-2016. Their study emphasised remittances as a means of financing children's education, improving access to healthcare or alleviating poverty and inequality. Based on these findings, they also recommended proactive policies that facilitate inflows of remittances. Similarly, Acosta et al. (2008) confirmed the significant role of remittances in increasing economic growth and reducing inequality and poverty in 10 Latin American and Caribbean countries.

While many regional studies generally indicate positive effects of remittances on inequality and poverty, here again, the regional context should be taken into account. For example, Wagle (2016), in a case study of Myanmar, found that although remittances directly increased household income and consumption, their impact on broader economic security was insignificant once other household variables were accounted for. In fact, remittance-receiving households sometimes experienced lower food and overall consumption and higher poverty, which was likely due to the small remittance volumes. These findings were reinforced also by newer studies, e.g., by Huay et al. (2019), who used panel data for developing countries from 1980 to 2014. They found that the increase in remittances has a statistically significant and positive impact on HDI. In particular, a 10% increase in remittances was associated with a 0.016% increase in human development. These results are consistent with older studies by Ustubici & Irdam (2012) or Adenutsi (2010), who also confirmed the significant and positive role of remittances in boosting human development.

Another significant aspect of remittance inflows - or substantial inflows of any form of external finance – is their effect on the real exchange rate, which can have broader macroeconomic consequences, particularly in the long run. Large capital inflows can increase demand for non-tradable goods, reduce the competitiveness of tradable sectors, and potentially crowd out productive investments, a phenomenon often referred to as Dutch Disease (Acosta et al., 2009). As a result, in high-remittance countries this may also limit industrialisation and the structural transformation of the domestic economy that FDI could otherwise support. However, empirical evidence from various economies, including African countries (Ali & Ayele, 2024) or Latin America - particularly high-remittance Central American countries such as Honduras, El Salvador, Guatemala, and Belize (Acosta et al., 2009) - does not universally confirm this mechanism. A broader analysis of 199 countries by Sadiq et al. (2025) suggests that these effects are highly context-dependent, closely linked to the socio-economic and institutional situation of the receiving country.

Migration, Remittances and Human Development in Latin America

While global and regional evidence demonstrates the importance of remittances and FDI for human development, Latin America's high migration outflows and remittance inflows make it a particularly relevant case for examining the mutual links between migration, remittances, FDI and human development. The link between remittances and human development was analysed by, e.g., Ustubici & Irdam (2012), who compared the effects of remittances on human development with those of FDIs and ODAs. Their findings indicate that remittances have a positive correlation with human development, especially in medium-income countries, where they represent an effective tool to enhance human development in the medium run.

Similarly, more recent research by Daud et al. (2025) showed on Latin American data from the period 1992-2022 that FDI can contribute to poverty reduction in Latin America even though these effects are unevenly spread across countries and depend also on the local economic and institutional environment. Empirical evidence presented in the older study of Mexican migration and remittances flows by López-Cordova (2005) further highlights how remittances can influence development outcomes at the national level, especially in migrant-sending regions.

The effects of remittances and FDI on human development are influenced by multiple country-specific factors. Government approaches to migration might also play a key role – the positive impact on human development tends to be stronger in countries where migration is

treated as an effective labour export strategy. (Ustubici & Irdam, 2012) In addition, institutional quality shapes these outcomes, as shown by a broad study of 143 developed and developing countries by Thi Cam Ha et al. (2023), which found that the effectiveness of FDI and remittances in improving health, education, and standard of living depends on governance capacity and institutional strength. Interestingly, the stronger effects were observed in the case of developing countries compared to developed countries. The findings of this study suggest that attracting FDI can be beneficial for enhancing the HDI, especially in developing countries. A study by Chang et al. (2025) offers evidence on how persistent poverty and human capital disparities across Latin American countries highlights the structural context in which remittances and FDI operate. According to their research, socioeconomic conditions have significant influence on how these flows translate into improvements in human development.

The aforementioned literature confirms that migration and remittances are closely tied to human development through multiple economic and social channels, including economic growth, reduction of inequality, and formation of human capital. However, the extent and direction of these effects vary across regions. Despite Latin America's historically high migration outflows and remittance inflows, relatively few studies provide a systematic assessment of their implications for this region. Building on this background, the next section presents the data, methodological approach, and findings of the analysis of the impact of remittances on human development in Latin America between 1990 and 2023.

2. Research Methodology

The relationships between the human development index and its explanatory variables were analysed using panel data regression. The aim was to gain a better understanding of the dynamics of human development in Latin American countries and to identify its most significant macroeconomic determinants. For this study, the standard econometric procedures and tests, including the F-test and Hausman test, were applied to determine the most suitable regression model. The fixed effects (FE) model was chosen to account for unobserved, time-invariant country-specific effects.

Based on the previous research and the availability of data for the sample countries, the following model was applied:

$$HDI_{it} = \beta_0 + \beta_1 REM_{it} + \beta_2 FDI_{it} + \beta_3 GDPPC_{it} + \beta_4 GOVEXP_{it} + \beta_5 GFCF_{it} + \beta_6 TRADE_{it} + \beta_7 POPGR_{it} + \beta_8 FCE_{it} + \mu_i + \varepsilon_{it} \quad (1)$$

where, HDI_{it} represents the human development index (HDI) for country *i* at time *t*; REM_{it} represents personal remittances received as a % of GDP; FDI_{it} denotes net inflow of foreign direct investment as a % of GDP; $GDPPC_{it}$ is gross domestic product per capita, expressed in current USD; $GOVEXP_{it}$ refers to government expenditure on final consumption as a % of GDP; $GFCF_{it}$ represents gross fixed capital formation as a % of GDP; $TRADE_{it}$ measures economic openness, expressed as foreign trade (export + import) as a % of GDP; $POPGR_{it}$ represents the population growth rate as an annual percentage, and FCE_{it} represents final consumption expenditures as % of GDP. As for the parameters μ_i and ε_{it}, they stand for unobserved, time-invariant country-specific effects (treated as fixed in FE models or random in random effects models) and the idiosyncratic error term, respectively.

We expect that REM_{it}, FDI_{it}, $GDPPC_{it}$, and $GOVEXP_{it}$ will have a positive impact on HDI levels in the studied region. For the remaining explanatory variables, the literature offers mixed results: the effects may be positive (e.g., economic growth, job creation, technological progress) or negative (e.g., increased inequality, dependence of countries, spread of poverty). As such, these outcomes can subsequently contribute to either an increase or a decrease in HDI values.

In addition, the model was adapted to test whether the effects of remittances and FDI differ across countries at different levels of human development. Using the United Nations' official classification of human development (Low (< 0.550); Medium (0.550-0.699); High (0.700-0.799); Very high (≥ 0.800)) (UNDP, 2025b), countries were divided into 2 groups: Low/Medium-HDI and High/Very High-HDI. Countries with HDI < 0.7 were classified as Low/Medium HDI (LowMed dummy), while those with HDI ≥ 0.7 were classified as High/Very High HDI. Interaction terms between the variables REM and FDI and the LowMed dummy were included in the model to capture potential differences in their impacts, based on the country's level of development.

$$HDI_{it} = \beta_0 + \beta_1 REM_{it} + \beta_2 FDI_{it} + \beta_3 (REM_{it} x LowMed_i) + \beta_4 (FDI_{it} x LowMed_i) + \beta_5 GDPPC_{it} + \beta_6 GOVEXP_{it} + \beta_7 GFCF_{it} + \beta_8 TRADE_{it} + \beta_9 POPGR_{it} + \beta_{10} FCE_{it} + \mu_i + \varepsilon_{it} \quad (2)$$

Here, β1 and β2 represent the effects of REM and FDI for High/Very High-HDI countries (the reference group), while β3 and β4 capture the differences in effects for Low/Medium-HDI countries. Group-specific effects were then computed as the sum of the main coefficient and the corresponding interaction term (e.g., REM effect in LowMed = β1+β3).

These proposed models aim to contribute to the extensive research on human development, remittances and FDI impacts, with a particular focus on the Latin American region.

3. Results and Discussion

Data set Overview and Descriptive Statistics

Based on data availability, 14 Latin American countries were selected: Argentina (ARG), Belize (BEL), Bolivia (BOL), Brazil (BRA), Colombia (COL), Costa Rica (COS), Ecuador (ECU), El Salvador (ELS), Guatemala (GUA), Honduras (HON), Mexico (MEX), Panama (PAN), Paraguay (PAR), and Peru (PER). The observed period was set from 1990 to 2023, covering the period during which the United Nations Development Programme published annual HDI values for individual countries.

The final panel data set consists of 476 observations for 10 different variables. The data set includes two factor variables: "Country" (14 levels) and "Year" (32 levels, 1990–2023). The HDI time series were retrieved from the United Nations Development Programme database. (UNDP, 2025a) The macroeconomic data set was retrieved from the World Bank database (World Bank, 2025) and includes: personal remittance as % of GDP, net inflows of foreign direct investment as % of GDP, GDP per capita in current USD, government expenditures as % of GDP, gross fixed capital formation as % of GDP, foreign trade as % of GDP, annual population growth in %, final consumption expenditures as % of GDP, and migration rate in %.

To address the main research questions of this study, how remittance flows evolve in Latin America, what their relationship with human development is, how their impact compares to FDI, and how these impacts vary across countries by HDI level, we first explored the patterns of migration, remittances, FDI, and HDI across the 14 selected countries.

Table 1: Descriptive Statistics of the Panel Data Set (1990-2023)

1990-2023	min	1Q	mean	median	3Q	max	st.dev
HDI	0.484	0.638	0.689	0.685	0.749	0.865	0.078
REM	0.007	0.891	4.153	1.717	3.934	27.001	5.875
FDI	-5.088	1.385	3.059	2.483	4.154	16.229	2.605
GDPPC	685.943	2,194.164	4,981.786	4,016.74	6,568.204	18,686.41	3,552.832
GOVEXP	2.976	10.968	13.309	13.469	15.781	22.160	3.505
GFCF	7.627	16.785	19.936	19.383	22.119	40.632	4.438
TRADE	13.75	40.621	65.139	60.222	82.424	166.698	31.767
POPGR	-0.0560	1.130	1.577	1.603	1.962	3.525	0.645
FCE	41.6	76.5	82.1	81.1	86.2	107.0	9.22
MIGR	-16.90	-3.022	-1.387	-0.800	0.200	14.70	4.175

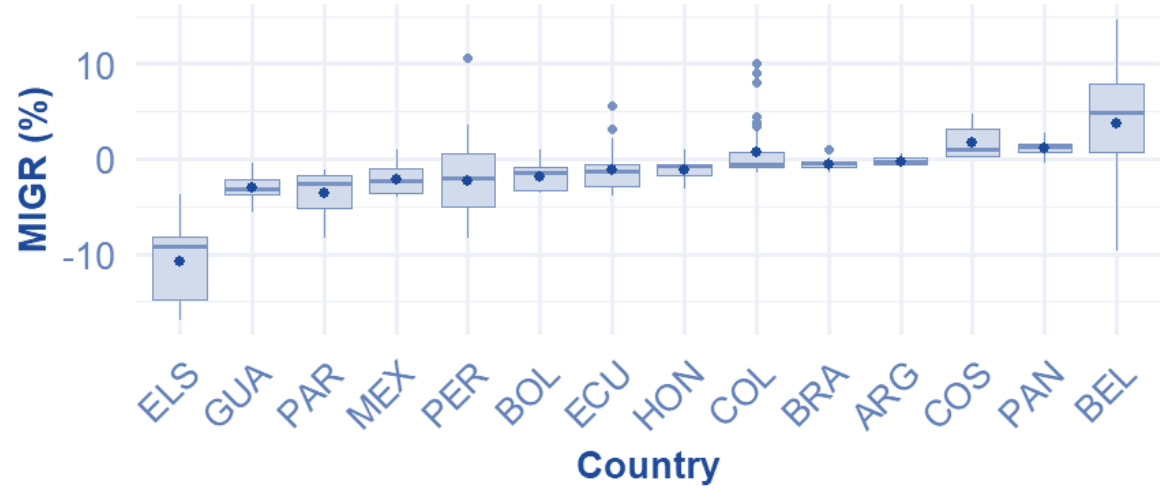
Source: Authors' calculations.

Descriptive statistics of the data set are presented in Table 1. The values indicate significant variability across countries and years, which is evident from the ranges between the minimum and maximum values, as well as the standard deviations. For example, the HDI values ranged from a minimum of 0.484 (Guatemala, 1990) to a maximum of 0.865 (Argentina, 2023), showing also substantial improvement over time. Both HDI and GDPPC present upward trends in each of the examined countries. The REM indicator shows a wide range of values (0.007-27%), with the mean (4.153%) considerably higher than the median (1.717%), pointing to an asymmetrical distribution of these flows across the region. In contrast, FDI's statistics do not display a clear trend; the values appear to fluctuate randomly. The negative minimum value of FDI also reveals some investment outflows during the observed period. The migration rate indicates predominant emigration in most countries, as both the mean and median are negative. Overall, these descriptive statistics highlight the heterogeneity of economic and human development indicators across selected Latin American countries, which provides a basis for the panel regression analysis and subsequent heterogeneity analysis.

Evolution of Remittance Inflows, FDI Inflows, and HDI

Firstly, we studied the distribution of migration rates by countries, also displayed in Figure 1. From our sample of 14 analysed countries, only three (Belize, Panama, and Costa Rica) have both median and mean values in the positive range, indicating stronger migration inflows than outflows. The remaining countries are characterised by higher emigration. This movement of citizens to other countries subsequently creates the basis for the international financial outflows in the form of the personal remittances which are the focus of this analysis.

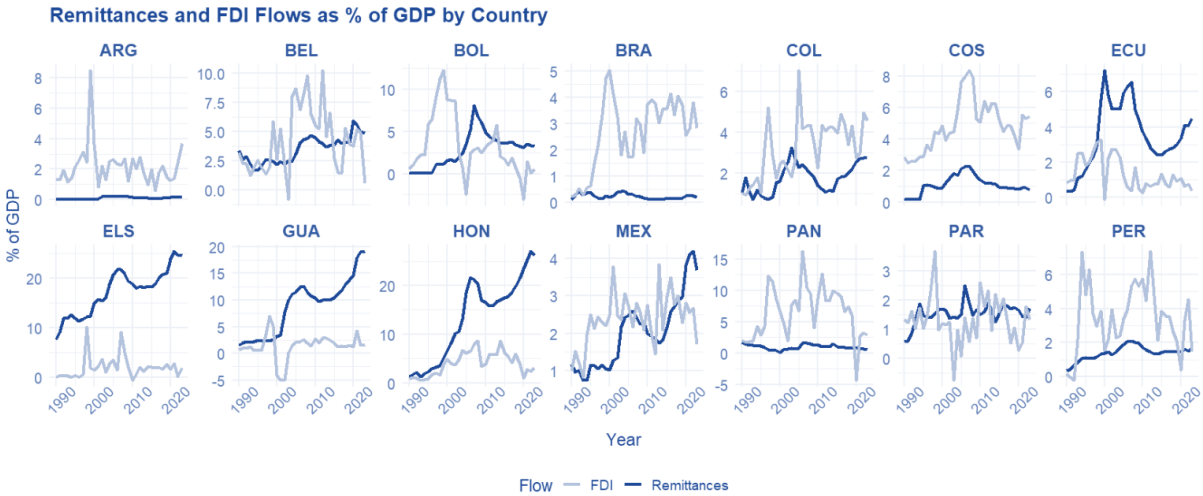
Figure 1: Distribution Migration Rate (%) by Country (1990-2023)



Source: Authors' compilation, data from World Bank Database (2025).

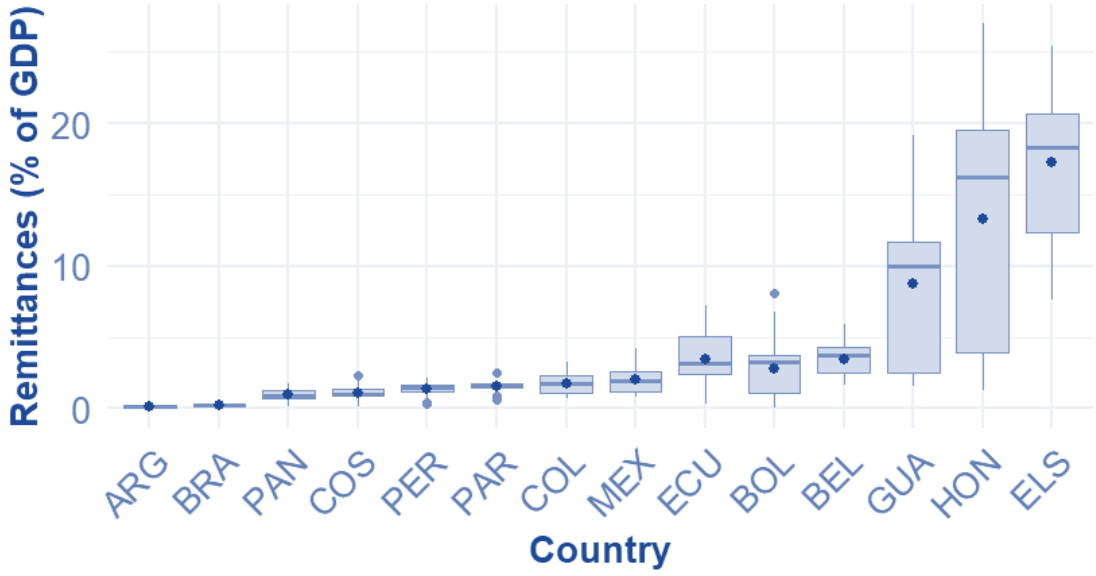
The evolutions of both the remittance and FDI inflows as % of GDP for each country in the region over the 1990–2023 period are represented in Figure 2. Comparison of these two forms of international financial flows shows higher volatility in FDI inflows compared to REM inflows. For most countries, remittances generally follow smoother trends, with only gradual increases or decreases, while the evolution of FDI is often marked with periods of high investment/disinvestment. The highest volumes of remittances (reaching up to 27% of GDP) were recorded in El Salvador, Honduras, Guatemala, and Belize–so-called high-remittance countries. However, most of the 14 Latin American countries have relatively modest remittance inflows, with median values around 1–2% of GDP (Figure 3). Median values for FDI inflows as % GDP are similarly low (approximately 2-3% of GDP), although some countries experienced peaks above 15% of GDP (Figure 4). The comparison of two time series confirms the higher volatility of FDI inflows compared to REM inflows across all observed countries. (Figure 2-4)

Figure 2: Remittance and FDI flows as % of GDP by country (1990-2023)



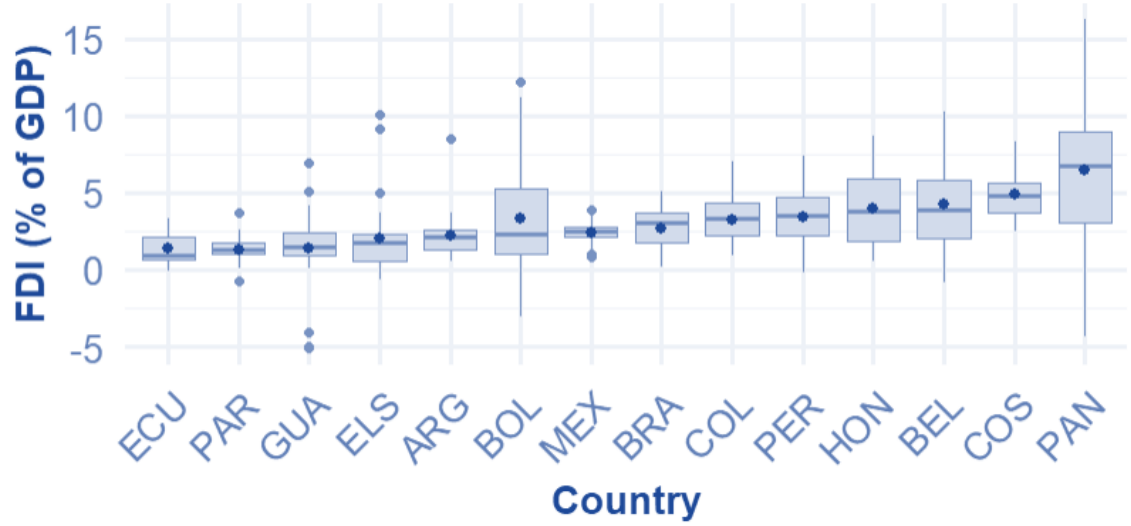
Source: Authors' compilation, data from World Bank Database (2025).

Figure 3: Distribution of Remittance as % of GDP by Country (1990-2023)



Source: Authors' compilation, data from World Bank Database (2025).

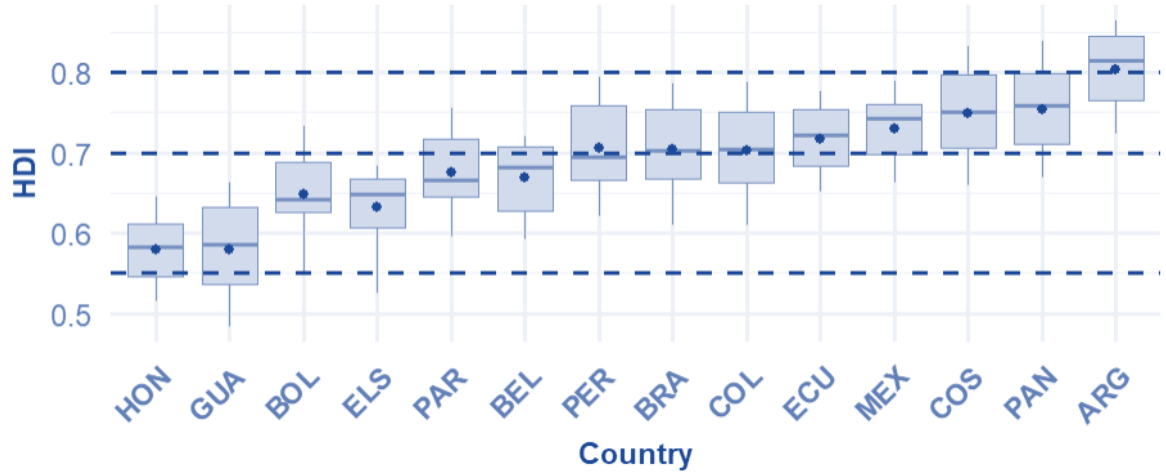
Figure 4: Distribution of FDI as % of GDP by Country (1990-2023)



Source: Authors' compilation, data from World Bank Database (2025).

The country-level HDI values are displayed in boxplots (Figure 5). The figure also shows the official thresholds for the four HDI levels as defined by the United Nations Development Programme (2025b), i.e., 0.55 for medium, 0.7 for high, and 0.8 for very high human development. In our sample, most countries cluster around a median of 0.688, nearing the UN's threshold for high human development. Argentina is the only country that could be considered as highly developed according to HDI levels, with both average and median values above the 0.8 threshold. In contrast, countries such as Honduras, Guatemala, Bolivia, and El Salvador fall into the medium human development category (HDI values below 0.7). We also note that countries with the lowest HDI levels during the observed period are also among the high-remittance countries, suggesting a potential relationship between these two indicators.

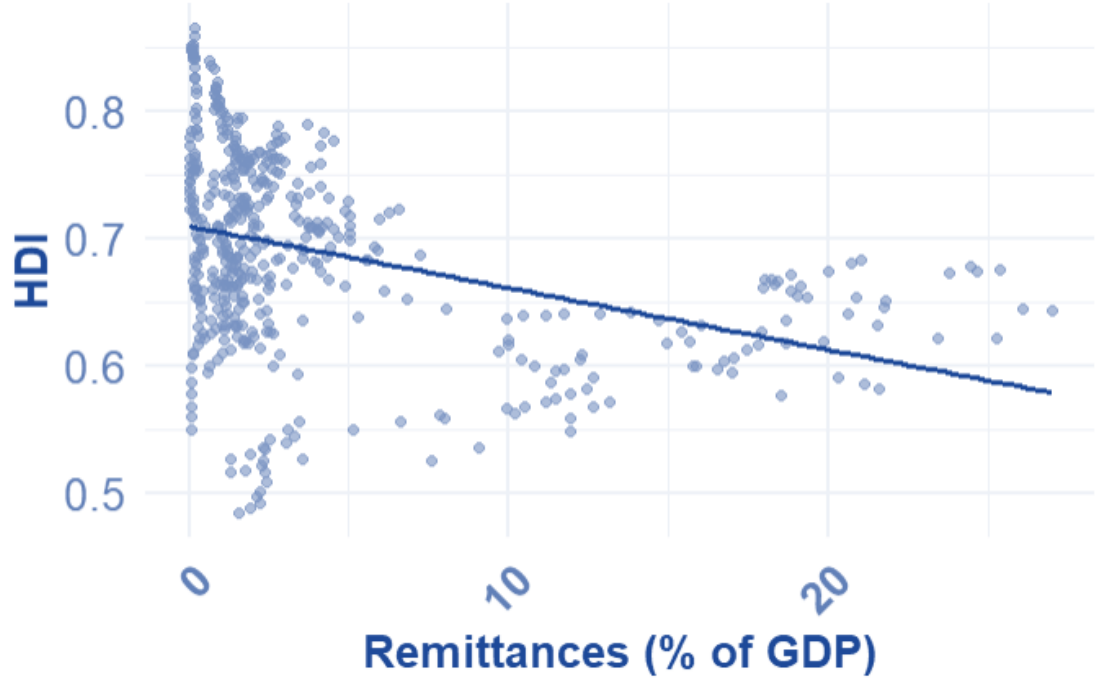
Figure 5: Distribution of HDI levels by c=Country (1990-2023)



Source: Authors' compilation, data from UNDP Database (2025).

To further explore these relationships, we examined the correlations between REM, FDI, and HDI at the country level. Scatterplots (Figures 6 and 7) reveal a weak negative relationship between REM inflows and HDI (Figure 6) and a weak positive relationship between FDI inflows and HDI (Figure 7). The slope in the case of REM suggests that remittance dependence is more characteristic for less developed countries, whereas more developed countries are less dependent on this source of financial means. In the case of FDI, the positive relation indicates that higher inflows of foreign capital are associated with higher HDI levels. Overall, neither variable appears to be a strong determinant of HDI in isolation, which points to the importance of broader economic and institutional factors as suggested, e.g., by Thi Cam Ha et al. (2023) or Daud et al. (2025).

Figure 6: Scatterplot of Remittances as % of GDP vs HDI (1990-2023)



Source: Authors' compilation, data from World Bank Database (2025).

Figure 7: Scatterplot of FDI as % of GDP vs HDI (1990-2023)

Source: Authors' compilation, data from World Bank Database (2025).

The next sections present estimates of both original and extended models.

Estimated Model

After the initial statistical analysis, we estimated a fixed effects panel regression model to test the impacts of remittances and FDI across different HDI levels. The first step of this analysis was to define three basic models, i.e., pooled ordinary least squares (OLS), fixed effects (FE), and random effects (RE) models. This was followed by standard tests to determine the most suitable model for our data set. For final model selection, we applied the F-test to compare pooled OLS and FE models, followed by the Hausman test to compare FE and RE models. Both tests indicated that the FE model provides the most reliable and consistent results for this data set.

The robustness check included standard diagnostic tests for normality, stationarity, heteroscedasticity, serial correlation, cross-sectional dependence, and multicollinearity. The results indicated the presence of heteroscedasticity, serial correlation, and cross-sectional dependence, which could potentially bias standard error estimates and affect statistical inference. To address these issues, Driscoll-Kraay robust standard errors were employed (Beylik et al., 2022; Akter et al., 2023). This approach corrects for heteroscedasticity, autocorrelation, and cross-sectional dependence and is appropriate given our data structure and focus on contemporaneous relationships.

Initial testing also revealed non-stationarity in several key time series, in particular for remittances, GDP per capita, and HDI. Such trends are often typical for macroeconomic variables that exhibit long-term growth tendencies. Economic theory suggests that these variables are expected to grow over time due to structural factors such as economic development or demographic changes (e.g., Stojanov et al., 2019). Since these trends reflect predictable long-term growth patterns rather than random fluctuation, they should not necessarily be considered problematic for the model. Therefore, no transformations (such as differencing) were applied to the data. This approach aligns with our emphasis on contemporaneous, rather than long-run dynamics. (Baltagi, 2021).

Table 2 presents the estimated coefficients of the FE model, showing the impact of the independent variables on HDI before and after the application of robust standard errors (Driscoll-Kraay). Although the coefficient estimates remained unchanged after robust errors correction, the significance levels of several variables were affected.

Table 2: FE Estimates Before and After Robust Correction

Variables	Coefficients FE Estimate / p-value	Coefficients FE (Driscoll–Kraay) Estimate / p-value
REM	0.00148 0.0001 (***)	0.00148 < 0.001 (***)
FDI	0.000765 0.0734 (.)	0.000765 0.1659
GDPPC	0.00001 < 0.001 (***)	0.00001 < 0.001 (***)
GOVEXP	0.00358 < 0.001 (***)	0.00358 < 0.001 (***)
GFCF	0.000133 0.6936	0.000133 0.7991
TRADE	0.000464 < 0.001 (***)	0.000464 < 0.001 (***)
POPGR	-0.03049 < 0.001 (***)	-0.03049 < 0.001 (***)
FCE	0.000051 0.8358	0.000051 0.9007
R2	0.847	0.847
F-statistic (overall p-value)	314.769 (p < 0.001)	robust SEs applied, no change in overall significance)

Notes: FE = Fixed Effects. Significance codes: *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors' calculations.

The panel regression results indicate that remittances (REM), GDP per capita (GDPPC), government expenditure (GOVEXP), and trade openness (TRADE) have a significant positive effect on the HDI, while population growth (POPGR) has a significant negative effect. In contrast, foreign direct investment inflows (FDI), gross fixed capital formation (GFCF), and final consumption expenditure (FCE) were not statistically significant.

The statistical insignificance of the two variables, GFCF and FCE, can be explained by their indirect effects on human development. Private investments represented by GFCF may increase future productive capacity but do not immediately improve education, health, or life expectancy, especially if concentrated in other sectors. Similarly, FCE, as an indicator of private aggregate spending, may target services that do not directly or immediately improve human development. Thus, improvements in these two domains are necessary but not sufficient for improvements in HDI. In contrast, remittances and FDI may have more important

and direct effects on households, which could explain the stronger and more significant impact of REM on HDI in the sample countries.

Overall, the results suggest that, compared to FDI inflows, remittances have a stronger and more consistent effect on HDI. These findings are consistent with previous studies, such as the study by Ustubici & Irdam (2012), who also found a positive correlation between remittances and human development. These results align with other studies showing that the effects of remittance can be either direct, improving welfare (Pan & Sun, 2024) and reducing poverty and inequality (Acosta et al., 2008; Anwar et al., 2024; Bare et al., 2022), or indirect, through increasing economic growth (Meyer & Shera, 2017; Stojanov et al., 2019) or government expenditures on education and health, which strengthens their developmental effects (Williams, 2024). Comparisons of REM and FDI impacts on HDI have also been explored by Driffield and Jones (2013), whose results contrastingly point to a significant contribution from both forms of external capital, although the relative magnitude varies across regions.

Heterogeneity Analysis (Two HDI Groups)

According to the UNDP (2025b), countries can be divided into four groups based on HDI level: Low HDI (< 0.550); Medium HDI (0.550-0.699), High HDI (0.700-0.799), and Very high (≥ 0.800). To account for heterogeneity across countries, i.e., differences in human development, the original model was extended by including interaction terms: REM × LowMed and FDI × LowMed (where LowMed = 1 for HDI < 0.700). This allowed us to analyse whether the impact of remittances and FDI on HDI differs between more and less developed countries.

Table 3 presents the group-specific effects of REM and FDI, with Driscoll-Kraay robust correction, based on the extended FE model. In this model, the main effects correspond to High/Very High-HDI countries, while the interaction terms capture the differences for LowMedium-HDI countries. The total effect for the group of Low/Medium-HDI countries was obtained by summing the corresponding β coefficients.

Table 3: Group-Specific REM/FDI Effects with DK Correction

Variables	High/Very High-HDI Estimate / p-value	Low/Med-HDI Estimate / p-value	Low/Medium-HDI total effect* Estimate
REM	0.00781 / <0.001 (***)	-0.00580 / <0.001 (***)	0.00201
FDI	0.00195 / 0.010 (**)	-0.00162 / 0.045 (*)	0.00033

Note: * Total effect for Low/Medium-HDI = main effect + interaction; REM = β1+β3; FDI = β2+β4. Estimates are based on the extended FE model. p-values are Driscoll–Kraay robust. (Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1)

Source: Authors' calculations.

According to these estimates, for the group of High/Very High-HDI countries, both REM and FDI have a positive and significant effect, with REM having a stronger impact. However, for the group of Low/Medium-HDI countries, the effect of REM is smaller but still positive (0.00201), while the effect of FDI is considerably weaker (0.00033). Additional testing (Wald test) confirmed that the differences between the two HDI groups are statistically significant for both REM ($p < 0.001$) and FDI ($p = 0.045$). We can conclude that the impact of both REM and FDI is stronger in higher-HDI countries. These results suggest that the level of development is a major factor influencing the effectiveness of both REM and FDI in promoting human development.

Our findings are consistent with prior studies showing stronger remittance effects in higher-HDI countries (e.g., Ustubici & Irdam, 2012) and weaker FDI effects in less developed countries or regions (Driffield & Jones, 2013). These patterns also align with studies suggesting that the effectiveness of REM and FDI in promoting human development depends on the level of development, as well as institutional capacity and quality (Thi Cam Ha et al., 2023; Daud et al., 2025). In higher-HDI countries, financial systems, governance, and public infrastructure (e.g., education and healthcare) are at a level that allows remittances to be more efficiently transformed into improvements in human development. This also aligns with Williams (2024), who identified a positive relationship between higher remittance inflows and increased government spending on human capital.

In addition, the estimates of the control variables were also compared between the original and extended FE models. (Table 4)

Table 4: Comparison of Coefficients for Control Variables

Variables	Coefficients – original model (FE DK) - Estimate / p-value	Coefficients – extended model (FE DK) - Estimate / p-value	Direction of change sign
GDPPC	0.00001 / < 0.001 (***)	0.000009 / <0.001 (***)	–
GOVEXP	0.00358 / < 0.001 (***)	0.003746 / <0.001 (***)	+
GFCF	0.000133 / 0.7991	-0.000122 / 0.803328	–
TRADE	0.000464 / < 0.001 (***)	0.0002792 / <0.001 (***)	–
POPGR	-0.03049 / < 0.001 (***)	-0.02491 / <0.001 (***)	+
FCE	0.000051 / 0.9007	-0.000178 / 0.575160	–

Note: "+"/ "–" = coefficient increased/ decreased in magnitude
Source: Authors' calculations.

In general, in both models, the coefficients for GDPPC, GOVEXP, GFCF, TRADE, POPGR, and FCE remain broadly consistent in magnitude and significance. The observed changes are minimal and do not affect the estimates or their significance. As expected, GDPPC and GOVEXP continue to show positive and highly significant effects, while POPGR remains negative and highly significant. TRADE also remains positive and significant, though its impact is slightly weaker in the extended model. By contrast, GFCF and FCE continue to be statistically insignificant in both of our models. These comparisons indicate that including interaction terms for REM and FDI does not substantially modify the estimated effects of the control variables. Overall, these results highlight that both REM and FDI contribute more strongly to human development in countries with better-developed institutions, stronger governance, and higher initial HDI. In lower-HDI countries, however, additional policy measures are essential to maximise the developmental impact of external financial flows.

Discussion and Policy Implications

This analysis shows that, in Latin America, remittance inflows have a stronger impact on human development in the group of High/Very High-HDI countries, even though Low/Medium-HDI countries tend to experience larger migration outflows and consequently rely more on remittance inflows. Similarly, FDI has a positive, though weaker, impact on human development, especially in low-HDI countries.

These patterns can be partially linked to differences in overall economic development and institutional efficiency or quality, factors that affect how effectively these financial flows can be transformed into improvements in health, education, and standard of living (Thi Cam Ha et al., 2023; Daud et al., 2025). In higher-HDI countries, financial systems as well as the education and healthcare infrastructures are typically more developed. What is more, governance and institutions are also generally more effective (Schiopu & Siegfried, 2006).

In addition, remittance inflows are often associated with increased government expenditures on education and health, which further strengthens their developmental impact (Williams, 2024). As a result, remittances can be more efficiently transformed into improvements in health, education, and overall well-being. In low-HDI countries, on the other hand, remittance flows are often used to cover primarily basic needs, which limits their wider impacts on human development. Moreover, in high-remittance countries, large inflows of capital may generate Dutch Disease effects by reducing the competitiveness of tradable sectors and crowding out productive investments. This further highlights the role of institutional quality in enabling FDI to effectively support industrialisation as well as overall structural transformation of domestic economies.

From a policy perspective, our findings suggest that reducing remittance transaction costs and improving the investment climate can enhance the impact of remittances-particularly in low-and medium-HDI countries. These countries should not only seek to attract external financial flows but also focus on improving institutions, governance, and human capital formation, as mentioned also by Pan & Sun (2024), Meyer & Shera (2017), and Thi Cam Ha et al. (2023). Strengthening financial infrastructure and promoting household investment in education and health are other ways to amplify the positive effects of remittances, as suggested also by Huay et al. (2019) or Driffield & Jones (2013).

Finally, these findings highlight the importance of recognising heterogeneity across countries. While financial flows such as remittances and FDI can improve human development, their effectiveness depends on pre-existing levels of development, governance, and institutional quality. Human development cannot rely solely on external financial inflows; targeted policy measures and investments in public infrastructure are essential to transform these funds into sustainable improvements in health, education, and overall well-being.

Conclusion

This study analysed the relationship between remittances, FDI, and human development in 14 selected countries from the Latin American region over the period 1990 to 2023. The findings confirmed that both studied forms of external capital (remittance and FDI) can contribute to increases in human development level. Nevertheless, the effect of remittance was stronger and more consistent, particularly in comparison to FDI.

The heterogeneity analysis revealed that these benefits are not evenly distributed: countries with higher levels of human development (above the 0.7 threshold) have better initial conditions for transforming these financial inflows into real improvements in education, health, and living standards. For lower-HDI countries (under the 0.7 threshold), remittances often serve to cover basic needs, which may effectively limit their potential to improve three domains of human development.

These findings highlight the importance of infrastructure, institutional quality and structural conditions in shaping how external funds can be transformed into improvements in HDI levels. As a result, policy strategies and particular measures should not focus solely on attracting remittance or FDI inflows. Instead, reducing remittance transfer costs should be considered, together with strengthening the investment environment.

To conclude, this analysis shows that foreign financial inflows alone are insufficient for consistent increases in human development level. Sustainable improvements in this domain require complementary economic policies, improvements in the quality of institutions, and targeted investments in education and the health sector. Future research could expand this analysis even further, for example, by examining additional regions, including institutional and governance indicators, or studying the sectoral impacts of financial inflows. Such extensions would further clarify the relationships and ties between migration, corresponding financial flows, and subsequent shifts in human development.

Credit Authorship Contribution Statement

Bartokova, L. contributed to the conceptualization of the research, development of the theoretical framework, design of the empirical strategy, and drafting of the original manuscript. She also supervised the overall analytical process and contributed to the interpretation of the results. Kovesdiova, V. was responsible for data collection and curation, panel dataset construction (1990–2023), econometric modelling and statistical analysis, as well as visualization of results. Both authors jointly contributed to the literature review, discussion of findings, revision.

Acknowledgements/Funding

This research did not receive any financial support.

Conflict of Interest Statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Data Availability Statement

The data that support the findings of this study were obtained from the World Bank's World Development Indicators database and are available at https://data.worldbank.org/ with open access.

Ethical Approval Statement

Ethical approval was waived due to the use of secondary data sources and the retrospective nature of the study. All data used were either publicly available or derived using custom text-mining scripts, and no human participants were involved.

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