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RESEARCH PAPER

The Effect of Remittance on Human Development in the Organization of Islamic Cooperation Member Countries: Evidence from DCCE AND CS-ARDL

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Abstract
This study examined the effect of remittance inflows on human development in the Organization of Islamic Cooperation (OIC) member countries from 1990 to 2018. The study applied second-generation techniques. Based on the results of the second-generation unit roots test, our variables had mixed stationarity. In addition, the result of the Westerlund cointegration technique showed that long-run relationships exist among the variables. In addition, the long-run and short-run coefficients from Dynamic Common Correlated Effects (DCCE) and Cross-Sectional Autoregressive Distributive Lags (CS-ARDL) techniques revealed that remittances inflows promote human development. Moreover, it was revealed that financial development and foreign direct investment inflows positively impact human development, while the short-run coefficients were statistically insignificant. The causality test results showed a unidirectional causal link between remittance inflows and human development and between financial development and human development. In contrast, a bidirectional causal link was demonstrated between foreign direct investment and human development. Therefore, the study concluded that remittance inflows promote human development in OIC member countries. The policymakers in OIC should consider policies that will attract migrant workers to send remittances to their home country.

Keywords: CS-ARDL, DCCE, human development, remittances.

Introduction

The movement of people from one country to another in search of better life and opportunities has various socio-economic and cultural implications. The amount of money, goods, or assets that migrant workers send to their households or families in their home countries are known as remittances inflows (Adams, 2011). The inflows of remittances significantly improve the receivers' lives, as it enables recipients' households to balance their unstable income-consumption constraints and promote human capital development and physical capital investments. It has been argued that migrant families are, in many cases, financially better off than households that have no members working abroad (Imran et al., 2018; Kamalu et al., 2019). Remittances are necessary injections of income into the home economies of overseas workers, particularly during economic downturns when they offer a substantial source of income for recipient households. By 2009, remittances had surpassed FDI in certain countries and formed a resource inflow in a broad group of developing nations that outpaced various other balance of payments movements (Nurse, 2018).

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What consequence do remittance inflows have on human development? Previous research has discovered substantial links between remittances and economic progress, which has benefited human development. Earlier theoretical work was founded on the New Economics of Labor Migration thesis, claiming that migration reduces risk in domestic and international markets. Furthermore, the optimistic school of human development, which arose from the neoclassical migration theory that remittances will boost development in recipient countries, underpins the link between remittances and human development (Huay, et al., 2019). Studies such as the seminal work of Üstubuci and Irdam (2012) demonstrated the impact of remittances on human development compared to foreign currency inflows such as Official Development Assistance (ODA, a term coined by the OECD), FDI, and exports, providing supporting empirical evidence. Sahoo, and Sethi, (2020) found evidence of a positive association between remittances and human development in a limited panel of sub-Saharan African nations, claiming that remittances are foreign currency financial flows that contribute to human development. Azizi (2018) found that remittances could enhance investment in human capital, improve health outcomes, and have a favorable and substantial influence on education in developing countries, based on data from 122 developing countries from 1990 to 2015.

However, the human development approach put people back at the center stage of developmental agendas, after decades in which a labyrinth of technical frameworks had overshadowed this basic dream. Human development refers to broadening and enlarging people choices that strengthen their capabilities "to do or be" what they aspire most in life (Sen, 1994). The most important objective of any development agenda is to provide opportunities for all people to attain the maximum level of happiness. Therefore, the concept of human development is considered "richer and deeper" in capturing the real development than other previously used indicators (Streeten, 1994), for instance, GDP per capita. Although people may vary in capabilities to transform the available resources at their disposal, to be and do what they aspire the most, examining the means alone without focusing on the end will provide misleading information. The capability approach to human development by Sen (1994) proposed a multidimensional approach to the concept of human development, which provided the framework used in constructing the human development index (HDI) considered as a better measure of wellbeing than the GDP/GNI per capita. The work of Streeten (1994) also stressed that human development should be promoted in an economy because human beings are the end in each other without the need for any justification. However, OIC member countries have a lower ranking in HDI, especially the lower- and middle-income countries. These countries are associated with lower life expectancy, higher rate of child mortality, lower level educational enrolment and attainment and highest level of human deprivations (SESRIC, 2019).

Therefore, remittances have been demonstrated to play an influential, if not determining, function as a source of human capital investment (Ghosh, & Parab, 2021), and remittances have been demonstrated to play an important, if not determining, function as a source of human capital investment (Ahmad, et al., 2015a; Ahmad, et al., 2015b; Ahmad, et al., 2015c; Alkousini, 2020; Sghaier, 2021). It is not uncommon for remittances to the family to be used to fund the schooling of younger siblings, or at the very least to keep them in school longer rather than becoming early earners or working in the family business. Still, the evidence is mixed, with a positive relationship between remittances and schooling in Egypt (Sami, & El-Aziz, 2018) but negligible in Moldova. In other ventures that eventually contribute to human growth, the funds might also be invested. Nonetheless, the link between remittances and human development in underdeveloped nations has received little research. Therefore, whether the rising trend in remittances has any influence on human development remains a mystery.

However, remittances are an essential source of foreign exchange for many developing countries and form a significant part of their GDP. Due to the stable nature of remittance inflows even in times of economic downturn and natural disasters, remittances inflows are found to stabilize the economy, thereby promoting growth and development (Matuzeviciute & Butkus, 2016). Remittances also positively affect poverty, inequality, human capital, and life expectancy (Adams, 2011), especially in developing countries. We attempt to shed light on this question by analyzing the link between remittances and human development in OIC member countries. More specifically, we examine the dynamic relationship between inflows from remittances and human development. This paper may give rise to additional recommendations for policymakers in OIC member countries. In addition, the study is significant as the OIC member countries receive a large amount of remittance inflows and have the lowest rankings in human development. Thus, examining the effect of remittances on human development could guide the policy makers in the region on how to design a policy regarding remittance inflows. This study employed second-generation dynamic panel techniques of analysis that are considered to be more powerful and less bias, in order to achieve its objective. The study used two-unit root tests: Cross-Sectional Im-Pesaran-Shin (CIPS) and Cross-sectional Augmented Dickey-Fuller (CADF) to determine the stationarity of the variables. Moreover, the study used Rees and Westerlund cointegration test to evaluate the long-run link among the variables. Furthermore, the study used DCCE and CS-ARDL techniques developed by Chudik and Pesaran (2015) to estimate the obtained model. This method is considered to be robust to various forms of errors in cross sectional dependency, non-homogeneous slope and any possible non-stationarity in the variables. Moreover, we conducted causality test developed by Dumitrescu and Hurlin (2012).

The rest of the paper is organized as follows. Section 2 will present the Literature Review, Section 3 Methodology, Section 4 Results and Discussions, section 5 Conclusion and section 6 Policy Implication.

Literature Review

Various studies in the literature have provided different explanations on how remittances affect economic growth and development. Economic growth is just one of the three dimensions of human development. The other dimensions, however, relate to human capital as well as a long and healthy life. Therefore, this work reviews literature related to these three dimensions, as the empirical works on the impact of remittances on human development are scanty. A thorough analysis was provided in Rapoport and Docquier (2005) on why migrants' workers remit to their home country. They came up with three theoretical reasons that include altruism, insurance, and investment. Families and community consider migrants' act of sending money or assets to help their household members as altruism. It is based on insurance when they transfer money or assets to protect family members against risk or financial shock and unforeseen adversities. Remittances are considered for investment purposes when migrants remit to their home country to purchase properties, stocks and equity or invest in physical capital. On the other hand, Brown and Poirine (2005) provided a "weak altruism theory" which argued that migrant workers remit to their families to repay for the investment they did on them in acquiring human capital. They also argued that a u-shape link might exist between the age of migrant workers and the decision to send money to families.

Moreover, the existing research emphasizes the mechanism through which remittances influence economic growth, but there is no evidence of remittances' direct impact on human development. According to Shelton, (2021) financial development is a conduit through which remittances positively affect growth by giving an alternative means to fund investment and

assisting in resolving liquidity difficulties. Sobiech, (2019) found that in 66 developing countries, an efficient banking system complements the favorable effect of remittances on economic growth. On the other hand, Abor, et al. (2021) examined the real exchange rate as the conduit through which remittances positively affect growth. Because human development is frequently a result of poverty reduction, it is critical to recognize the essential role remittances play in human development (Mohammed, 2021). Poverty and human development are linked, according to Gumede, (2021), who see poverty as a result of limited access to household spending on human development. Limited access to household spending on human development, such as the lack of or delays in obtaining vital healthcare, causes a decline in population health, which leads to lost income and denial of basic requirements such as food, housing, and health care, all of which contribute to poverty (Dahliah, & Nur, 2021). As a result, further research is needed to see a clear trade-off between remittances and human development.

From a theoretical standpoint, there are two contrasting perspectives on the impact of remittances on development, referred to as the optimistic and pessimistic perspectives, respectively. Remittances are seen as instruments to boost development by the former, while they are not seen as encouraging sustainable development by the latter. Early research (Boccagni, & Pérez Murcia, 2021; Amrith, 2022) backed up the gloomy perspective of remittances, claiming that money sent by migrant workers is mainly spent rather than invested. On the other hand, remittances were proven to be a significant source of investment expenditure in developing nations in recent research by Adams (2011). Remittances are viewed as a form of investment capital that may be utilized to fund entrepreneurial activity, improve competitiveness (Akanle, Kayode, & Abolade, 2022), provide education, and help people overcome negative income shocks. Studies have proven how remittances improve human development (Üstubuci & Irdam, 2012), indicating a similar shift in perspectives on human development. Migrants' money enables them to access better health care, education, and social security (Üstubuci & Irdam, 2012; Azizi, 2018). Using a fixed-effect model, Aregbeshola, (2022) demonstrated the critical influence of remittances on human development in 15 sub-Saharan African (SSA) developing nations, giving considerable evidence on the effect of remittances on human development. His findings revealed that remittance inflows have a crucial role in boosting economic activity by rising aggregate spending and allowing for greater access to vital social infrastructure such as education and healthcare, all of which improve the quality of life for people.

According to Adenutsi's estimations, a 10% increase in remittances boosts human development by 0.1 percent, implying that remittance inflows are important for promoting human development, because they provide additional income to the SSA region, allowing it to meet basic human needs like education, healthcare, and protection. Üstubuci and Irdam (2012) investigated the influence of remittances on human development using a new technique, applying the OLS to quantify the influence of remittances on human development. They compared the influence of remittances on human development to the effects of FDI and ODA using 32 randomly chosen nations, finding a positive link between remittances and human development. According to their empirical findings, remittances have a higher explanatory power on human development than FDI and ODA, because the money migrants send home avoids political obstacles and goes directly to households to raise living standards, including better education and healthcare essential for human development. In the Philippines, Albert, & Vizmanos, (2020) discovered that remittances had a favorable welfare impact on households, but in Peru, Berloffa, and Giunti, (2019) discovered a tangible link between remittances and health outcomes. These studies, however, do not address the issue of endogeneity.

The study of Azizi (2018) examined the effect of workers' remittances on human capital

and supply of labor in 122 developing countries and found that remittances inflows improve health care services and decrease mortality rate, thereby positively affect the supply of labor. Moreover, remittances inflows positively affect school enrolment rate and attainment in developing countries. Another study by Gyimah-Brempong and Asiedu (2015) evaluated the impact of remittances on investment in education in Ghana. The study found that remittances improve school enrolment in primary and secondary schools in Ghana. The exciting finding of this work was that remittance to a household headed by a female increases school enrolment more than a household headed by male counterpart. Therefore, the study concluded that remittances inflows negatively affect poverty in the long run via the channel of human capital. The study by Mozumdar and Islam (2013) found that remittance inflows to developing countries positively affect school enrolment and average years of schooling, thereby promoting human capital development.

The remittance inflows have been found to positively affect economic growth in 116 countries (Matuzeviciute & Butkus, 2016) and in six higher remittance recipients nations (Meyer & Shera, 2017). Another study by Kadozi (2019) investigated the effect of remittances on countries' economic growth in sub-Saharan Africa between 1980 to 2014. The study analyzed the debate on the channel of remittance on growth, using endogenous growth theory and the national income accounts model. The results indicated that two frameworks are complimentary in examining the remittance-growth nexus in sub-Saharan African countries. The results from the panel study revealed that remittance inflows were found to promote economic growth depending on the country's level of economic and financial development.

Borja (2020) examined the impact of remittances and corruption on five development indicators using a panel of 26 Latin American and Caribbean nations from 1985 to 2016. She discovered that remittances had a substantial impact on human capital indices, particularly in countries combating corruption. The two rounds of the India Human Development Survey, performed in 2004–2005 and 2011–2012, were used by Navita and Pal (2022). They used a model of Two-Stage Residual Inclusion. The findings revealed that migrant numbers were endogenous and positively impacted the overall remittances received by urban families. However, there was no link between the number of migrants and remittances in rural families. They also discovered that remittances for both rural and urban households were motivated by charity. In addition, for rural and urban households, there was some evidence of inheritance and insurance reasons. For 2005-2015, Mlambo and Kapingura (2020) utilized panel data with a sample of five SADC nations (Zimbabwe, Mozambique, Lesotho, Eswatini, and DRC). The researchers employed a fixed-effects model, a random-effects model, and a GMM method to assess the impacts of remittances and economic development. Remittances have a positive effect on economic development, according to their findings. This study showed that remittance inflows could help countries thrive economically. They suggested that the government might implement measures that facilitate the translation of remittances into economic development.

John et al. (2020) empirically examined the connection between foreign aid and remittances using current 1980–2016 data from 50 aid-recipient countries. They found a negative relationship between foreign aid and remittances using dynamic panel estimating approaches. Further examination of the transmission channels indicated that foreign aid enhanced remittance flows through expanding human capital through its powerful impacts on schooling. The human capital-led growth channel was successful in all nations (and sub-groups), but the assistance migration channel boosted remittances considerably only in LDCs. Aid typically replaced remittances, but it also enabled remittances indirectly through other transmission routes.

Noushad et al. (2020) used known and new data sources to investigate current trends, state-by-state shifting patterns, and drivers of low-skilled emigration from India to the Gulf

Cooperation Council. Furthermore, they looked at the developmental effects of remittances in India in considerable depth. They discovered that the Indian diaspora is growing worldwide, with migration patterns changing from backward Asian regions to comparatively advanced North America, Europe, and Oceania. When a state in India falls behind in terms of development and wellbeing, it tends to drive its labor into low-skilled migration streams, with a tendency to 'withdraw' when the state progresses. Poverty and unemployment are two of the most critical factors driving India's low-skilled emigration. Although there is little evidence that remittances directly influence GDP growth, their impact on development and wellbeing is tremendous. With general unemployment on the rise, a pro-migration foreign policy is an urgent requirement. Furthermore, encouraging young skill development might help sustain overall growth by increasing skilled emigration to North America, Europe, and Oceania. As a result, higher remittance inflows appear in the long run.

In the period 1990–2015, Emara and Mohamed (2021) investigated the relationship between global economic fluctuations and human development in Egypt as an open developing economy through four transmission channels, namely foreign direct investment (FDI), official development aid (ODA), remittances, and export earnings. The researchers employed a vector autoregressive model, which entails looking at impulse response functions and variance decompositions. Their findings showed that global economic fluctuations negatively impacted human development through four channels: ODA, FDI, export gains, and remittances. Furthermore, FDI is the most successful short-term transmission channel, whereas export profits are the most effective.

Asongu and Nting (2021) studied the direct and indirect links between financial development and inclusive human development in Africa. Two-stage least squares, fixed effects, an extended method of moments, and Tobit regressions were among the estimation approaches they used. The inequality-adjusted human development index was the dependent variable. All dimensions of the World Bank's Financial Development and Structure Database were taken into account. Their primary conclusion was that financial depth, activity, and scale enhance inclusive human development, but banks' incapacity to convert mobilized deposits into loans for financial access has a detrimental impact. Policies should be designed to strengthen the channels through which credit may be supplied to individuals and businesses. They also asserted that surplus liquidity problems caused by banks' failure to convert mobilized deposits into credit could be addressed by expanding the use of information sharing offices, which would minimize information asymmetry between lenders and borrowers.

In general, the studies mentioned above emphasize the impact of remittances on macroeconomic issues. However, there is limited evidence that remittances have a direct effect on human development. This study aims to add to the empirical literature on the association between remittances and OIC member countries human development. For at least two reasons, we believe our contribution is significant. Firstly, this paper addresses a lack of studies conducted on OIC member countries by assessing the relationship between remittances and human development from 1990–2018. Secondly, the present study differs from previous works by using the DCCE and CS-ARDL techniques to estimate our model to investigate dynamic relationships between remittances and human development.

Methodology and Data

Data and Empirical Strategies

This study aimed to analyze the effect of remittance inflows on human development in 57 OIC member countries. It used financial development and foreign direct investment as a

control variable. The study was done using annual panel data over the period from 1990 to 2018. The data were sourced from World Bank Development Indicators (WDI, 2020). Moreover, it used a second-generation approach. The primary function of this study can be expressed as follows:

$$HDI_{it}=f(RM_{it}, FD_{it}, FDI_{it}) \quad (1)$$

where HDI_{it} indicated the Human Development Indicator, RM_{it} signified Remittance, FD_{it} presented the Financial Development, and FDI_{it} indicated the Foreign Direct Investment, and *i and t* stood for cross-sectional and time, respectively.

Econometric Methodology

Cross-Sectional Dependence (CSD) Test

The empirical analysis starts with applying the cross-sectional dependence test among the countries to determine the suitable methods. The advantage of panel data analysis ranges from better degrees of freedom, greater efficiency of the estimates, and reduced occurrence of multicollinearity among the variables (Dabachi et al., 2020; Jakada et al., 2020). However, the risk of cross-sectionally dependent panels is very high due to the units' close proximities and the possibility of sharing common features. In the event of cross-sectional dependence (CSD) in the data, biased estimates and inferences will occur (Pesaran, 2004). To forestall this, the study engaged the Pesaran (2007, 2015) test for cross-sectional dependency (CD), which can be applied to small and large panels. The null hypothesis of no CSD, which can be rejected at the 1%, 5%, and 10% significance levels, is expressed as:

$$CD = \sqrt{\frac{2T}{\tau(\tau-1)}}\sum_{i=1}^{\tau-1}\sum_{j=i+1}^{\tau}\frac{(T-m)\breve{\aleph}_{ij}^{2}-E\left[\left((T-m)\breve{\aleph}_{ij}^{2}\right)\right]}{var\left[\left((T-m)\breve{\aleph}_{ij}^{2}\right)\right]} \quad (2)$$

where $\breve{\aleph}_{ij}^{2}$ is the similarity between the residues derived from the OLS estimate of each pair. In comparison, the CD measure suits the panel with a small transverse axis, a small-time dimension, and a broad cross-sectional dimension with a small-time dimension.

Slope Homogeneity Test

On the other hand, the validity of the non-constancy of slope homogeneity in the coefficients among cross-sections instigates the importance of slope heterogeneity (Adam et al., 2021; Ahmad et al., 2018; Jakada et al., 2020). For this reason, we employed the slope homogeneity test by Pesaran and Yamagata (2008). This test extends the Swamy (1970) test called the $\tilde{\Delta}$ test. While the former is applied to panels with relatively large/small cross-sections (N) to the time dimension (T), the latter is used to a relatively small cross-section. The modified version of Swamy's statistics is extended to both balanced and unbalanced data. The standardized statistics for unbalanced data is given by

$$\bar{\theta} = \sum_{i=1}^{\tau}\left(\breve{\rho}_{i}-\bar{\rho}_{WFE}\right)'\frac{G_i' J_t G_i}{\breve{\vartheta}_{i}^{2}}\left(\breve{\rho}_{i}-\bar{\rho}_{WFE}\right) \quad (3)$$

In Eq. (10), $\bar{\rho}_{WFE}$ represents the pooled slope coefficient weighted effect, while $\check{\rho}_i$ is the pooled OLS regression cofactor per unit. Besides, $\check{\vartheta}^2$ signified the evaluation of $\check{\vartheta}^2{}_i$, and J_t specified the uniqueness matrix. Furthermore, the consistent dispersion statistic Δ and the biased-adjusted dispersion $\bar{\nabla}_{adj}$ are stated as:

$$\bar{\nabla} = \sqrt{\tau}\left(\frac{\tau^{-1}\bar{\theta} - m}{\sqrt{2m}}\right) \tag{4}$$

$$\bar{\nabla}_{adj} = \sqrt{\tau}\left(\frac{\tau^{-1}\bar{\theta} - Y\ (\bar{p}_{it})}{\sqrt{var\,(\bar{p}_{it})}}\right) \tag{5}$$

Where $Y\ (\bar{p}_{it}) = m$ and $var\,(\bar{p}_{it}) = \dfrac{2m(T - m - 1)}{T + 1}$

Panel Unit Root Tests

Given the presence of cross-sectional dependence, the data is subjected to second-generation unit root tests to avoid spurious results (Ahmad et al., 2018; Jakada et al., 2020). The cross-sectional augmented Im-Pesaran-Shin (CIPS) and cross-sectional augmented Dickey-Fuller (CADF) tests developed by Pesaran (2007) are engaged. These techniques account for cross-sectional dependence among the constituent units. The equation for the CADF is stated as:

$$\Delta L_{i,t} = \pi_i + \omega_i L_{i,t-1} + \gamma_i \bar{L}_{t-1} + \delta_i \Delta\bar{L}_{i,t} + \varepsilon_{it} \tag{6}$$

Likewise, Pesaran (2007) stated the CIPS statistic as:

$$\bar{L}_{t-1} = \frac{1}{\tau}\sum_{i=1}^{\tau} L_{i,t-1}; \Delta\bar{L}_{i,t} = \frac{1}{\tau}\sum_{i=1}^{\tau} L_{i,t-1}\Delta L_{i,t} \tag{7}$$

$$CIPS\ (\tau, T) = \frac{1}{\tau}\sum_{i=1}^{\tau}(\tau, T)t_i \tag{8}$$

where, $(\tau, T)\ t_i$ indicates the t statistic of ω_i

Panel Cointegration Tests

The second-generation panel cointegration tests proposed by Westerlund (2007) are deployed to assess whether a long-run relationship exists among the variables. This technique is suitable for CSD's presence in the data (Ahmad, et al., 2015d; Ahmad, et al., 2015e; Ahmad, et al., 2015f; Umar, et al., 2015; Jakada et al., 2020; Jakada, & Mahmood, 2020; Alkhawaldeh, et al., 2020). The null hypothesis of no cointegration, which is rejected at the 1% and 5% significance levels. These outcomes further assert the presence of a long-run cointegrating relationship among the variables. Hence, a long-run relationship exists between energy consumption, economic growth (income), and environmental degradation (CO2 emissions) in the South Asian region.

$$\Delta L_{i,t} = \partial_i' \pi_t + \alpha_i \left(R_{i,t-1} - \gamma_i' L_{i,t-1}\right) + \sum_{j=1}^{m}\delta_{ij}\Delta R_{i,t-j} + \sum_{j=0}^{m}\beta_{ij}\Delta L_{i,t-j} + \varepsilon_{i,t} \tag{9}$$

where α_i is the error correction coefficient for each individual. Westerlund (2007) suggested two sets of statistics, including two groups of average statistics and two committees to inspect

the null hypothesis (no cointegration between variables). The statistics of Gτ and Gα are used to verify if cointegration occurs in at least one cross-sectional unit and are calculated as:

$$G_{\tau} = \frac{1}{\tau}\sum_{i=1}^{\tau}\frac{\breve{\alpha}_i}{\breve{Se}(\alpha_i)} \tag{10}$$

$$G_{\alpha} = \frac{1}{\tau}\sum_{i=1}^{\tau}\frac{T\,\breve{\alpha}_i}{1-\sum_{j=1}^{m}\breve{\alpha}_{ij}} \tag{11}$$

Statistics for Pτ and Pα are used to determine if the whole panel has cointegration; these are given in Eqs. (12) and (13):

$$P_{\tau} = \frac{\breve{\alpha}}{\breve{Se}(\alpha)} \tag{12}$$

$$P_{\alpha} = T\,\breve{\alpha} \tag{13}$$

Dynamic Common Correlated Effects

DCCE method developed by Chudik and Pesaran (2015) estimates the EC model (error correction). Atiku, Ismail, and Ahmad, (2021) implies that variables are exogenous and require feedback effects across observables, leading to severe consistency problems. The new approach offered by Chudik and Pesaran (2015) takes into consideration three key issues, the first issue being cross-sectional dependencies that can be overcome by taking the averages of the cross-sectional and lagging cross-sectional averages of dependent variables on the right side of the equation with independent variables. The second issue is parameter heterogeneity, which can be overcome using mean group process (Eberhardt & Presbitero, 2015). The third issue is dynamics that can be solved by incorporating the independent variable lag of the dependent variable into the model. The dynamic common correlated effects (DCCE) approach of panels solves all the problems mentioned earlier and offers more consistent estimates. The model in question consists of the following equations:

$$\begin{aligned} HDI_{it} &= j_i + \text{Ɪ}IHDI_{it-1} + q_1 RM_{it} + q_2 FD_{it} + q_3 FDI_{it} + \vartheta_{0i}^{'} EV_{it} + m_{it} \\ m_{it} &= \varnothing_i^{'} r_t + \varepsilon_{it} \\ h_{it} &= \frac{EV_{it}}{z_{it}} = jh_i + \gamma_i HDI_{it} + w_i^{'} r_t + \mu_{it} \end{aligned} \tag{14}$$

where i = 1 to N;t = 1 to T ; HD_{it} is a dependent variable that represents Human Development Index; RM_{it} is the measure of Remittance; FD_{it} is the measure of the financial development, FDI_{it} is the measure of foreign direct investment, and EVit denotes different explanatory variables for an extended model which includes, financial development, and FDI Also j_i signifies country-specific effects that are not observed; Z_{it} entails variables that depend on some common factors but are not dependent on the dependent variable. r_t are the country-specific sound effects of time extraneous factors that are not observed and reflect shocks that impact all newly industrialized countries of the same degree on a global level. ε_{it} is an error that is not associated with regressors. In addition, ε_{it} represents abnormal and unobserved shocks, and these errors are also weakly independent across countries and are also associated

in many ways. m_i signifies matrix for dynamic loadings, γ_i characterizes the vector of coefficients, and μ_{it} is a stationary process of covariance irrespective of μ_{it}. It is further assumed that vector entailing of factor loadings ($\emptyset_i$, m_i) as well as the coefficient such as $\Omega_i = \left(m_i, \mathrm{q}_1, \mathrm{q}_2, \vartheta_{0i}^{'}\right)$ follow the model below with a random form of coefficients.

$$\varnothing_i = \bar{m} + \cap_{0,i},\ \pi_{o,i} \sim IID\left(0,\ \theta_0\right)$$
$$\mathrm{VEC}\left(m_i\right) = \mathrm{VEC}\left(\mathrm{m}\right) + \cap_{m,i}, \pi_{m,i} \sim IID\left(0,\ \theta_m\right)$$
$$\Omega_i = \Omega + \cap_{\Omega,i}, \cap_{\Omega,i} \sim IID(0,\ \theta_\Omega)$$

The following mean group estimator equation was used to measure asymptotic variance

$$\bar{\Sigma}_{MG} = \frac{1}{N-1}\sum_{i=1}^{N}\left(\Omega_i - \Omega_{MG}\right)\left(\Omega_i - \Omega_{MG}\right)^{'} \tag{15}$$

We adopted the dynamic specific associated effect estimation technique (Chudik & Pesaran, 2015) for the estimation equation and used it as cross-sectional averages dependent variable HDI. Eq (16) model also contains the lag of the dependent variable as a reference for specific impact factors together with REM and the extended variables.

$$HDI_{it} = j_i + \mathrm{I}HDI_{it-1} + q_1 RM_{it} + q_2 FD_{it} + q_3 FDI_{it} + \vartheta_{0i}^{'} EV_{it} + \sum_{x=0}^{y}\gamma 1_{ix}\,\overline{HDI_{it-x}} + \sum_{x=o}^{y}\overline{\gamma_{1ix} RM_{it-x}} + \sum_{x=o}^{y}\overline{\gamma_{2ix} FD_{it-x}} + \sum_{x=o}^{y}\overline{\gamma_{3ix} FDI_{it-x}} + \sum_{x=o}^{y}\overline{\gamma_{8ix} EVHDI_{it-x}} + \varepsilon_{it} \tag{16}$$

where $\overline{HDI_{it-x}}$, $\overline{RM_{it-x}}$, , $\overline{FD_{it-x}}$, $\overline{FDI_{it-x}}$, $\overline{EVHDI_{it-x}}$ denotes the cross-sectional average of the dependent variable, and y represents the lags of the cross-sectional averages. Predictable variable $\overline{HDI_{\iota t-x}}$ is taken as explained variable because models with dynamics properties such as DCCE use lag as an explanatory variable (Chudik & Pesaran, 2015). It is, of necessity, particularly possible in various economic issues that if a causal relationship exists for a nation or an individual, it also occurs for some other region or country. In this case, the causality with NT observations can be checked more effectively in a panel setting.

Cross-Section Augmented Autoregressive Distributed Lags (CS-ARDL)

This study used CS-ARDL to explore the effects of remittance, financial development, and foreign direct investment on human development for sensitivity analysis. This approach is more effective and has more power since it tackles slope heterogeneity, endogeneity issues, and cross-sectional dependency. In addition, in the event of limited samples, the procedure gives correct results. Since the variables were not found to have an explanatory influence that could yield inaccurate and responsive estimates, CS-ARDL was a powerful approach to resolve this problem. This research used the CS-ARDL approach based on its evident presumptions. The equation of CS-ARDL is specified as:

$$\Delta HDI_{i,t} = \sigma_i + \sum_{j=1}^{q}\forall_{it}\Delta HDI_{i,t-1} + \sum_{j=0}^{q}\forall_{it}^{'}\Delta L_{i,t-1} + \sum_{j=0}^{q}\forall_{it}^{'}\Delta\bar{P}_{i,t-1} + \varepsilon_{ij} \tag{17}$$

Where

$$\bar{P}_{i,t} = \left(\overline{HDI_{it,}}\Delta\bar{P}_t\right) and\ L_{it}\left(RM_{it}, FD_{it}, FDI_{it}\right) \tag{18}$$

and,

$$\bar{P}_{i,t} = \left(\overline{HDI_{it,}}\Delta\bar{P}_t\right) and\ L_{it}\left(RM_{it}, FD_{it}, FDI_{it}\right) \quad (19)$$

where L is the set of explanatory variables such as RM, FD, FDI

Dumitrescu-Hurlin non-Causality Test

Finally, this study used Dumitrescu and Hurlin (2012) to establish causality between the variables. The Dumitrescu and Hurlin (2012) technique was adopted because it accommodates heterogeneity and cross-sectional dependence among the constituent units that make up the panel the Granger causality test does not have. Similarly, the technique is capable of providing reliable estimates for small sample data. Ahmad, et al., (2018) constructs the Dumitrescu and Hurlin (2012) model as:

$$\Delta HDI_{i,t} = \omega_i + \sum_{\sigma=1}^{\sigma}\partial_i^{(\sigma)}\Delta HDI_{i,t-\sigma} + \sum_{\sigma=1}^{\sigma}\tau_i^{(\sigma)}\Delta RM_{i,t-\sigma} + \sum_{\sigma=1}^{\sigma}\varnothing_i^{(\sigma)}\Delta FD_{i,t-\sigma} + \sum_{\sigma=1}^{\sigma}\aleph_i^{(\sigma)}\Delta FDI_{i,t-\sigma} + \varphi_{i,t} \quad (20)$$

$$\Delta RM_{i,t} = \omega_i + \sum_{\sigma=1}^{\sigma}\tau_i^{(\sigma)}\Delta RM_{i,t-\sigma} + \sum_{\sigma=1}^{\sigma}\partial_i^{(\sigma)}\Delta HDI_{i,t-\sigma} + \sum_{\sigma=1}^{\sigma}\varnothing_i^{(\sigma)}\Delta FD_{i,t-\sigma} + \sum_{\sigma=1}^{\sigma}\aleph_i^{(\sigma)}\Delta FDI_{i,t-\sigma} + \varphi_{i,t} \quad (21)$$

$$\Delta FD_{i,t} = \omega_i + \sum_{\sigma=1}^{\sigma}\varnothing_i^{(\sigma)}\Delta FD_{i,t-\sigma} + \sum_{\sigma=1}^{\sigma}\tau_i^{(\sigma)}\Delta RM_{i,t-\sigma} + \sum_{\sigma=1}^{\sigma}\partial_i^{(\sigma)}\Delta HDI_{i,t-\sigma} + \sum_{\sigma=1}^{\sigma}\aleph_i^{(\sigma)}\Delta FDI_{i,t-\sigma} + \varphi_{i,t} \quad (22)$$

$$\Delta FDI_{i,t} = \omega_i + \sum_{\sigma=1}^{\sigma}\aleph_i^{(\sigma)}\Delta FDI_{i,t-\sigma} + \sum_{\sigma=1}^{\sigma}\varnothing_i^{(\sigma)}\Delta FD_{i,t-\sigma} + \sum_{\sigma=1}^{\sigma}\tau_i^{(\sigma)}\Delta RM_{i,t-\sigma} + \sum_{\sigma=1}^{\sigma}\partial_i^{(\sigma)}\Delta HDI_{i,t-\sigma} + \varphi_{i,t} \quad (23)$$

where ω_i is constant across the time dimension, and σ means constant lag commands for all panel cross-sections. This enables $\partial_i^{(\sigma)}, \tau_i^{(\sigma)}, \varnothing_i^{(\sigma)}\ and\ \aleph_i^{(\sigma)}$ as autoregressive constraints and slope symmetries for differentiating the groups. Therefore, the model is a dynamic function with a dynamic coefficient that uses individual effects. The heterogeneous hypothesis of no-causality is the null hypothesis: ($H_0\ \partial_i^{(\sigma)}, \tau_i^{(\sigma)}, \varnothing_i^{(\sigma)}\ and\ \aleph_i^{(\sigma)} = 0 : \infty_{ij} = 1,..N$). The F-statistics and p-value, which indicate whether to reject or retain the null hypothesis, report the presence or no causality, respectively. The F value-statistics and probability value, which mostly implies if the null hypothesis is to be rejected or not, estimates the existence or no causality, respectively

Results and Discussions

This research first examined cross-sectional dependency in panel statistics, as it affects the robustness of later estimate findings if econometric techniques of the second generation are not used. In other words, the analysis used second-generation econometric methods for consistent long-term projections in the occurrence of cross-sectional dependency. Breusch, and Pagan, (1980). Lagrange Multiplier (LM) test can analyze cross-sectional dependence in Table 1. However, Pesaran (2004) claimed that the LM-test is insufficient if the cross-sectional dimension is high. The CD test was then proposed by Pesaran (2015). This research therefore applied a CD test in various countries (Pesaran, 2004 and 2015). The findings revealed that cross-sectional panel dependency was observed in Table 1 at a 1% significance level.

Table 1. Cross-Sectional Dependence Results

Variables	CD-test	P-value
$LHDI_{it}$	19.288*	0.000
LRM_{it}	17.20*	0.000
LFD_{it}	25.918*	0.000
$LFDI_{it}$	20.045*	0.000

Moreover, the research was used to test the slope homogeneity hypothesis using Pesaran and Yamagata (2008). Table 2 below indicates that the null slope homogeneity hypothesis was dismissed at a significance level of 1%, suggesting that slope heterogeneity existed. The proof of parameter heterogeneity and cross-sectional dependency indicated that in the analysis, conventional approaches such as PP, IPS, and LLC are not suitable because of cross-sectional dependency issues (Pesaran, 2007).

Table 2. Slope Heterogeneous Test

Variables	Delta	P-value	Adj	P-value
$LNHDI_{it}$	763.695*	0.000	805.005*	0.000

Additionally, this research used CIPS and CADF for Pesaran's (2007) second-generation unit root tests. Table 3 below revealed that all null hypotheses of unit roots vary in the first instance concerning CIPS and CADF unit root testing. Thus, the results indicated that FD and FDI were stationary at the I(0) level. In contrast, HDI and RM were not stationary at I(0), but were stationary at the I(1).

Table 3. Results Panel Unit root

Variables	CIPS		CADF	
	Level	First difference	Level	First difference
$LHDI_{it}$	-2.013	-4.228*	-2.235	-3.282*
	(-2.58)	(-2.69)	(-2.690)	(-2.690)
LRM_{it}	-2.207	-4.991*	-1.965	-3.794*
	(-2.58)	(-2.69)	(-2.690)	(-2.690)
LFD_{it}	-3.189*	-5.245*	-2.408	-3.902*
	(-2.69)	(-2.69)	(-2.690)	(-2.690)
$LFDI_{it}$	-3.189	-5.555	-2.878*	-4.462*
	(-2.69)	(-2.69)	(2.690)	(2.690)

This research avoided conventional measures of cointegration because the heterogeneity and cross-sectional dependency of the cointegration variables were not addressed. Instead, the analysis used a Westerlund (2007) cointegration procedure using error correction. Table 4 shows the results of the cointegration test. The findings showed that for all the four Westerlund statistics (Gć, Gα, Pμ and Pα), the null hypothesis of cointegration was not rejected. It demonstrated that all the variables were linked in the long run: RM, FD, FDI, and HDI. This is consistent with the finding of Kausar et al. (2019), which also found the existence of a long-run relationship between RM, FD, FDI, and HDI

Table 4. Westerlund ECM Panel Cointegration Tests

Statistics	Value	Z-value	Robust p-value
Gt	-5.123	-20.972	0.000
Ga	-19.953	-20.693	0.000
Pt	-11.360	-21.690	0.000
Pa	-14.866	10.212	0.000

* & ** represent 1% and 5% significant level

The model of this study was estimated using the DCCE method, and the results presented in Table 5 revealed that the long-run coefficient of remittance inflows was positive and statistically significant. This indicated that remittance inflows improve the level of human development in OIC member countries. In addition, this result was consistent with cointegration tests results for the long-run association between remittance inflows and human development. Moreover, the positive coefficient justified altruism, insurance and investment hypothesis proposed by Rapoport and Docquier (2005). The hypothesis states that migrant workers remit to support their family members or community (altruism), to protect them against unforeseen adversities and financial shocks (insurance), and for investment purposes to promote economic activities. These improve national output and income as well as people's welfare, hence promoting human development.

Nonetheless, the coefficient of financial development is found to be positive and significant in the long run. This shows that financial development explains the level of human development in OIC member countries. The result is consistent with our cointegration result that found a long-run relationship between financial development and human development. The results also confirmed the finance-growth hypothesis, where financial development is seen as the catalyst for achieving higher economic growth, promoting the welfare and human development. The long-run coefficient of FDI was positive and statistically significant, which was confirmed by long-run cointegration between FDI and human development earlier found in this study. The inflow of foreign capital informs FDI provided employment, helps transference of technology, and increases local production and national income, which positively correlate with human development. Nonetheless, this result is inconsistent with the findings of Kausar et al. (2019), who found a negative effect by FDI on human development. The short-run coefficients from DCCE estimation revealed that the coefficient of remittance inflows (ΔRM) is positive and significant. At the same time, the other explanatory variables – financial development (ΔLFD) and FDI (ΔLFDI) – were insignificant. Importantly, the coefficient of error correlation term is negative and significant, revealing that the deviation from the long-run mean will be corrected by 37.5 percent each year.

The remittances coefficient estimate for HDI fulfils our predictions and is consistent. In OIC member countries, the effect of remittances was found to be statistically significant and positive. According to the significant coefficient of remittances, increased remittance inflows are crucial catalysts for human growth when other variables are held constant. Migrant workers' money goes a long way toward rising investment and consumption, both of which have a favorable impact on HDI components. For remittances, the coefficient estimate was positive and significant. An increase of 10% in remittances would result in a 0.92 percent rise in human development. These findings are in line with those of Üstubuci and Irdam (2012), and Kamalu, et al., (2019) who discovered evidence that remittances are positively connected with human development levels and boost it.

In particular, the lagged HDI value recorded of -0.237 signifies a 23.7% correction of annual HDI in the OIC countries in total. The approximate CS-ARDL model showed a positive signal of robustness for the panel in general. This is due to the statistical importance of the F-test first for the panel, which means that the results will sufficiently match the model. Additionally, the R2 values for the panel were high, suggesting significant variables in the dependent variable (HDI). The predicted panel model's RMSE values were, finally, below 0.08 and implied a strong predictive ability for the model to predict the dependent variable. The CS-ARDL framework was used to validate that the DCCE approach was robust. CS-ARDL and DCCE methods exhibited very close indicators of long-term evaluations. However, the magnitudes were a bit different. Compared to the CS-ARDL coefficient, the value of the DCCE process was higher. The outcomes of the CS-ARDL method showed that

remittance, financial development, and foreign direct investment are vital factors in OIC countries' human development index. Table 7 explains the findings based on the CS-ARDL estimator.

Table 5. Panel Data Estimation Results

Dependent variable: $LNHDI_{it}$						
	DCCE			CS-ARDL		
	Long-run estimates					
Variables	**Coefficient**	**Standard error**	**P-value**	**Coefficient**	**Standard error**	**P-value**
$LNHDI_{it}$	-0.237* [-29.63]	0.008	0.000	-	-	-
LRM_{it}	0.172* [6.62]	0.026	0.000	0.251* [3.26]	0.077	0.000
LFD_{it}	0.3264** [2.31]	0.141	0.016	0.612* [5.67]	0.108	0.000
$LFDI_{it}$	0.072** [2.48]	0.029	0.038	0.122** [2.71]	0.045	0.011
	Short-run estimates					
ΔLRM_{it}	0.039** [2.05]	0.019	0.049	0.158* [6.87]	0.023	0.000
ΔLFD_{it}	-0.019 [-0.20]	0.093	0.824	-0.164 [-0.93]	0.176	0.288
$\Delta LFDI_{it}$	0.015 [0.144]	0.004	0.972	0.044 [0.233]	0.189	0.743
ect_{t-1}	-0.375* [-5.68]	0.066	0.000	-0.568* [-47.33]	0.012	0.000
F-stat	8.432*	-	-			
R^2	0.58	-	-			
ROOT MSE	0.047	-	-			

* & ** represent 1% and 5% significant level, and [] is the t-statistics

The study conducted the panel causality test proposed by Dumitrescu and Hurlin (2012). The result presented in Table 6 showed that remittance inflows and financial development were unidirectional causal links with human development. In contrast, there was bidirectional causality between FDI and human development. The unidirectional causality between remittances and human development proved our DCCE result and cointegration test results. Our results confirmed the argument that remittance inflows ease income-consumption constraints of the recipients; it is also used to acquire human capital and health care services, which promote human development.

Table 6. Dumitrescu and Hurlin Non- Granger Causality Test

Variables	**W-bar**	**Z-bar**	**Z-bar tilde**
		3.94*	3.39*
$LRM_{it} \rightarrow HDI_{it}$	7.39	(0.0000)	(0.0000)
$LRM_{it} \leftarrow HDI_{it}$	6.27	2.89	2.36
		(0.745)	(0.367)
		3.51	3.02*
$LFD_{it} \rightarrow HDI_{it}$	6.58	(0.0000)	(0.0000)
$LFD_{it} \leftarrow HDI_{it}$	6.87	17.43	14.76
		(0.182)	(0.103)
		28.22*	23.89*
$LFDI_{it} \rightarrow HDI_{it}$	6.29	(0.0000)	(0.0000)
$LFDI_{it} \leftarrow HDI_{it}$	5.8729	26.014*	21.988*
		(0.000)	(0.000)

Conclusion

This paper examined the effect of remittance inflows on human development in OIC member countries. We conducted various tests, including homogenous, cross-sectional, unit root, cointegration, and causality tests. We estimated our model using the second-generation DCCE method of analysis. The results revealed a long-run relationship among remittances, financial development, FDI, and human development in OIC member countries. We also found that remittance inflows, financial development, and FDI positively and significantly affect human development. Moreover, the causality test indicated the unidirectional causal link between remittance inflows and human development a well as unidirectional causality between financial development and human development. The bidirectional causality was established between FDI and human development. Based on these results, we concluded that remittance inflows, financial development, and FDI promote human development in OIC member countries. It is vital to note that the optimistic perspective of remittance as a vehicle for development supports the conclusions of this article. According to the positive effects of remittance on human development, remittance increases income, allowing improved access to health care, education, and social security.

Policy Implication

Our results have several policy implications. Policymakers who want to improve the benefits of remittances for the poor can address institutional flaws by reducing the number of official visits to public offices to complete legal procedures, moderating restrictions on property rights documentation, and stopping the practice of abrupt and unannounced policy changes, particularly in the exchange rate and monetization. Furthermore, remittances should be welcomed into recipient nations with minimum government intervention and ongoing reductions in transfer costs. Besides, the financial industry should create places and mechanisms to help the disadvantaged meet their financial requirements. Simultaneously, the government should encourage financial literacy and invest in infrastructure to expand financial intermediaries in rural and distant regions. Governments may significantly help in forming local credit unions that would adapt financial instruments to the needs of remittance-recipient households.

In addition, policymakers should consider reducing the cost of sending remittances across member countries, encouraging migrant workers to remit through formal channels. This will promote human capital development, longer life, and decent living in member countries. Moreover, the floating exchange rate is essential in encouraging foreign workers to send money to their home country to support their families. Therefore, policymakers of top remittance-recipient OIC member countries should devise an excellent policy to manage the exchange rate regime and attract more remittance inflows. Moreover, the free movement of production factors should be encouraged within the OIC members so that labor and capital can freely move, which will improve the level of remittance inflows and harmony among member states. It is advised that governments in emerging nations establish a structured financial system to guarantee that remittance services are more widely available and have reduced transaction costs. Migrants are discouraged from remitting money to their home countries due to high transaction costs and currency rate volatility, encouraging migrants to transfer remittances through informal channels.

Additionally, remittances and the movement of remittances through formal channels would be encouraged by a standardized financial system and lower transaction costs. It is also crucial for policymakers to know the exact rate at which remittances are increasing. However,

to maintain and increase human development, a combination of relevant and complementary policies that go beyond remittances must be implemented. Policymakers must also consider human development indicators as drivers for human development. The study implies that public policies may encourage and enhance human growth by promoting income, health, and education. The additional variables influence human development as well. Policymakers should rely on other macroeconomic variables (such as government expenditure and financial development) in addition to remittances to stimulate human development in OIC member countries. Effective measures must be put in place to maintain a safe financial market and increased government efficiency in order to boost human development and productivity. Because remittances are interconnected and are commonly considered options to enhance living standards and alleviate poverty in developing countries, the study might be expanded in future work to assess the influence of migration on human development (Azizi, 2018). Having access to a more specific measure of migration, future research will be able to address this. Another issue that has to be addressed is endogeneity.

Although the DCCE and CS-ARDL techniques address specific concerns such as endogeneity, heterogeneity, and measurement errors, some of the explanatory factors, particularly the remittance variable, cannot be eliminated. In our model, it is shown that remittances and a country's economic success are positively associated with one another and with the level of human development. This indicates that a nation with a poor economy will get more remittances from its émigrés. Future research should focus on the economic performance variable as well as other relevant remittance-related factors.

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