Does Remittance Promote Socio-Economic Development? Evidence from Bangladesh

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Abstract

Bangladesh is promoting remittance inflows as it has become one of the main sources of foreign exchange. This paper investigates how remittances promote socio-economic development in Bangladesh by using the time series data for the period of 1990-2020. Unit root test shows that all variables are stationary at first difference. That is, integrated of order one I(1). The long-run relationship is ensured by the Johansen Cointegration approach. Finally, we use Vector Error Correction Model (VECM) to estimate the impact. The results confirm that remittances and HDI in Bangladesh are interrelated long-run. The long-run coefficient indicates that an increase in remittance inflow will promote socio-economic development measured by HDI. For the disaggregate Level, we examine the impact of remittances on per capita GDP, life expectancy, and years of schooling. In the long run, remittances promote per capita GDP, life expectancy, and years of schooling.

Keywords: Human Development Index, Remittance, VECM

1. Introduction

Remittance flows and Diaspora seem to be noticed as growing arguable news in the case of economic progress within the modern world. In contrast, the latter term root traces back to the known history of human civilization. Migration for seeking better life and earnings has risen robustly over the past few decades, and the estimated number of persons living outside of their origin country reached 281 million in 2020, of which 108 million labor migrants, 17 million asylums, and forcibly displaced 34 million (United Nations, 2020). Despite the slower recent growth of migrants due to the adversities of the COVID-19 pandemic, the importance of foreign incomes on remittance inflows never fades away.

Many reasons involving a large volume of migration, are termed as labor or family shift, political refugees, compulsion, or exile, whereas assisting homeland beneficiaries is regarded as the primary cause against leaving their native land. Expatriates play a significant role in bringing prosperity to their countries of origin by providing foreign earnings, known as remittance inflows. Bangladesh, a Least Developed Country (LDC) from the third world, is one of those economies that highly benefitted through inward remittances to maintain macroeconomic stability progress.

Remittances are part of migrant income privately wired to their home country from their employment country. According to the International Monetary Fund (IMF), Expatriates' remittances refer to the monetary transfers from individuals residing abroad for over one year to their home country and are documented in various components of the Balance of Payments (BoP). Inward remittances are targeted to the specific needs of the recipients to reduce poverty, and probably for that reason, inflows to developing countries have experienced a steady increase for the last four decades.

Each year, there is recorded a USD 186.4 billion increase on average in the inflows. World remittance inflows also enhanced continuously with little variation and

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stood at USD 701.9 billion in 2020 (World Bank, 2021). Chart-01 shows increasing growth in inflows during 1980-2020 of Low-and-Middle-Income Countries (LMIC) and Globally. This bulge in remittance inflows has inclined researchers and academicians to identify and procure secondary income sources' influence in different aspects of the recipient and sender economy.

Many case researches scrutinize inward remittance's impacts on recipient countries in different subject areas, whereas notable sectors are: growth and remittance (Pal *et al.*, 2022) poverty reduction and remittances (Banga & Sahu,2010) financial improvement via remittance (Aggarwal & Peria, 2006) migrant labor and dutch disease (Basnet *et al.*, 2019) brain drain problem of remittances (Iravani, 2011) political relevance of remittances (Williams, 2017).

Besides, remittances to human capital improvement (Azam & Raza, 2016) influence education, health, and per capita income (Anwar & Cooray, 2015., Amega, 2018) for developing countries perspectives are carrying higher importance. So, these points influences require further research and more clarity for recipient aspects. However, few studies have been done on influences on sender nations' outward remittances (Alsamara, 2022) that also require further quantitative exploration.

The significance of remittances respective to Balance of Payment (BoP) stability, improving external credit worthiness, and enhancing internal demands are evidenced strongly for developing nations. The potentiality of this private income is enormous in many sub-sectors. It is an essential reliable source for foreign funding and maintaining macroeconomic sustainability. Remittances stimulate the economy by broadening financial functionality with necessary external resources and promoting economic advancement. 'Migrants' remitting incomes and economic growth proved to have a causal bi-directional relationship (Islam, 2021).

Furthermore, remittances act as a solid resource basis for raising human capital, and financial inclusion with progressing health and education. Migrants' incomes could improve life standard of recipient communities and households by facilitating infrastructure in knowledge, sanitation and other socioeconomic indices. As beneficiaries spend foreign receipts on consumption and savings, which may foster employment generation and inclusive growth. Mozumdar and Islam (2017) found an affirmative remittance impact to be global and regional human capital development.

Pandemic stagnation and lockdown from COVID-19 hinder and lowered estimated inflows of remittances. However, quick recovery from adversities, the flow returns to the level of pre-pandemic surge in 2021. Chart-02 shows the top LMICs recipients of the remittances flows in 2021. Bangladesh, with larger unskilled labor migrants, retained the seventh highest recipient position among top 10 LMIC nations in 2021 (Migration and Development Brief-36, World Bank).

Despite the onset of COVID-19 in 2020, only Bangladesh and the other two nations (Mexico & Pakistan) experienced a rise in remittance flows among the prominent most recipient nations (The Economist Intelligence Unit, 2021). In South Asian region, Bangladesh scored the third highest remittance flow (2.2 percent growth and US$22 billion) in 2021. Forgovernment initiatives (specially 2.5 percent cash incentive for inward remittance through legal channels) enhanced the flows in Bangladesh essentially.

Remittance inflow works as the second most significant contributor to foreign earnings for Bangladesh, and preventing extreme hunger and unemployment problem. As ratios of GDP and export earnings, remittances stood at 6.03 percent and 67.14 percent as of FY21 (Bangladesh Economic Review, 2022). Foreign exchange reserve has reached to arobust position on the basis of higher migrant earnings in Bangladesh. Mentionable Bangladeshi labors are employed in Middle-East countries and many other countries worldwide.

As a densely populated nation, Bangladesh faces numerous problems, such as a higher mortality rate, low education and health amenities, poorer income, inequality and worse living standard. With migrants forwarding earnings help to decrease people hardship.

Ensuring socioeconomic well-being of Bangladesh, impacting socio-economic indices such as human development, education, health, growth, and percapita income are needed to explain statistically from the influence standpoint ofinwards remittance.

With this discussion in mind, this study searches for significant socioeconomic development impacts by remittance flows in Bangladesh. For that purpose, this paper addresses main two questions: How do remittances influence socio-economic development as assessed by HDI? And To what extent can the remittances in Bangladesh affect mortality rates, Literacy rate, and per capita GDP? Therefore, answering empirically seems crucial for evaluating workers' remittances' overall impact on Bangladesh's economy and major socio-economic indicators, HDI, health, education, and Income.

The formation of this study paper goes as: with a brief introduction, a short denote on Bangladesh's economy and remittances flows will be in Section 2. After that, Section 3 provides detailed background literature. Then, methodology and data selection will be described in Section 4. After that, Section 5 exhibits empirical findings with result discussion, whereas Section 6 summarizes the study in conclusion.

2. Bangladesh Economy and Remittance Flows

Bangladesh, a poor yet developing scenic beauty, is undoubtedly considered one of the fastest-growing economies with plenty of profound potential in South Asia and the world. After the initiation of Wage Earners' Scheme in 1974, valuable foreign assets earning through migrant workers became very popular. However, export earnings from goods and service is the first source of foreign income, whereas external aid and loan also carry a significant share.

Bangladesh is endowed in abundant un-skilled or semi-skilled labor with higher demographic density. This considerable human asset has made this country a significant manpower-exporting nation. In 2021, of the total labor migration less skilled labor migration was

76 percent in Bangladesh and destination-wise labor migrants were 74.1 percent to the Kingdom of Saudi Arabia (KSA) (Bureau of Manpower, Employment, and Training-BMET).

The number of migrant laborers from Bangladesh has noticeably enhanced because unskilled migrants are less costly for employer countries. In FY21, about 2.8 lakh workers migrated from this country, and inward remittances stood at USD 24.8 billion (6.0 percent of GDP). So, it implies remittance has turned out to be a significant contributor to this economy with enriched influence on piling up foreign exchange reserves, reducing poverty, and offering a healthier standard of living to beneficiaries. Chart-03 and 04 show increasing trends of remittances per capita and inflows as a share of GDP size in Bangladesh.

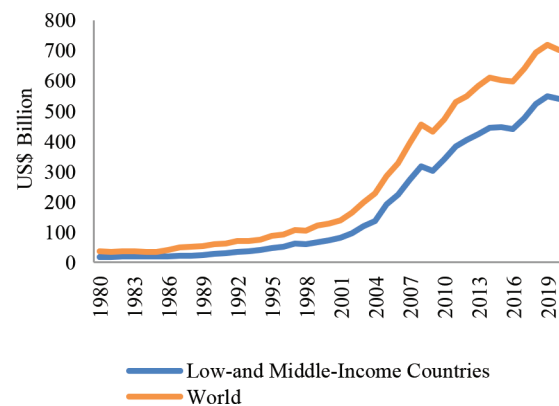On the demand side, Bangladeshis improving day by day. Since independence, with a low level of

Chart 1. Migrant remittance inflows.
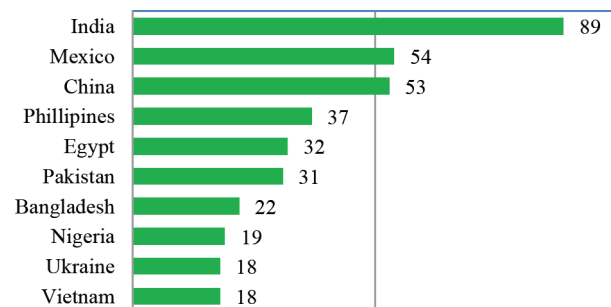Source: The Global Knowledge Partnership on Migration and Development, KNOMAD

Chart 2. Top Recipients LMICs (billion USD), 2021.
Source: Various issues of Migration and Development Brief, World Bank Group, KNOMAD

resources macro-economy of this country stayed behind compared with neighboring nations for the first two decades. Public poor health, low education, and inequality were highly presented and larger unemployment was hindering development programs. However, this economy experienced major changes by turning higher-populating unemployment into less expensive labor migrants. Bangladesh has improved over the last three decades with more significant support since its migrating labor is increasing and so is inward remittance.

In 2021, the GDP growth of Bangladesh ranked second (6.9 percent annually) among South Asian countries (IMF). With impressive economic growth, Bangladesh is gradually progressing in Human Development Index (HDI). Bangladesh is positioned 129th out of 191 countries in HDI (HD report, 2021/2022). About 24.9 percent of the Government budget is spent on sectors related to human development, namely education, health, family welfare, women and children, social welfare, labor, and employment. (Budget 2021-22).

Bangladesh's socioeconomic development is running at a fast pace, with increasing migrant earnings for the past few years. So, uses and influences from remittances are needed to be analyzed thoroughly, with socioeconomic impact models from remittance flows. Socioeconomic development is measured with crucial indicators, such as GDP size and growth, income equal distribution, and aggregate demand with notable private-sector investment. Besides life expectancy, health, and sanitation, literacy rate and per capita income, and employment levels also carry much weight in that measurement. In practice, the HDI index, mortality rate, secondary school enrolment, and per capita income are utilized to imply socio-advancement and economic growth may be applied for progress indicators in the calculation. The dependency study of socioeconomic development and remittances would assist a country's appropriate authority of policy setup and implementation highly.

3. Literature Review

Initial research on the effects of remittances on human capital (including health and education), financial development, poverty and inequality, and exchange rates failed to account for the endogeneity of remittances. Nevertheless, contemporary research on the influence of remittances on many characteristics of families and nations that receive them acknowledges the inherent endogeneity of remittances. Various techniques are used to address the issue of endogeneity in remittances.
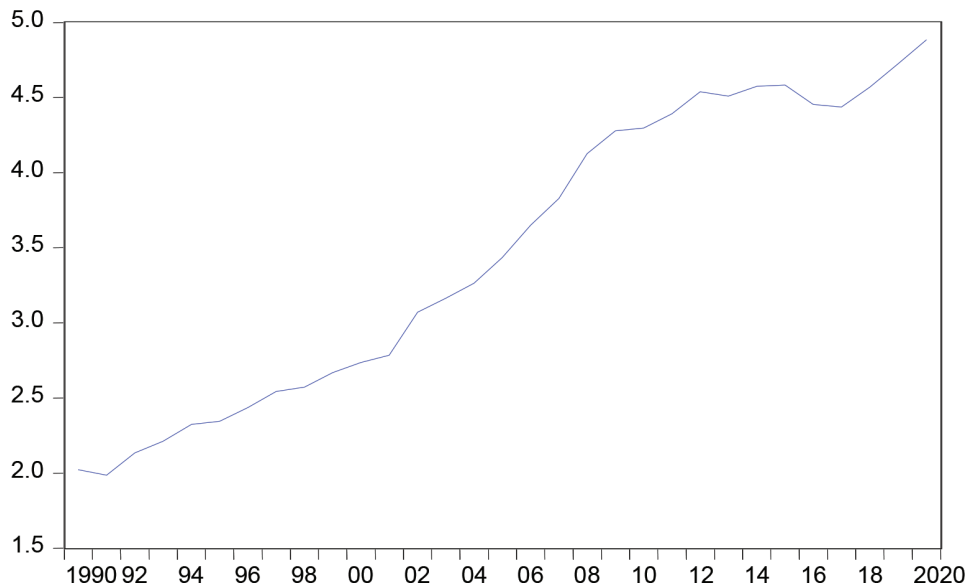

Chart 3.   Trends of Remittances per capita in Bangladesh.

Source: WDI, World Bank

Given the significance of the endogeneity problem, writers place particular emphasis on the instruments used. To address the issue of endogeneity, we included the lagged GDP as an independent variable in our regression model.

Remittances and economic growth and development are highly associated in all countries that receive remittances. Siddique *et al*. (2012) examined the cause-and-effect connection between remittance and economic growth in three South Asian nations: Bangladesh, India, and Sri Lanka. The study used data from 1976 to 2006. The research used economic methodologies, including unit root, co-integration, and causality tests, to ascertain the causal connection between remittance and growth. The empirical findings revealed distinct causal relationships for each nation. In Bangladesh, a unidirectional causal link has been identified between remittance and economic progress. However, causal relationships have yet to be detected in India. Conversely, the two-way causal relationship refers to the connection between the rise of remittances and the economic development of Sri Lanka.

Several observations have shown that remittance has had a detrimental effect on economic development. Sutradhar (2020) examines the influence of remittances on the per capita GDP of Bangladesh, India, Sri Lanka, and Pakistan, all of which are South Asian nations. The study included the time frame from 1970 to 2016 and used several statistical models, including Polled OLS, fixed effect, random effect, and dummy variable interaction model, to quantify the impact of remittances. The empirical findings yielded a heterogeneous impact of remittances on economic development in the four South Asian nations over the analyzed timeframe. The remittance had a detrimental effect on the per capita GDP of Bangladesh, Sri Lanka, and Pakistan, but it had a beneficial impact on India.

Remittance is crucial for many families' survival, and many developing nations substantially depend on migrant workers who send money back home. In addition, remittance has played a vital role in augmenting the income levels of nations and making significant strides towards eliminating poverty. Ustubici and Irdam (2012) investigated the influence of remittances on human development in poor countries. The researchers are using a quantitative analytic methodology, utilizing Ordinary Least Squares (OLS) approaches, to examine the connections between remittance and human development throughout the period spanning from 1990 to 2005. The statistical analysis of this research study demonstrated that remittances had a favorable effect on human development in poor nations. Additionally, the research revealed that remittances have a more crucial role in human development than foreign inflows, Foreign Direct Investment (FDI), Official Development Assistance (ODA), and exports.

According to Guha (2013) when families get more money from sources other than wages, such as remittances,
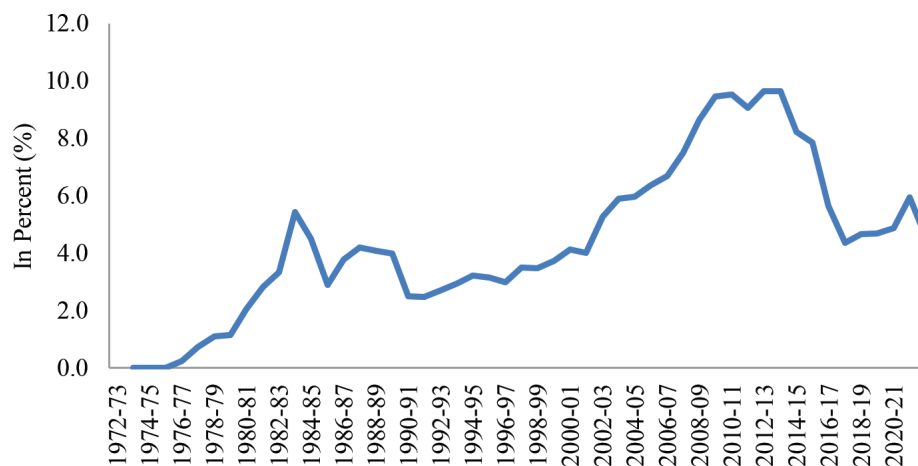

Chart 4.   Remittances as share of GDP size in Bangladesh.
Sources: Bureau of Manpower, Employment and Training (BMET), Bangladesh Bureau of Statistics (BBS)

they reduce their work hours and have more free time. This is because the rise in remittance income offsets the decrease in wage income. The author utilizes international remittances to Bangladesh as the focal point and employs the Dynamic Stochastic General Equilibrium (DSGE) model to demonstrate that a sudden surge in foreign remittances leads to decreased labor supply to the traded sector and a decline in output within the traded sector.

The receiving nation utilizes remittances for economic and human development, with remittances playing a significant role in expanding job possibilities. Asad *et al*. (2016) examined the correlation between workers' remittances and economic growth in Pakistan. The study also explored the impact of labor migration and worker remittances on unemployment and the interaction between unemployment and economic development. The researchers employed a Multivariate and Bivariate co-integration approach. The research identified a durable connection between workers' remittances, unemployment, labor migration, economic growth, and human capital development in Pakistan.

In their study, Mozumdar and Islam (2017) discovered that remittances favor the development of human capital at both the global and regional levels. The remittance has contributed to improving both the average duration of schooling and the number of students enrolled in primary, secondary, and postsecondary education levels. Additionally, the research demonstrated the beneficial influence of remittance on the average level of education and secondary schooling in a developing nation.

In his study, Mohammed (2022) investigates the correlation between remittance, institution, and Human Development (HDI) in Sub-Saharan Africa using data from 2014 to 2018. The study determined that remittances substantially influence the Human Development Index (HDI) in Sub-Saharan Africa (SSA). Providing direct remittance assistance to recipient households helps satisfy their fundamental requirements, such as access to education and healthcare, thus contributing to enhanced human development in Sub-Saharan Africa (SSA). Additionally, the study determined that the absence of a

more effective remittance institution plays a significant role in supplying funds for Human Development Index (HDI) advancement in Sub-Saharan Africa (SSA). This article proposed that governments implement a well-designed strategy for robust macroeconomic and institutional development.

The paper's authors are Hassan *et al*. (2013) examined the effects of working remittance on the development of human capital in Pakistan. The researchers used the Autoregressive Distributed Lag (ARDL) Bounds Testing Approach to ascertain the influence of remittance on human capital. The study paper identifies a substantial adverse effect of remittance on human capital. The remittance recipient's relatives effectively supervised their children's education without parental direction. The final observation of this research is that the act of working remittance may indeed augment the income of the receiving family. However, it is worth noting that the ramifications of the transfer go beyond the mere expansion in money.

Naeem and Arzu (2017) examined the impact of remittance on human development in 100 developing countries. The analysis was based on cross-sectional data from the year 2014. They observed that the remittance has had a beneficial but negligible effect on human growth in some chosen poor nations. Additionally, they discover that remittance is crucial in influencing more incredible human growth. However, it is not the only reason. Other elements contribute to the enhancement of human development as well.

Adenutsi (2010) used panel data analysis to establish the correlation between overseas remittances and the advancement of human capital in impoverished Sub-Saharan African nations. The research used yearly data from 1987 to 2007 to ascertain the correlation between remittance and the advancement of human capital. An empirical investigation revealed a significant and enduring positive association between remittance and human capital in nations located in Sub-Saharan Africa.

The rising trend of remittances has facilitated the advancement of human development in poorer nations. As per the research conducted by Huay *et al*. (2019)

Remittance has had a beneficial effect on long-term human development. Panel estimate was used to ascertain the correlation between remittance and human growth in underdeveloped nations. According to their statistical study, the remittance has a positive and statistically significant coefficient. The research study observed that factors outside remittance will influence human development in poor nations. Based on statistical research, a 10 percent rise in remittances results in a 0.016 percent enhancement in human development.

The remittance inflows contributed to the augmentation of healthcare, education, social security, and human development. The paper's authors, Kamalu et al.(2022) conducted a thorough analysis to investigate the impact of remittance inflows on human development in OIC nations. The study used advanced methodologies and data from 1990 to 2018. The research discovered a persistent correlation between remittances, financial development, foreign direct investment, and human development in nations belonging to the Organization of Islamic Cooperation (OIC). The research study found that remittance, Foreign Direct Investment (FDI), and financial development had a good and substantial influence on human development. Furthermore, the statistical analysis demonstrates a one-way causal relationship between remittance and human development and a two-way relationship between financial development and human growth in OIC nations.

Azizi (2018) used bilateral remittances as a means to address the issue of Endogeneity. Their objective was to determine the impact of worker remittances on both labor supply and investment in human capital. This article examined the effect of gender on health, the Human Development Index (HDI), education, and the labor force about remittances. The findings indicate that remittances significantly influence education and health outcomes, resulting in a favorable and statistically significant impact on labor force participation, which is detrimental in developing nations. The gender-specific results demonstrate that remittances have a nearly similar and beneficial effect on the health outcomes of both male and female offspring. Nevertheless, remittances have a more significant positive impact on females' educational achievements than boys. Once again, the inflow of remittances leads to a decline in female labor force participation, while male participation stays unchanged.

Funkhouser (2006) used longitudinal data from 1998 and 2001 in Nicaragua to investigate the influence of household members' emigration on the integration of the family into the labor market and its effect on poverty. According to the author's analysis, homes with emigrants had a decrease in their labor income compared to households that were identical in other aspects.

The remittance has positively impacted the primary school enrollment in the receiving nation, hence significantly influencing the Human Development Indicator in remittance recipient countries. Acosta (2011) investigated the impact of remittance inflows on child labor and school attendance in El Salvador. The author used an instrumental variable methodology to address the endogeneity issue. The findings suggest that remittances have a negligible impact on education. Remittances substantially impact reducing child labor in homes that receive them. Furthermore, it heightened the demands of unpaid familial responsibilities on the youngsters. Girls' school attendance demonstrates an increase based on gender, but males do not experience such advantages.

Adams and Cuecuecha (2010) used a household survey conducted in Guatemala that represented the whole country. They demonstrated that families allocate more of their transitory income, such as remittances, towards investment goods, namely education and housing, rather than consumption goods, such as food. This allocation pattern eventually contributes to the overall economic growth. Adams (2007) examined evidence conducted at the household level, suggesting that a rise in remittances has led to a decrease in poverty's extent and severity. Households receiving remittances allocate a more significant proportion of their resources towards children's education and housing than other sectors.

Alcaraz et al. (2012) examined the impact of remittances from the United States on child labor and school attendance in Mexican homes that receive

them. They used the distance to the United States border, measured along the train network from 1920, to determine participation in the group of individuals receiving remittances. They provide insight into the immediate consequences of remittances on education and child labor, distinguishing them from the lasting effects of migration on family decisions. The 2008 and 2009 global economic crisis was regarded as an exogenous factor for assessing the volatility of child labor and school dropout rates.

Amuedo and Pozo (2010) state that remittances favor children's school attendance, particularly in females' education. Remittances provide the most significant advantage to children of secondary school age and their younger siblings. Conversely, family migration adversely affects a child's education since they may have less time available for study. Ultimately, they participate in economic transactions to generate revenue that may be used to cover the costs associated with household movement. Alternatively, children may be tasked with family activities formerly taken care of by the migrant no longer around—assuming that children are motivated to move in the future. Under such circumstances, individuals can choose to discontinue their studies if the educational system of their home country requires broader recognition in the country they want to go to.

Bansak and Chezum (2009) conducted a study to analyze the influence of remittances on the educational achievement of school-age children in Nepal, specifically focusing on gender disparities. An instrumental variable method was used to address the issue of Endogeneity. It was discovered that remittances increase the likelihood of young children attending school.

Using original data and an instrumental variable method, Bouoiyour and Miftah (2016) discovered that males in homes receiving remittances had a higher likelihood of attending school than girls. The observed favorable influence of remittances on boys' schooling highlights the gender disparity within Morocco's rural education system. This inclination is oriented towards believing that investing in males' education would provide a greater return than saving or investing in girls' education. Hence, monetary transfers from relatives alleviate the limitations of financial restrictions and enable parents to make optimum investments in their children's education.

Antman (2011) conductedindividual Fixed Effects and Instrumental Variables estimates (FEIV) revealed that when parents migrate to the U.S., it has a detrimental influence on the education and working hours of children in Mexico, particularly for younger children. Adolescent males between the ages of 12 and 15 increase their time working while reducing the time dedicated to studying and attending school to compensate for the absence of migrating individuals in household duties. Possible reasons include funding their father's journey and awaiting lucrative work opportunities.

Using a bivariate probit model, Bucheli *et al*. (2018) found that remittances had both beneficial and detrimental impacts on children's education. Urban men of lower socioeconomic status experience more substantial beneficial effects, but rural females have adverse effects. Once again, children from financially stable households have either detrimental or little impact on the income received via remittances.

Edwards and Ureta (2003) examined the impact of remittances on the educational choices made by families in El Salvador. The researchers examined the variables influencing school attendance and discovered that remittances are the primary determinant of school retention. Nevertheless, it was essential for them to acknowledge the issue of Endogeneity in their research.

Using the instrumental variable methodology, Acosta, P., Calderón, C., Fajnzylber, P., & Lopez, H. (2008) examined the impact of remittance inflows on child education in eleven Latin American nations. The researchers discovered that the offspring of households that receive remittances are more inclined to continue their education. Furthermore, the impact is more pronounced when the parents have lower levels of education.

Kikkawa *et al*. (2019) reported that the influx of remittances leads to a decline in investment in rural

businesses. In contrast, the reverse impact is shown in the case of migrants who have returned. The act of migration has a beneficial effect on both health expenses and children's academic achievement. Gaduh (2018) investigated the adverse effects of remittances on labor participation and working hours and their reduction of adult female labor supply. No impact of remittances on children's education was seen.

According to Salas(2014) it is often believed that the educational quality of private schools surpasses that of public schools. Remittance inflows may influence individuals' choice of school type by increasing household income and alleviating budget limitations. The author analyzed the impact of remittance on the educational outcomes of children in Peru. Using the instrumental variable technique, he discovered a favorable correlation between remittances and the enrollment of children in private schools.

Additionally, there are some contradictory results. Gao *et al*. (2021) discovered that remittances had a detrimental effect on educational spending and results in the Kyrgyz Republic. This might be because families receiving remittances prefer to allocate a more significant portion of their income toward purchasing long-lasting products rather than investing in human capital. The increase in remittance inflows leads to decreased children's school enrollment. Another comparable study was conducted by Ang*et al*. (2009) focusing on the Philippines. They demonstrated that remittances have the potential to assist this nation in breaking free from poverty but need assistance in achieving a balanced and enduring development. Additionally, they discovered that remittances have no meaningful impact on educational spending.

According to Lu and Treiman (2007) children from homes receiving remittances are likelier to be enrolled in school than children from households that do not get remittances. The research revealed a decline in school attendance among children from homes who receive remittances. This decline may be attributed to an increase in educational expenditure, a reduction in child labor, and the alleviation of the negative impact of parental absence resulting from out-migration in these households.

According to Zhunio *et al*. (2012) remittances favor many components of the Human Development Index (HDI), such as educational achievement, life expectancy, and the reduction of neonatal mortality. Secondary students are more prone to dropping out of school in favor of employment. According to Chowdhury (2014) remittances in Bangladesh have both beneficial and detrimental effects on the socioeconomic situation. Furthermore, he affirmed that the positive influence is more influential when compared to the negative impact.

4. Methodology

4.1 Data

Our Research explores the impact of remittances on Human development. The analysis has been conducted using time series data from 1990 to 2020 because the data on HDI is available from 1990. All variable data are available at World Development Indicators (WDI) compiled by the World Bank.

4.1.1 Econometric Process

Modern econometrical approaches and the relationships among the variables are used in this paper. The following steps are applied here. The first step is to determine whether each variable has a unit root. The next procedure is to examine the existence of long-run. We will apply the Johansen Cointegration method to examine the long-term relationship, when all variables are stationary at first difference. To find short-term dynamics, we can apply Vector Error Correction Model (VECM).

4.1.1.1 The Augmented Dicky Fuller (ADF) Test

The ADF test is a popular unit root test to check the stationarity of the variable. This test assumes error term will be auto-correlated if autocorrelation exists in the first difference of the series.The ADF test with intercept and trend is written as:

$$Z_t = \alpha_0 + \alpha_1 T + \alpha_2 Z_{t-1} + \sum_{k=1}^{n} \Omega_k Z_{t-1} + \omega_t$$

4.1.1.2 Phillips Perron (PP) Test

Phillips and Perron (1988) tests are similar to ADF tests, but they corrects for any serial correlation (like

ADF) and heteroskedasticity in the errors by directly modifying the DF test statistics in a non-parametric way.

The PP test with intercept and trend is written as

$$Z_t = \alpha_0 + \alpha_1 T + \alpha_2 Z_{t-1} + \omega_t$$

Advantages of PP over ADF

- PP tests consider the presence of heteroskedasticity.
- No prior specification of lag length.

4.1.1.3 Johansen Cointegration Method

We can run regression model with the variables that are integrated of order one, I(1), if the variables are cointegrated. More specifically, the time series are non stationary at level but their linear combination is stationary, then they can be cointegrated. That is, they may have a long run relationship among the variables.

Granger suggested that the presence of cointegration between two or more variables indicates that a valid error correction model exist between them. The Error Correction Model (ECM) works as presentation of the short-run dynamic relationship between two variables.

If x_t and y_t are I(1)variables, then run the following equation:

$$Y_t = \beta_0 + \beta_1 X_t + u_t$$

Perform the ADF test of the residuals to see if they are non-stationary or stationary. If u_t is I(0),variables are cointegrated, then run the following error correction mechanism

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_2 u_{t-1} + \epsilon_t$$

Δ is the first difference operator
Here β_2 is the speed of adjustment.

The standard Johansen methodology is based on VAR, which allows for I(1)variables. It involves several steps.

5. Result and Discussion

5.1 Specification of the Econometric Model

We use the regression model used by Azizi (2018).

The following econometric models has been used in order to evaluate the effects of Remittance on HDI.

$$LHDI_t = \beta_0 + \beta_1 LRPC_t + \beta_2 LGDPPC_t + \beta_3 LGEEGDP_t + u_t \ \text{-------} \ (1)$$

Here,
LHDI = Log Human Development Index
LRPC= Log Remittance Per Capita
LGDPPC = Log GDP Per Capita
LGEEGDP = Log Government Education Expenditure to GDP ratio

$$LMOR_t = \beta_0 + \beta_1 LRPC_t + \beta_2 LGDPPC_t + \beta_3 LGEEGDP_t + \beta_6 LUR_t + u_t \ \text{----} \ (2)$$

Here,
LMOR= Log Mortality Rate
LRPC= Log Remittance Per Capita
LGDPPC = Log GDP Per Capita
LGEEGDP = Log Government Education Expenditure to GDP ratio
LUR= Log Proportion of Population Living in the Urban Area

$$LES_t = \beta_0 + \beta_1 LRPC_t + \beta_2 LGDPPC_t + \beta_3 LGEEGDP_t + u_t \ \text{------} \ (3)$$

Here,
LES = Log Secondary School Enrollment
LRPC= Log Remittance Per Capita
LGDPPC = Log GDP Per Capita
LGEEGDP = Log Government Education Expenditure to GDP ratio

Following the equation used by Sutradhar (2020), we calculate the impact of remittance on GDP. The equation is as follows,

$$LGDPPC_t = \beta_0 + \beta_1 LRPC_t + \beta_2 LFDI_t + \beta_3 LGCF_t + \beta_4 LEX_t + \beta_5 LER_t + u_t \ \text{---} \ (4)$$

LGDPPC = Log GDP Per Capita (USD)
LRPC= Log Remittance Per Capita (USD)
LFDI = Log Foreign Direct Investment (Million USD)
LGCF= Log Gross Capital Formation (Million USD)

LEX= Log Export Receipts (Million USD)
LER= Log Exchange Rate (Taka Per USD)

B_0 is intercept of the model and β_1, β_2, β_3, β_4, β_5, β_6 are partial slope coefficients of the model which also measure the partial elasticities. In addition,   is error term.

The unit root test results are reported in Table 1. We use both ADF and PP to check stationarity of the variables. Results indicate that although all variables are have unit root at level, they become stationary after first difference. We can conclude that all variables are first difference stationary.

We use Johension Cointegration Approach to check the long run relationship. Results of the Table 2 show that long run relationship exists in the all models.

Table 3 reports the result of the VECM. Equation-1 shows that GDP per capita and remittances per capita positively impact the Human Development Index.

More specifically, on average, a one percent increase in GDP per capita results in a 0.09 percent increase in HDI, and a one percent increase in remittance per capita results in a 0.05 percent increase in HDI. Although the effect of government education expenditure is positive, it is statistically insignificant. The error correction term has an expected negative sign which indicates that any disequilibrium will be adjusted with a speed of almost 15 percent. The value of R^2 shows that the regression model can explain a 55 percent variation in the HDI.

Equation-2 shows that GDP per capita, Government education expenditure, people living in an urban area, and remittances per capita significantly reduce the mortality rate, improving people's health condition. More specifically, a one percent increase in GDP per capita, government education expenditure, remittance per capita, and people living in the urban area result in a reduction of the mortality rate by 1.5%, 6.4%, 2.4%, and 15%, respectively. The error correction term has an expected negative sign, which indicates that any disequilibrium will be adjusted with a speed of almost 64 percent. That

Table1. Unit root test

Series	Level				First difference				Decision
	ADF		PP		ADF		PP		
	Constant	Constant & Trend	Constant	Constant & Trend	Constant	Constant & Trend	Constant	Constant & Trend	
LHDI	-2.337	-2.266	-6.257*	-1.437	-4.034*	-4.610*	-3.849*	-5.328*	I(1)
LGDPPC	1.070	-1.438	2.446	-1.438	-3.479**	-3.781**	-3.487**	-3.647**	I(1)
LGEE_GDP	-1.940	-1.149	-2.871	-2.609	-6.833*	-9.060*	-7.826*	-.8.895*	I(1)
LES	0.752	-3.024	0.667	-3.068	-6.788*	-6.544*	-6.464*	-6.345*	I(1)
LMOR	-0.938	-2.137	-0.450	-2.291	-4.863*	-4.874*	-4.645*	-4.497*	I(1)
LRPC	-0.355	-5.718*	-0.407	-1.636	-3.947**	-3.918**	-4.029*	-3.988**	I(1)
LUR	-0.507	-3.797*	1.336	-1.985	-3.633**	-6.726*	-3.868*	-6.522*	I(1)
LEX	-1.687	-1.550	-1.753	-1.756	-4.962*	-5.225*	-4.985*	-5.239*	I(1)
LER	-1.807	-0.913	-3.027*	-0.621	-4.036*	-3.563**	-3.953*	-4.944*	I(1)
LGCF	1.042	-1.213	0.909	-1.213	-3.815*	-3.749*	-3.732*	-3.632**	I(1)
LFDI	-2.333	-2.590	-3.736*	-2.271	-4.822*	-4.187*	-5.329*	-10.290*	I(1)

Source: Author's calculation using Eviews
* indicates significant at 1% level and ** indicates significant at 5% level

Table2. Johansen Cointegration test

Hypothesized No. of CE(s)	Equation-1		Equation-2		Equation-3		Equation-4	
	Eigen value	Trace Statistic	Eigen value	Trace Statistic	Eigen value	Trace Statistic	Eigen value	Trace Statistic
None	0.6009**	44.673**	0.8751*	101.83*	0.7271*	113.63*	0.8756*	182.57*
At most 1	0.3267	18.9495	0.5590	43.5810	0.6299*	75.965*	0.8242*	124.22*

Trace test indicates 1 cointegrating equation at the 0.05 level (*) and (**) at 10% level.

Table3. Long-run Relationship (VECM results)

Regressors	Equation-1 LHDI	Equation -2 LMOR	Equation -3 LES	Equation -4 LGDPPC
LGDPPC	0.0937** (0.040)	-0.015* (0.002)	0.625* (0.285)	
LGEE_GDP	0.066 (0.040)	-0.064* (0.003)	0.720* (0.166)	
LRPC	0.054** (0.023)	-0.024* (0.002)	0.266** (0.106)	0.049** (0.015)
LUR		-0.147* (0.034)		
LEX				0.054 (0.104)
LER				-0.068* (0.216)
LFDI				0.031* (0.005)
LGCF				0.077* (0.033)
ECT t	-0.146* (0.038)	-0.637* (0.149)	-0.286* (0.0256)	-0.320*** (0.167)
Trend		0.0125 (0.001)	0.1245* (0.026)	
Constant	-1.583	9.809	6.833	-0.412
R2	0.554	0.673	0.843	0.489

*, **,*** indicate 1% , 5% and 10% significance level.

is, it takes nearly 1.5 years to correct the disequilibrium. The value of R2 shows that the regression model can explain a 67 percent variation in the mortality rate.

Equation-3 shows that GDP per capita, Government education expenditure, and remittances per capita significantly improve secondary school enrollment. More specifically, a one percent increase in GDP per capita, government education expenditure, and remittance per capita improved secondary school enrollment by 62%, 72%, and 27%, respectively. The error correction term has an expected negative sign which indicates that any disequilibrium will be adjusted with a speed of almost 29 percent. That is, it takes nearly three years to correct the disequilibrium. The value of R2 shows that the regression model can explain an 84 percent variation in the mortality rate.

Equation-4 shows that Exports, FDI, Gross capital formation, and remittances per capita significantly positively impact GDP per capita. However, the exchange rate has a negative effect on GDP per Capita. More specifically, a one percent increase in Exports, FDI, Gross capital formation, and remittances per capita results in increased GDP per capita by 5.4%, 3.1%, 7.7 %, and 4.9%, respectively. On the other hand, a one percent increase in the exchange rate reduces GDP by 6.8 percent. The error correction term has an expected negative sign, which indicates that any disequilibrium will be adjusted with a speed of almost

32 percent. That is, it takes nearly three years to correct the disequilibrium. The value of R2 shows that the regression model can explain a 50 percent variation in the GDP per capita.

6. Conclusion

Remittances have contributed significantly to the socioeconomic development of Bangladesh Economy. This study uses time series data from 1990 to 2020 to examine how remittances affect the development of a country measured by HDI. At a disaggregate level, our study explores the impact of remittance on income, health, and education in the economy of Bangladesh.

Remittances per capita promote socioeconomic development as measured by HDI. More specifically, on average, a one percent rise in per capita remittance leads to a 0.05 percent rise in HDI.

Remittances per capita significantly reduce the mortality rate, improving people's health conditions— more specifically, a one percent increase in remittance per capita 2.4% reduction in child mortality rate. Remittances per capita significantly improve secondary school enrollment. More specifically, a one percent increase in remittance per capita improved secondary school enrollment by 27%, respectively. Remittances per capita have a significant positive impact on GDP per capita. The empirical findings indicate that a one

percent increase in remittances per capita increases GDP per capita by 4.9%.

This study adds to the exiting literature by investigating the potential pathways of remittance to influence socioeconomic development, including its impact on income, education, and health. Overall, this study provides new insights into the relationship between remittances and socioeconomic development in Bangladesh, which can be helpful for policymakers. Given the current global context, the results of our research can provide important insights for researcher looking to leverage remittances for the socioeconomic development of their countries.

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