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A Study on Determinants of Workers' Remittance Inflow in Bangladesh

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Abstract: *Remittance inflows of workers to their country of birth is one of the most influential factors contributing to the economic growth of developing countries. Remittance has a significant impact on the economic growth of Bangladesh. It also a vital source of foreign exchange earnings for Bangladesh. This study aims to identify the determinants of worker's remittance in Bangladesh using time series data from 1976 to 2018. The Augmented Dickey-Fuller Test checks the stationarity of data.*

After conducting the Engle-Granger two-step test and bound test, cointegration is found. The Autoregressive-Distributed lag (ARDL)-Error Correction Model (ECM) approach is used to determine the short-run and long-run relationship between workers' remittance inflow and macroeconomic determinants of remittance inflow in Bangladesh. In the long run, the number of migrants, the host country's GDP, Consumer Price Index (CPI) of the home country, Per capita GDP of the home country, and home country's exchange rate positively affect the workers' remittance inflow in Bangladesh. There is a positive relationship between the current years' remittance and previous years' remittance in the short run. A negative short-term relationship was found between remittance and host countries' GDP. Per capita GDP and CPI of Bangladesh also have an inverse relationship with remittance inflow in the short term. Granger Causality test shows no endogeneity problem in the model. The short-run negative association between Remittance inflow and GDP indicates that a substantial portion of remittances is used for non-productive purposes like consumption. Bangladesh Government can attract the migrants to invest in the productive sectors by reducing bureaucratic complexity and providing a stable and investment-friendly environment.

Keywords: *remittance inflow; ARDL; ARDL-ECM; short-run; long-run*

Introduction

Remittance plays a fundamental role in the economy of developing countries. For better earning and providing better support to their family, workers from

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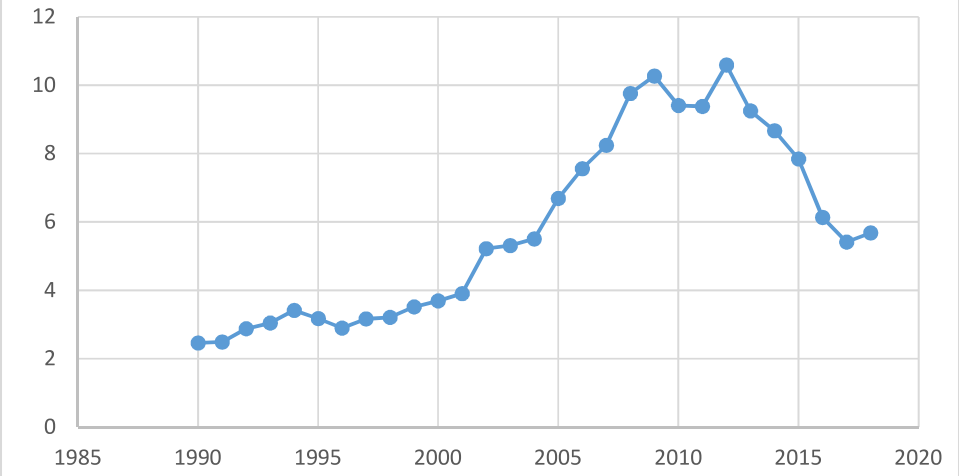
impoverished countries generally migrate to developed countries. Many authors also mentioned altruism as a reason for sending remittance (Bouoiyour and Mifat, 2015, Schiopu and Siegfried, 2006). Based on World Bank data (2018), overall international remittance rose by 7% to USD 613 billion in 2017, from $573 billion in 2016. Overall recorded remittances to low and middle-income countries increased by 8.5 percent in 2017, $466 billion. Based on the Global Development Finance (World Bank 2014), the second-largest source of external funding is remittances, behind the foreign direct investment. Bangladesh was the third-largest remittance-receiving country in 2018, and the annual remittance of Bangladesh keeps increasing significantly over time. Remittance is the second-largest source of foreign currency earnings after exports of readymade garments (RMG) in Bangladesh. According to the World Bank data (2019), Bangladesh received almost $15.3 billion in 2018, a jump of nearly 14% over 2017 value ($US12.77 billion). According to the Bangladesh Bank report of remittance inflows by selected countries in 2020-2021, Saudi Arabia was the largest source of remittance in Bangladesh, followed by the other countries like the U.S.A, UAE, Malaysia, the U.K, Kuwait, Oman, Qatar, Italy, Singapore, Bahrain, South Korea, and Australia.

Based on the regional data in Asia, the outflow of migrants from South Asia was the highest since the 1990s. In 2015, South Asia accounted for almost 15% (37 million) of all international migrants (ADB 2016). Economic, demographic, social, political, cultural, and environmental factors contribute to increasing global migration (ADB 2016). In 1990, the number of international migrants was 153 million, but in 1970 it was 78 million. In 2015, the number of international migrants became almost more than three times (244 million) than in 1970 (Ratha et al.2016).

Remittance is a relatively stable and less volatile source than private capital flows, official development assistance, and FDI (Ratha, 2007). Besides, it may have counter-cyclical properties relative to the recipient economy. It is widely agreed that during the economic downturn, financial crisis, natural disaster and political instability, migrants try to send more money for their families and friends (Ratha, 2007). According to the World Bank, remittances are vital contributors to foreign exchange earnings, economic growth and poverty reduction throughout Europe and Central Asia. Remittance also assists the recipient country to repay foreign debt, boost foreign exchange, etc. In the short term, remittances help overcome their recipients' budget constraints by encouraging them to raise expenditure on durable and nondurable goods and protect them against adverse income shocks (Bruyn, 2005).

Figure 1. Remittance as share of GDP (in percent) in Bangladesh



The figure shows that the remittance shares in GDP increased by 7.81% from 1990 to 2009. In 2010 and 2011, the GDP's remittance shares remained almost the same at 9.41% and 9.38%, respectively. In 2012, it reached 10.59%, followed by a decreasing trend; it was 5.42% in 2017 and 5.68% in 2018.

Literature Review

Bangladesh has observed continuous remittance inflows in the last few years, and even covid-19 still does not hurt the remittance inward in Bangladesh. Some past studies, including Swamy (1981), Lianos (1997), EL-Sakka and MacNAbbb(1999), Glytsos (2002), Gupta (2005), Shahbaz and Aamir (2009), Barua & Rafiq (2020), and Deodat E. & Christian R (2021) focused on the macro-determinants of remittances. Some of these studies found that the home country's income level, inflation, and exchange rate significantly affect the remittance inflow. The factors including dependency ratio, economic shocks, natural disaster, interest rate fluctuation, exchange rate fluctuation, economic volatility, and skill of migrants have a significant influence on remittance income (Jackman,2013). Hasan (2008) examined the macroeconomic determinants of remittance in Bangladesh. The author forecasted that, on an average, remittance would rise by 1.94% due to a 1% increase in the domestic interest rate, and the remittance would increase by 3.06 percent when the five host countries' GDP rises by 1%. Remittance inward in Bangladesh depends on the labor force, consumer price index, export, import, government expenditure, and devaluation or appreciation of host countries. The altercation of these factors has a significant impact on the inward remittance income

(Rana & Hashmi,2015). Omeje and Asogwa (2013) found a negative association between remittance income and GDP per capita, tax revenue, and the real exchange rate of the home country. The critical determinants of remittances are income, employment, education of the migrant workers, and the home and host country's interdependency (Arun & Ulku, 2011). Remittance inward depends on workers' characteristics, including migrant income, sex, and age (Bouoiyour & Miftah,2015). Besides, Remittance inflow is also positively associated with education level, being a male, and employment types (Emmanuel et al., 2012). Shahbaz and Aamir (2009) and Kamran et al. (2014) found that inflation rates, world economic development, and depreciation of home country's exchange positively influence remittance inflows, and the escalating world interest rate and enriched educational attainment shows a negative association with remittance inflows. Remittance inflow in Tajikistan depends on the opportunities of changing migrants' incomes in the labor market of the host county besides global economic factors (Sultonov,2013).

Ratha et al. (2010) found that the current account deficit as a percentage of GDP could have been twofold in the past few years without considering remittance income. A new index of overall financial development to identify the significance of remittances for economic growth in developing countries disclose that the greater financially developed a country is, the smaller the contribution of remittances on growth (Sobiech 2019).

Rahman (2003) identified that the per capita GDP and remittance per worker from the United Kingdom are positively related. There is a pro-cyclical relationship between remittance flow and macroeconomic activities in the country. Browne and Mineshima (2007) found a linkage between remittances and the aggregate stock of migrants. Semblat and Morant (2005) examined that growth in remitting countries and changes in exchange rates also influenced the remittances inflow. Most of the recent studies that so far have been estimated their model using the home country's macroeconomic factors. Very few studies incorporated the host countrys' macroeconomic factors. The source country's economic condition certainly influences the remittance inflow. In our study, the weighted average of seven host countries' GDP is used as a proxy of the host country's economic condition. Besides, very few studies have examined the short-run and long-run influence of factors contributing to remittance inflow in Bangladesh so far as my knowledge. The flow of remittance in the Samoa increases with the depreciation of the Samoan currency. This study differs from earlier studies by attempting to examine the effect of the weighted average of seven host countries GDP, GDP per capita of the home country, consumer price index of the home country, the number of migrant workers from Bangladesh per year, and domestic exchange rate on remittance inflow in

Bangladesh over the period 1976-2018 by using ARDL approach to suggest short-run and long-run policy guidelines for enhancing remittance inflow in Bangladesh.

Objective

Remittance plays a significant role in maintaining the balance of payment and in increasing foreign currency reserves. The study tries to find the determinants of the workers' remittance inflows in Bangladesh.

Methodology

Data and variables

The study examines the macro-determinants that influence the remittance inflow in Bangladesh by using annual time series data from 1976 to 2018. This study used secondary data collected from the World Bank, IMF, Bangladesh Bank (central bank of Bangladesh), and Bangladesh Bureau of Statistics. The annual data is used in the analysis containing a total of 43 observations. The remittance flow of Bangladesh (the independent variable) is assumed to be a function of the macroeconomic variables (explanatory variables), including a weighted average of seven host countries GDP (KSA, UAE, Qatar, Kuwait, Oman, UK, and Malaysia), constant GDP per capita of the home country (2010 US$), consumer price index of the home country, number of migrant workers from Bangladesh per year, and domestic exchange rate. Table 1. presents descriptive statistics of data used in this study.

Table 1. Descriptive Statistics for the macro-determinants of the workers' remittance inflow in Bangladesh from 1976- 2018.

Variables	Mean	Standard Deviation	Min.	Max.
Remittance of Bangladesh (Re) $ Million	4458.893	5383.935	23.71	15544.68
Number of migrants from Bangladesh (NM)	283700.7	259482	6087	1008525
Seven host countries weighted GDP (GDP_W) $ M	153000	112,000	15500	499,000
Consumer price index (CPI)	7.6069	3.6643	1.94	18.46
Per Capita Bangladesh GDP (PC_BGDP) $	575.3851	236.3741	343.95	1203.22
Exchange Rate (ER)	48.6665	22.3839	14.4	83.9

Table 1. presents that the mean value of workers' remittance inflow per year is US$ 4458.893 million, the weighted average GDP(GDP_W) of seven host countries is US $153000 million, and per capita mean Bangladesh GDP is US$575.3851. The table shows that the weighted average GDP of the seven countries is highly volatile.

Procedure

Worker remittance inflow (Re), number of migrant workers from Bangladesh (NM), weighted average of seven host countries GDP (GDP_W), consumer price index of the home country (CPI), GDP per capita of the home country (PC_BGDF), domestic exchange rate for per U.S dollar (ER) are transferred by taking natural logs. The weighted average of seven host countries' GDP (GDP_W) is estimated using the weight of migrant workers' outflow per year from home country to previously stated seven countries. The unit root test is used to uncover whether the series used in the analysis are stationary or nonstationary in levels. Dickey-Fuller test is used to examine the stationarity of the series. The cointegration test is executed by using the Engle-Granger two-step test. The first step is to run an Ordinary Least Square (OLS) regression separately for each share equation. The log-Linear empirical regression can be specified as:

$$lnRe_t = \alpha_0 + \alpha_1 lnNM_t + \alpha_2 lnGDP\_W_t + \alpha_3 lnCPI_t + \alpha_4 lnPC\_BGDP_t + \alpha_5 lnER_t + \varepsilon_t$$

The ADF test for stationarity of the residuals is done in the second step. The null hypothesis is rejected at the 1% level of significance for the residuals. Therefore, cointegration is found among the dependent and independent variables. The result of this test justifies using the ARDL, ARDL-ECM models.

The cointegration is also tested by using the ARDL bounds testing approach and Engle-Granger cointegration test. Empirical studies are conducted on the time series, which may have spurious regression for non-stationary data set. This problem is solved by Engle and Granger (1987) cointegration framework. ARDL model is used to test for a long-run relationship among variables. The cointegration test's primary purpose is to identify the short-run and long-run relationship of macroeconomic determinants and worker remittance inflow in Bangladesh. ARDL approach is chosen because it can be used for time series with a mixed order of integration. This model takes sufficient numbers of lags to capture the data generating process in general to a specific modeling framework (Pesaran et al, 2001).

Moreover, the ARDL model is more efficient than the Johansen cointegration test for identifying the existence of long-run relationships with the small size of observations (Ghatak and Siddiki, 2001). The orders of lags used in the ARDL model are chosen by using Akaike Information Criteria (AIC). Pesaran and Shin (1999) recommended using a maximum of 2 lags. The study is also conducted by using a maximum of two lags. The equation of an ARDL model is specified as:

$$\Delta lnRe_t = \beta_o + \sum_{i=1}^{p} \beta_{1i} \Delta lnRe_{t-i} + \sum_{i=1}^{p} \beta_{2i} \Delta lnNM_{t-i} + \sum_{i=1}^{p} \beta_{3i} \Delta lnGDP\_W_{t-i} + \sum_{i=1}^{p} \beta_{4i} \Delta lnCPI_{t-i} + \sum_{i=1}^{p} \beta_{5i} \Delta lnPC\_BGDP_{t-i} + \sum_{i=1}^{p} \beta_{6i} \Delta lnER_{t-i} + \varepsilon_t$$

A long-run relationship is identified by examining the critical values of the lower and upper bounds provided by the bound test. The lower bound represents the restriction that all variables are I (0), and the upper bound represents the restriction that all variables are I (1). If the F statistic value is less than the lower bounds value, the null hypothesis of no cointegration is not rejected.

Alternatively, the null hypothesis of no cointegration is rejected if the F statistic is higher than the upper bound value. The bound test is inconclusive if the F statistic is between the lower and upper bound. I have concluded the long-run relationship from the result of the bound test. After getting cointegration from the bound test result, the long-run and short-run models are estimated using the Error Correction Model (ECM) in the ARDL model. The ECM for the estimation of the short-run and long-run linkage can be formulated as:

$$\Delta lnRe_t = \beta_o + \sum_{i=1}^{p} \beta_{1i} \Delta lnRe_{t-i} + \sum_{i=1}^{p} \beta_{2i} \Delta lnNM_{t-i} + \sum_{i=1}^{p} \beta_{3i} \Delta lnGDP\_W_{t-i} + \sum_{i=1}^{p} \beta_{4i} \Delta lnCPI_{t-i} + \sum_{i=1}^{p} \beta_{5i} \Delta lnPC\_BGDP_{t-i} + \sum_{i=1}^{p} \beta_{6i} \Delta lnER_{t-i} + \alpha_1 ECT_{t-1} + \varepsilon_t$$

This model's results present the short-run and long-run relationship between the worker remittance inflow and the determinants of that inflow. The main requirement for the acceptability of a long-run equilibrium relationship is that the adjustment term's sign is negative, statistically significant, and less than one in absolute value. The misspecification of the ARDL-ECM is checked by using a series of diagnostic tests. Granger Causality test is used to check the endogeneity problem.

Empirical Evidence

Unit root and cointegration tests: Dickey-Fuller test result indicates that all variables are nonstationary at levels and stationary at the first differences. The results are shown in the following table.

Table 2. Results of Unit Root Test

Variables	Augmented Dickey-Fuller Test			
	Level P-value		First Difference P-value	
	Constant, No Trend	Constant, Trend	Constant, No Trend	Constant, Trend
LnRe	0.3901	0.3145	0.0022**	0.0142**
LnNM	0.03507	0.0473	0.0000***	0.0000***
LnGDP_W	0.5292	0.0192	0.0000***	0.0000***
LnCPI	0.1039	0.2341	0.0000***	0.0000***
LnPC_BGDP	1.000	1.0000	0.0005***	0.0000***
LnER	0.0701	0.6124	0.0000***	0.0000***
Residual	0.0000***	0.0005***		

As all the variables are nonstationary or Vector Autoregressive models cannot be used to get unbiased results. The table shows that the residual is stationary and statistically significant, meaning that there is cointegration. The time trends for the variables are given in appendix A1.

Bound Test for cointegration

Table 3. Results of Bound test

Particulars	**Results**
Bound test for co-integration calculated F- Statistics	5.210***
Bound testing critical values at 10%	2.26 (Lower) 3.85(Upper)
Bound testing critical values at 5%	2.62 (Lower) 3.79(Upper)
Bound testing critical values at 2.5%	2.96 (Lower) 4.18(Upper)
Bound testing critical values at 1%	3.41(Lower) 4.68(Upper)

The results of the bound test demonstrate that a cointegration relationship exists between the worker's remittance inflow and the number of migrant workers, the weighted average of seven host countries GDP, CPI, GDP per capita of home countries, and exchange rate of the home country. The cointegration result implies that these determinants influence the worker's remittance inflow, and these determinants are also affected by the worker's remittance inflow.

The above table indicates that the calculated F- statistic is 5.210, which exceeds the upper critical bound (3.79) at 10% significant level, (3.79) at 5% significant level, (4.18) at 2.5 % level of significance, and (4.68) at 1% significant level. This implies that the null hypothesis of no cointegration is rejected.

ARDL-ECM empirical results

Table 7. Results of ARDL-ECM model

Coefficient	Estimates Ln Re	Standard error
Long run estimates		
Constant	-11.9601***	2.6636
β_1(Ln NM)	0.0441	0.1217
β_2(Ln GDP_W)	0.6679***	0.2005
β_3(Ln CPI)	0.2302**	0.0957
β_4(Ln PC_BGDP)	1.6114***	0.3134
β_5(LnER)	.9926**	0.3680
Short run estimates		
Δ (LnRe_L1)	0.2722***	0.0963
Δ (Ln GDP_W)	-0.2391**	0.0992
Δ (Ln GDP_W_L1)	-0.2971***	0.1034
Δ (Ln CPI)	-0.0579	0.0406
Δ (Ln PC_BGDP)	-6.1738***	1.8840
Δ (Ln PC_BGDP_L1)	2.5434	1.7033
Error correction	-0.4980***	0.1168
Adjusted R^2	0.6180	

Note: Level of statistical significance ***=1%, **=5% & *=10%.

Table 4, Table 5, and Table 6 in appendix A2 show how many lags have taken for each variable, the ARDL model results, and the results of misspecification tests for the static ARDL model.

Table 7 reveals the results of the ARDL-ECM. The results of the ARDL-ECM show that in the long run, there is a positive relationship between Ln Re and explanatory variables (Ln NM, Ln GDP_W, LN CPI, Ln PC_BGDP, LnER). The magnitudes of these coefficients are 0.0441, 0.6679, 0.2302 1.6114, and .9926, respectively. We get a positive relationship between the number of migrants workers and remittance

inflow, but the coefficient is not statistically significant. All other coefficients, in the long run, are statistically significant at the 5% level. The table shows that 49.80% of any deviation from the long-run path is corrected within the first year. In other words, almost half of the deviation is corrected in the first year. Here, the sign of the error correction term's estimated value is negative, statistically significant, and less than one in absolute terms, which indicates that the long-run relation is sensible. In short-run, the first lag of the remittance variable (Ln Re_ L1) shows a positive impact on Ln (Re), and the coefficient is statistically significant. But in the short-run Ln GDP_W and its lag reveal an inverse relation with Ln Re. The relationship between Ln RE and Ln CPI is negative. Ln PC_BGDP has an inverse effect, but the first lag is positively associated with the Ln Re in the short run. Except, the number of migrant workers, other determinants influence the worker's remittance inflows in the long run. In the long run, the host country's GDP and the home country's GDP positively impact remittance inflows. The Consumer Price Index and official exchange rate positively affect remittance inflow in the long run. In the short run, the previous year's remittance inflow significantly impacted the current year's remittance income. Besides, the current and previous year's GDP of the host countries are negatively associated with the remittance income of Bangladesh. Moreover, the current year GDP of the home country also has an adverse effect on remittance inflow in Bangladesh.

Granger Causality test:

We got a unilateral relationship between Ln Re and Ln GDP_W, and Ln Re & Ln Pc_ BGDP. Ln GDP_W affects Ln Re, but Ln Re does not affect Ln GDP_W. The same scenario has been observed for the relationship between Ln Re and Ln PC_BGDP. We did not get any endogeneity problem here. The test result of the Granger Causality test is given in table 8. In appendix A3.

Table 9. Mis-specification test results for the ARDL-ECM model: Mis-specification tests results

Test	Results
DW	1.9623
BG[1]	0.9189
BP[1]	0.1609
White[1]	0.4165

Note: DW=Durbin-Watson
BG=Breusch- Godfrey
BP=Breusch-Pagan
[1] P value

Table 9 presents the misspecification test results for the ARDL-ECM model. The DW test dictates that the value of d is close to 2, so there is no evidence for serial correlation. The p-value of Breush- Godfrey is 0.9189, indicating no serial correction of ARDL-ECM. The p-value of the White test is 0.4165, which represents homoskedasticity in the model. Besides, the P-value of the BP test also indicates there is no heteroskedasticity in the model. Therefore, the ARDL-ECM model is reliable and helpful for the policymaker.

Discussion

The study identifies that the number of migrants from Bangladesh, host countries GDP, consumer price index, per capita Bangladesh GDP, and exchange rate have long-run positive effects on Bangladesh's remittance inflow. The previous year's remittance inflow has a significant positive impact on the current year's remittance inflow. But the host countries' GDP and home country's GDP, CPI and exchange rate have short-run significant adverse effects on remittance in Bangladesh.

During the depressed economic condition of the host countries, the unskilled workers may get employment opportunities in the host countries due to low payments. But in the long run, as GDP increases in the host countries, the more skilled people could get jobs in the sophisticated tasks and get a high salary that positively impacts remittance inflows in the home country. Remittance inflow in Tajikistan depends on the opportunities of changing migrants' incomes in the labor market of the host county besides global economic factors (Sultonov,2013). The gross domestic product (GDP) of six host countries contributed to strengthening the remittance inward of Bangladesh; however, no significant relationship was found between remittance income and wage rate (Begum and Sutradhar,2012).

A small portion of remittance earnings goes to direct investment, while a considerable proportion goes to consumption. The remittance is a driving force to stimulate the imports of foreign substitute goods in the home country (Javed et al., 2017). On the contrary, domestic product consumption in the remittance-receiving countries is lower than the consumption of imported similar products (Bayer, 2015). Therefore, the association between remittance inflow and the home country's GDP is negative in the short run. Moreover, In the short run, the migrant workers may send more remittances during the depressed economic condition of their home country. But, in the long run, the home country's GDP positively impacts remittance inflow. In the long run, increasing GDP may make the individuals more skilled and human capital. More skilled workers may migrate to the developed countries that would bring a positive impact on remittance inflow. The official exchange rate has a significant positive effect on remittance inflow in the long run. The results suggest that remittance inflow react significantly to a depreciation of the exchange rate. The

migrants may be more encouraged to send remittances during depreciation; however, this remittance is not necessary to bear the consumption expenditure of their family. The home currency devaluation may be increased the trade balance by rising remittance inflow (Ratha and Kang,2013). The CPI has a positive and statistically significant impact on remittance inflow in the long run. The result implies that the consumption expenditure of the migrants family increases with inflation in the long run. Therefore, the migrant workers need to send more remittances as the price level increases in the home country.

Yoshino *et al.* (2020) examined panel data from 22 Asia-Pacific middle-income countries. They found that the gap in the per capita GDP growth rate between host and home countries and trade openness positively impacted remittance inflow.

Conclusions, Limitations, and policy recommendation

This paper analyzes the determinants of workers' remittance inflow to Bangladesh and identifies their relationship with the remittance inflow in the short and long run. The results indicate that in the long run, the workers' remittance inflow in Bangladesh is positively influenced by the number of migrants, the host country's GDP, CPI of the home country, and the home country's per capita GDP, and the home country's exchange rate. In the short run, the previous year's remittance inflow is positively related to the current year's remittance. However, Gthe host countries' current year's GDP and the previous year's GDP negatively influence the remittance inflow in the short run. It may happen because increasing GDP in the host country increases the price level of the host country. It may increase the workers' cost of living in the host country.

Moreover, the short-run relation between remittance inflow and the consumer price index is also negative. In the short run, increasing CPI creates the shock of reducing remittance, which discourages the workers from sending remittance. Surprisingly, the home country's per capita GDP shows the adverse effects on the remittance inflow in the short run. The key drivers of remittance inward in Africa are financial service delivery quality, home country's investment facilities, and migrants' expected home country exchange rates (Eyden et al.,2011; Adenutsi et al.,2012).

Limitations

Due to lack of data and time, some important variables, including altruism, interest rate, political instability, and unemployment rate, are not included that could have provided more accurate measures of responsiveness of remittance inflow in Bangladesh. The sample size is not too large due to a lack of data for some variables. However, these variables are not undertaken, and a large sample is not used in this study. Future research could be done, including these variables with a large sample.

Policy Recommendations

This study will help to take short-run and long-run measures for enhancing remittance inflow in Bangladesh. The important implication based on the findings of this study is that the cost of sending remittances should be reduced. Also, Institutions should inaugurate new and attractive saving instruments whereby migrants can channel their remittance into productive sectors of the economy (World Bank, 2005). Though consumption has a multiplier effect, channeling remittance into investment could enhance economic growth. Finally, Bangladesh Government can encourage migrants to invest in their home country by relaxing the complex bureaucratic system and providing a safe investment environment. Also, necessary mineral resources and electricity should be available.

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Appendix. A1

Figure 1. The time plots in level for worker remittance inflow:

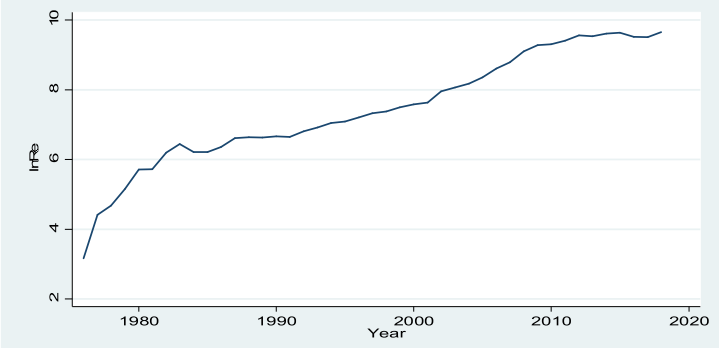


Figure 2. The time plots in level for number of migrant workers:

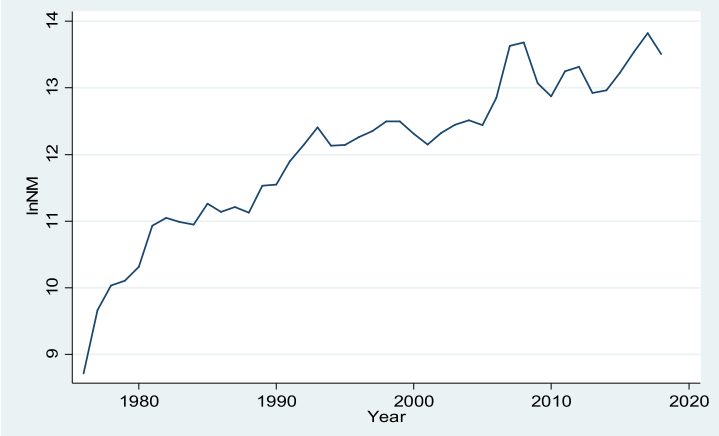


Figure 3. The time plots in level for weighted GDP of seven host countries:

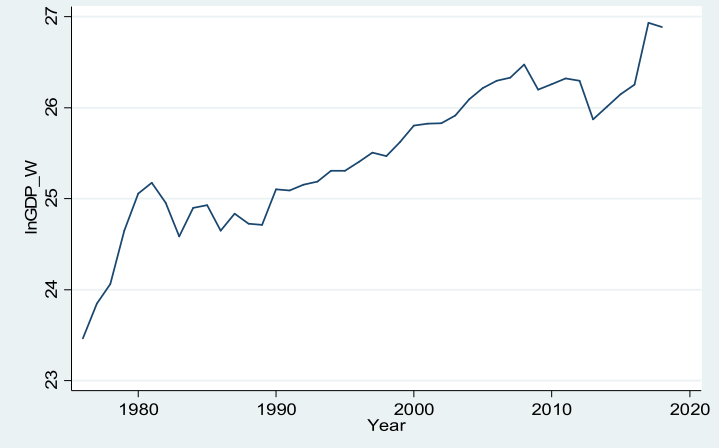


Figure 4. The time plots in level for CPI of home country:

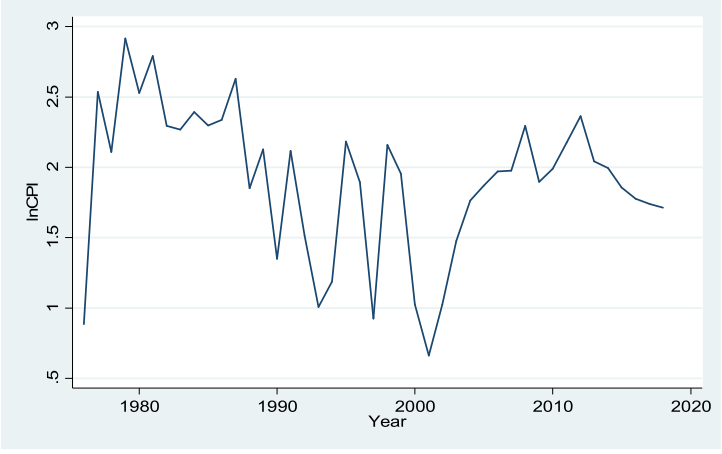


Figure 5. The time plots in level for per capita GDP of home country:

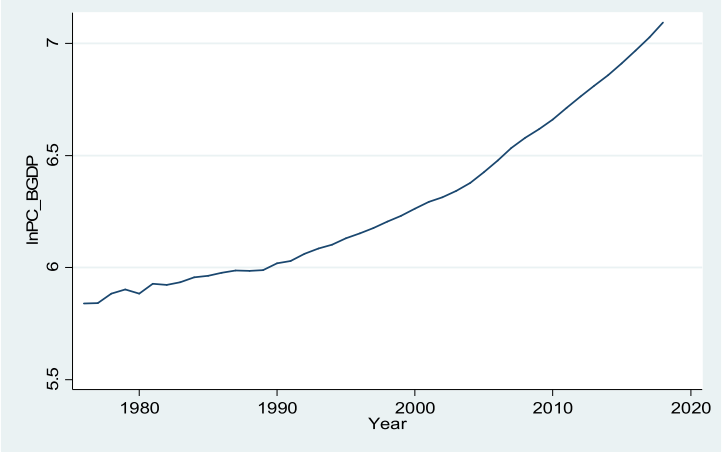


Figure 6. The time plots in level for per capita GDP of home country:

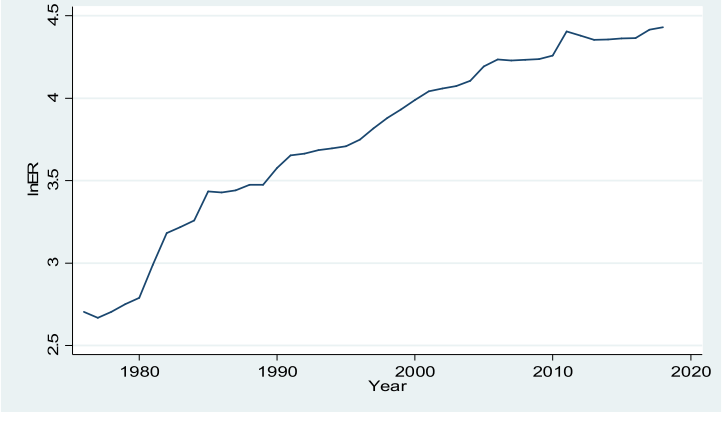
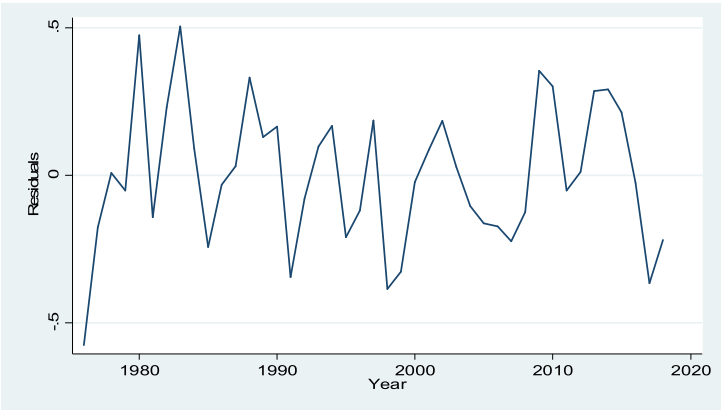


Figure 7. The time plots in level for the predicted residuals:



Appendix A2

Table 4. Matrix list of lags

Ln |Re	Ln NM	LN GDP_w	Ln CPI	Ln _BGDP	Ln ER
2	0	2	1	2	0

Table 5. results of ARDL model

Variables	**Ln Re**
Constant	-11.9600*** (2.6636)
Ln Re_L_1	-0.7743*** (0.1377)
Ln Re_L_2	-0.2722*** (.0.0963)
Ln NM	0.0219 (0.0616)
Ln GDP_W	0.0934 (0.0879)
Ln GDP_W_L_1	-0.0579 (0.01085)
Ln GDP_W_L_2	0.2971*** (0.1034)
Ln CPI	0.0567 (0.0434)

Ln CPI_L_1	0.0580 (0.0405)
Ln PC_BGDP	-5.3714*** (1.7360)
Ln PC_BGDP_L_1	8.7172*** (1.9013)
Ln PC_BGDP_L_2	-2.5434 (1.7033)
LnER	0.4943** (0.2459)
No of Observation	41
R^2	0.9968
P value of F	0.0000

Note: Level of statistical significance ***=1%, **=5% & *=10%.
Numbers in parentheses are standard error.

Table 6. Misspecification test results for the ARDL model

Test	Results
DW	1.9623
BG[1]	0.9189
BP[1]	0.3835
White[1]	0.4265

DW=Durbin-Watson
BG=Breusch- Godfrey
BP=Breusch-Pagan
[1] P value

Equation	Excluded	Chi2	df	Prob > chi2
lnRe	lnNM	1.0743	2	0.584
lnRe	lnGDP_W	13.202	2	0.001
lnRe	lnCPI	3.1164	2	0.211
lnRe	lnPC_BGDP	28.905	2	0.000
lnRe	lnER	2.5149	2	0.284
lnRe	ALL	61.586	10	0.000
lnNM	lnRe	4.6716	2	0.097
lnNM	lnGDP_W	2.2837	2	0.319
lnNM	lnCPI	2.4941	2	0.287
lnNM	lnPC_BGDP	1.4227	2	0.491
lnNM	lnER	1.2278	2	0.541
lnNM	ALL	22.204	10	0.014
lnGDP_W	lnRe	4.5944	2	0.101
lnGDP_W	lnNM	0.92363	2	0.630
lnGDP_W	lnCPI	2.138	2	0.343
lnGDP_W	lnPC_BGDP	6.3921	2	0.041
lnGDP_W	lnER	9.5953	2	0.008
lnGDP_W	ALL	29.861	10	0.001
lnCPI	lnRe	4.6041	2	0.100
lnCPI	lnNM	1.9311	2	0.381
lnCPI	lnGDP_W	0.36851	2	0.832
lnCPI	lnPC_BGDP	2.684	2	0.261
lnCPI	lnER	7.1647	2	0.028
lnCPI	ALL	17.007	10	0.074
lnPC_BGDP	lnRe	2.0708	2	0.355
lnPC_BGDP	lnNM	6.8788	2	0.032
lnPC_BGDP	lnGDP_W	1.9294	2	0.381
lnPC_BGDP	lnCPI	0.82449	2	0.662
lnPC_BGDP	lnER	2.5534	2	0.279
lnPC_BGDP	ALL	19.379	10	0.036
lnER	lnRe	20.056	2	0.000
lnER	lnNM	3.5494	2	0.170
lnER	lnGDP_W	18.879	2	0.000
lnER	lnCPI	1.5239	2	0.467
lnER	lnPC_BGDP	5.2261	2	0.073
lnER	ALL	38.881	10	0.000

Data Sources

https://www.bb.org.bd/econdata/
http://bmet.portal.gov.bd/site/info_officers/www.bmet.gov.bd
www.bbs.gov.bd
https://www.imf.org/en/Data
https://databank.worldbank.org/home.aspx