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Kanchan Datta
University of North Bengal

and

Bimal Sarkar
Bangabasi Morning College

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Bangladesh Development Research Center (BDRC)
2508 Fowler Street
Falls Church, VA 22046-2012, U.S.A.

Tel. +1 703 532 4893
E-Mail: contact@bangladeshstudies.org
http://www.bangladeshstudies.org

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Relationship between Remittances and Economic Growth in Bangladesh: An Econometric Study

Kanchan Datta and Bimal Sarkar*

Abstract

In Bangladesh, remittances have increased sharply over the last 20 years and amount since 2008 to over 10 percent of GDP. While remittances can foster growth and development as well as prevent balance of payment crises, they can also have a negative impact on growth if used for conspicuous consumption or unproductively. Recipients of remittance can become highly dependent on the easy money, causing them to reduce their efforts and or their participation in the labor market, which would affect economic growth negatively. In this paper an attempt is made to analyze the impact of remittances on economic growth in the Bangladeshi economy, using time series econometric techniques, specifically, the auto regressive distributed lag (ARDL) framework.

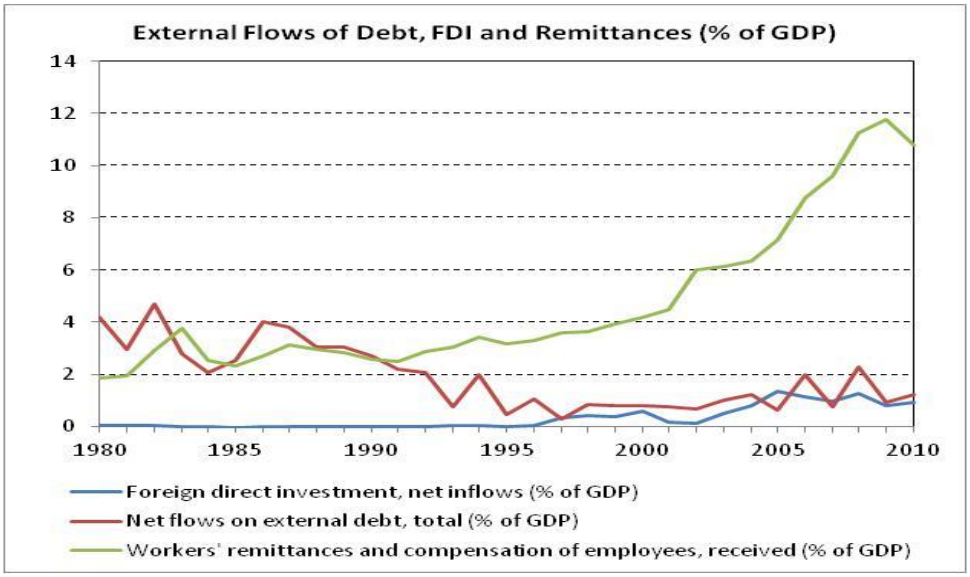
* Respectively, Associate Professor of Economics, University of North Bengal, Siliguri, District Darjeeling, West Bengal, 734430, Bairatisal, West Bengal 734013, India; and Assistant Professor of Economics, Bangabasi Morning College, Kolkata, West Bengal 700009, India. Comments are welcome to be sent directly to the authors at: kanchan.datta@gmail.com and bimal.bmc@gmail.com.

I. Introduction

Migration from Bangladesh to the rest of the world is not a new incidence. Bangladesh has a long history of migration and overseas remittances since 1942 (Mahmood, 1991). From 1979 to 2008, remittance inflows to Bangladesh have increased at an average annual rate of 19 percent (Hussain and Naeem, 2009). Between 1976 and 2010, a total of 7.1 million people emigrated temporarily from Bangladesh. Since 2009, emigrants sent home more than US$10 billion a year, amounting to slightly more than ten percent of GDP. Some years ago, Bangladesh had become one of the top 10 remittance-recipient countries in the world, after India, China, Mexico, Philippines, Poland, Nigeria, Egypt and Romania (Ratha, Mohapatra and Xu, 2008). It is important to note that a large part of remittances remains unrecorded. Unrecorded remittances have been estimated to be about 50 to 200 percent of the officially recorded remittances (Aggarwal, Demirgüc-Kunt and Peria, 2006).

At least two factors are responsible for fast growth in remittances in developing countries. First, in the past 20 years, immigration has increased dramatically between developing and developed countries. Second, due to technological improvements, the transaction costs for the international transfer of payments between individuals have declined (Giuliano and Ruiz-Arranz, 2005). In the case of Bangladesh, some macroeconomic reforms, like the opening of new exchange houses in source countries, expansion of drawing arrangements, setting an annual remittance threshold, close monitoring and supervision of banks, speeding up of delivery to the beneficiaries, and surveillance measures under the Money Laundering Prevention Act, have contributed to the increase in remittances since the late 1990s (see Bangladesh Bank, 2004).

Figure 1: External Flows of Debt, FDI and Remittances (% of GDP), 1980-2010



Source: Created by author based on World Bank (2012).

As Figure 1 shows, in Bangladesh, the flows of remittance are far higher than other types of capital inflows, like official development aid (ODA) and foreign direct investment (FDI). They

typically are also counter cyclical (World Bank, 2006) as remittance inflows increase during downturns as emigrant workers went to provide financial support to the family members in the country of their origin (Sayan, 2006). That is remittance act as a significant macroeconomic stabilizer in the developing countries.

In any developing country, a common problem is the shortage of foreign exchange reserves. Remittances can help prevent balance of payment crisis, providing a constant source of foreign currency (Lopez-Cordova and Olmedo, 2006). Bangladesh also depends on remittances to meet the payment obligations from import bills as imports of goods and services have exceeded exports of goods and services by about 7 percent of GDP in recent years as well as on average over the last three decades (World Bank, 2012).

This paper examines whether remittances are a statistically significant factor in determining economic growth and whether the relationship between remittances and economic growth is causal. Following this Introduction, the next section provides a brief review of the literature. The third section describes the methodology, while the fourth section provides the main results before the last section concludes.

II. Brief Literature Review

There is a relative large debate regarding the impact of remittances in the home country of migrant workers, though most of the studies have looked at the correlation between remittances and growth, but have not established any causation. There are various studies that claim that remittances promote growth through smoothing the investment constraint as it act as a substitute for in-efficient or non-existent credit markets (Giuliano and Ruiz-Arranz, 2005). There may also be positive impact of remittances on economic growth if remittances are used for the purpose of children's education and welfare expenses such as health care because in the long run there may be a positive impact on labor productivity and hence output. Furthermore, Glytos (2005) suggests that remittances can allow the import of more capital goods, which can help to increase the growth rate.

On the other hand, Stahl and Arnold (1986) pointed out that there may be negative impact of remittances on growth if there is a demonstration effect. This demonstration effect can motivate the remittance recipients to consume imported goods. Hence, if this effect becomes wide-spread, this can reduce savings and investments that may be sufficient to reduce the growth rate of the recipient country. If remittances are used for conspicuous consumption or unproductively by an excessive degree of capital intensity in the agricultural sector there would have negative impact on development (Oberoi and Singh, 1980). Again if recipients become highly dependent on the easy money which causing them to reduce labor market participation, there may exists the problem of moral hazard between remitters and recipients. That is remittances do effect economic growth negatively (Barajas et al. 2009, and Chami, Fullenkamp and Jahjah, 2003).

A large number of studies is based on panel-data, covering a number of countries. Chami et al. (2003) find that remittances have negative effects on growth in their study on 113 countries. A study by the International Monetary Fund (2005) finds no statistical link between remittances and per capita output growth studying on 101 developing countries. On the other hand, Pradhan, Upadhyay and Upadhyaya (2008) find a positive impact on growth in their work with 39 developing countries during 1980-2004. Ziesemer (2006) argues that remittances increase

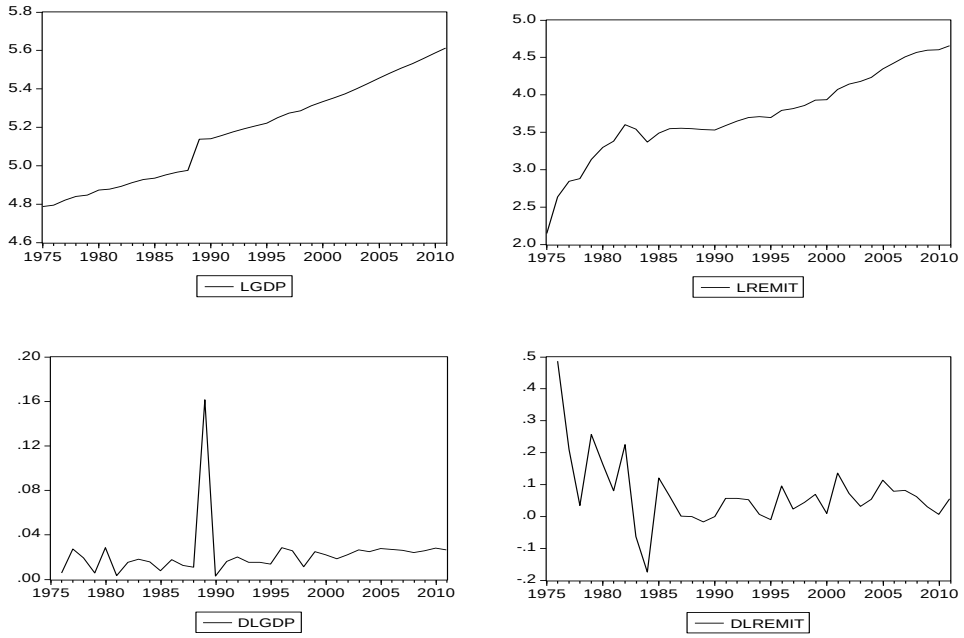
savings which increase investment by decreasing interest rates and also increases the literacy rate. Jongwanich (2007) finds that remittances have a positive but marginal impact on economic growth in Asian and Pacific countries. Barajas et al. (2009) find that remittances have no impact on economic growth. According to Catrinescua et al. (2009), research has not come to a conclusion whether remittances have a positive or negative impact on long-run growth.

There also are a few studies examining the impact of remittances in Bangladesh. Stahl and Habib (1989) argue that there is a multiplier effect of remittances. They explain that remittances increase savings, which then increase growth. They calculated the multiplier for Bangladesh for the period of 1976-1988 to be 1.24. Mahmud (2003) as well as Siddique (2004) claim that remittances foster growth in Bangladesh. Paul and Das (2011) find a long-run positive relationship between remittances and GDP, but that there is no evidence on remittance-led growth in the short run. Ali (1981) identifies that remittances help for favorable balance of payment. On the other hand, Rahman et al. (2006) and Rahman (2009) concludes that remittance seems to have insignificant and ambiguous effects on Bangladesh's GDP. Ahmed (2010) finds that flow of remittances to Bangladesh have been statistically significant but have a negative impact on growth. Siddique, Selvanathan and Selvanathan (2010) also find that growth in remittances does not lead to economic growth in Bangladesh.

III. Methodology

The data was collected from the Central Bank of Bangladesh. It covers the time period 1975 to 2011. GDP and Remittances are deflated by the GDP deflator with the base of 1995-96=100 and then converted into logarithmic form. So both the variables used are real variables, denoted by LRemit (for remittances) and LGDP (for GDP). The evolution of these variables (LRemit and LGDP), as well as their growth rates (DLRemit and DLGDP), are shown in Figure 2.

Figure 2: Time plots of GDP and Remittances and Their Growth Rates



The paper adopts the recently developed auto regressive distributed lag (ARDL) framework by Pesaran and Shin (1999). There are advantages of using this approach instead of the conventional Johansen (1991) approach. While the conventional cointegrating method estimates the long-run relationships with in a context of a system of equations, the ARDL method employs only a single reduced form equation. Moreover, the ARDL approach does not involve pre-testing variables, which means that the test on the existence relationship between variables in levels is applicable irrespective of whether the underlying regressors are purely I(0), purely I(1) or a mixture of both.

This feature alone, given the characteristics of the cyclical components of the data, makes the standard of cointegration technique unsuitable and even the existing unit root tests to identify the order of integration are still highly questionable. Furthermore, the ARDL method avoids the larger number of specification to be made in the standard cointegration test. These include decisions regarding the number of endogenous and exogenous variables (if any) to be included, the treatment of deterministic elements, as well as the optimal number of lags to be specified. The empirical results are generally very sensitive to the method and various alternative choices available in the estimation procedure (Pesaran and Smith, 1998). With ARDL, it is possible that different variables have different optimal lags, which is impossible with the standard cointegration test. Most importantly the model could be used with limited sample data (30 to 80 observations) in which the set of critical values were developed originally by Narayan (2004).

Basically the ARDL approach to cointegration involves estimating the conditional error correction version of the ARDL model for remittances and GDP of Bangladesh. Two sets of critical values are generated which one set refers to the I(1) series and the other for the I(0) series. Critical values for the I(1) series are referred to as upper bound critical values, while the critical values for I(0) series are referred to as the lower bound critical values.

If the F test statistic exceeds their respective upper critical values, we can conclude that there is evidence of a long-run relationship between the variables regardless of the order of integration of the variables. If the test statistic is below the upper critical value we cannot reject the null hypothesis of no cointegration, and if it lies between the two bounds, a conclusive inference cannot be made without knowing the order of integration of the underlying regressors.

The ARDL Model

$$DLGDP_t = \alpha_1 + \sum_{i=1}^{k} \beta_i DLGDP_{t-i} + \sum_{i=1}^{k} \beta_i DLRemit_{t-i} + \delta_1 LGDP_{t-1} + \delta_2 LRemit_{t-1} + \mu_{2t} \quad (1)$$

$$DLRemit_t = \alpha_1 + \sum_{i=1}^{k} \beta_i DLRemit_{t-i} + \sum_{i=1}^{k} \beta_i DLGDP_{t-i} + \delta_1 LRemit_{t-1} + \delta_2 LGDP_{t-1} + \mu_{1t} \quad (2)$$

The orders of the lags in the ARDL model are selected by either the AIC or BIS a criterion before the selected model is estimated by Ordinary Least Squares (OLS). For annual data, Pesaran and Shin (1999) recommended choosing a maximum of 2 lags. From this the lag length that minimizes the adjusted sum or squared residuals (SSR) is selected (Schwarz Bayesian Criteria).

Then, the F test is used for testing the existence of a long-run relationship. When a long-run relationship exists, the F test indicates which variable should be normalized. The null hypothesis for no-cointegration among the variables in equation (1) is

H_0: $\delta_1 = \delta_2 = 0$

against the alternative hypothesis:

H_1: $\delta_1 \neq \delta_2 \neq 0$.

The F test has a non-standard distribution which depends on

(i) whether variables included in the model are I(0) or I(1)
(ii) the number of regressors and
(iii) whether the model contains an intercept and or a trend

If there is evidence of long-run relationship (cointegration) of the variables, the following long-run model is estimated.

$$LGDP_t = \alpha_1 + \sum_{i-1}^{p} \beta_{1i} LGDP_{t-i} + \sum_{i=1}^{p} \delta_{1i} L\,\mathrm{Re}\,mit_{t-i} + \varepsilon_t \qquad (3)$$

The ARDL specification of the short-run dynamics can be derived by constructing an error correction model (ECM) of the following form

$$DGDP_t = \alpha_2 + \sum_{i-1}^{p} \beta_{2i} DLGDP_{t-i} + \sum_{i=1}^{p} \delta_{2i} DL\mathrm{Re}\,mit_{t-i} + \varphi ECM_{t-1} + \varepsilon_t \qquad (4)$$

where *DLGDP* is the 1st difference of log GDP, and *DL*Re*mit* is the 1st difference of log remittances.

The error correction model (ECM) is defined as

$$ECM = LGDP_t - \alpha_1 - \sum_{i=1}^{p} \beta_{1i} LGDP_{t-i} - \sum_{i=1}^{p} \delta_{1i} L\,\mathrm{Re}\,mit_{t-i} \qquad (5)$$

All coefficients of the short-run equation are coefficients relating to the short-run dynamics of the model's convergence to equilibrium and φ represents the speed of adjustment.

IV. Empirical Findings

Prior to the testing of cointegration we conducted a test of order of integration for each variable, using Augmented Dickey-Fuller (ADF) and Philip-Perron (PP) technique. Even though the ARDL frame work does not require pretesting variables, the unit root test could inform us whether or not the ARDL model should be used. The results in Table 1 show that there is a mixture of I(1) and I(0) of underlying regressors and therefore the ARDL testing could be proceeded.

Table 1: Results of the ADF and PP Unit Root Test

Variable	*Exogenous*	*ADF Statistic*	*Prob.* MacKinnon (1996) one-sided p-values	*PP statistic*	*Prob.*
LREMIT	Constant	-3.396896	0.0177	-2.854790	0.0608
LREMIT	Constant + trend	-5.378830	0.0005	-4.738733	0.0028
LGDP	Constant	0.332852	0.9769	0.526483	0.9854
LGDP	Constant + trend	-3.016009	0.1420	-3.016009	0.1420
DLGDP	Constant	-6.892125	0.0000	-6.946404	0.0000
DLGDP	Constant + trend	-6.845833	0.0000	-6.947532	0.0000

Our next step is to investigate the long-run relationship between the two variables. For this purpose we apply OLS on equation (1), the unrestricted regression. The number of lag is selected by Pesaran and Shin (1999) and Narayan (2004). Since our observations are annual in nature, we choose 2 as maximum order of lags in the ARDL and estimate for the period of 1975 to 2011. The calculated F-statistics for the cointegration test is shown in Table 2 (as well as the critical value, which based on Narayan (2004) is between 30 and 80 if using a small sample size).

The calculated F-statistic of 6.25 is (for the given degrees of freedom) higher than the upper bound critical value at the 1% level of significance, using restricted intercept and trend. This implies that the null hypothesis of no-cointegration can be rejected at the 1% level of significance and therefore, there is a cointegration relationship among the variables.

Table 2: F-statistic of Cointegration Relationship

Test Statistic	value	Lag	Significance level	Bound critical values (restricted intercept and no trend)		Bound critical values (restricted intercept and trend)	
F Statistic	6.25	2		I(0)	I(1)	I(0)	I(1)
			1%	4.614	5.966	5.333	7.063
			2%	3.272	4.306	3.710	5.018
			10%	2.676	3.586	3.008	4.150

The empirical results of the long-run model obtained by estimating the equation (3) are shown in Table 3 below. The results clearly show that even though there is a long-run relationship between the variables but that there is no long-run causal relation between the two variables.

Table 3: Results of Estimation of Equation 3

Dependent Variable: LGDP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGDP (-1)	0.805339	0.180451	4.462921	0.0001
LGDP (-2)	0.161754	0.183922	0.879471	0.3861
LREMIT (-1)	0.021205	0.059332	0.357393	0.7233
LREMIT (-2)	-0.000891	0.045365	-0.019651	0.9845
α_1	0.121011	0.191031	0.633462	0.5312

The results of the Error Correction Model (that represents short-run dynamics) is shown in Table 4, whereby lag 4 is selected based on the SIC criterion.

Table 4: Results of the Estimation of Error Correction Model (Equation 4)

Dependent Variable D (LGDP)			
Variable	Coefficient	Std. Error	t-value
ECM	-0.050088	0.08312	-0.60264
D (LGDP (-1)	-0.196063	0.22078	-0.88805
DLGDP (-2)	-0.094361	0.22541	-0.41862
DLGDP (-3)	-0.011976	0.22282	-0.05375
DLGDP (-4)	-0.046938	0.21526	-0.21805
DLREMIT (-1)	-0.057360	0.08367	-0.68552
DLREMIT (-2)	-0.061635	0.07355	-0.83801
DLREMIT (-3)	-0.022684	0.07105	-0.31926
DLREMIT (-4)	0.038371	0.06105	0.62852
α_2	0.037030	0.01642	2.25457

From the above results it is clear that even though the ECM coefficient is negative, it is not statistically significant. Hence, the short-run deviations are not significant. This implies the stability of a long-run relationship. Since no short-run coefficients are statistically significant (though the first three lags remittance growth is showing a negative relationship with GDP growth, but the estimated coefficients are not statistically significant), this implies that there is no short-run causality between the two variables. The residuals of the error correction model are not serially correlated. This is shown by Portmanteau Tests for Autocorrelations in Table 5, which is a diagnostic check that increases the reliability of our estimation.

Table 5: VEC Residual Portmanteau Tests for Autocorrelations

H_0: no residual autocorrelations up to lag h					
Lags	Q-Stat	Prob.	Adj. Q-Stat	Prob.	df
1	0.603113	NA*	0.622568	NA*	NA*
2	5.372691	NA*	5.710118	NA*	NA*
3	7.327517	NA*	7.867167	NA*	NA*
4	8.863867	NA*	9.622996	NA*	NA*
5	18.47484	0.0010	21.01378	0.0003	4
6	25.68293	0.0012	29.88527	0.0002	8
7	30.07829	0.0027	35.51133	0.0004	12
8	31.42932	0.0119	37.31271	0.0019	16
9	32.06987	0.0426	38.20390	0.0084	20
10	32.20164	0.1221	38.39558	0.0316	24
11	32.75787	0.2448	39.24317	0.0771	28
12	36.51104	0.2670	45.24824	0.0604	32

*The test is valid only for lags larger than the VAR lag order;
df is degrees of freedom for (approximate) chi-square distribution.

V. Conclusion

Remittances are a very important factor for the economic development of developing countries. Bangladesh is a huge labor surplus country and is an important supplier of migrant workers to those countries which are suffering from labor shortages or can afford to hire cheap labor. A large number of Bangladeshi migrant workers are going to almost all countries of the world, especially to the oil-rich countries.

This paper attempted to find out the impact of remittances on economic growth in the Bangladeshi economy. The data was taken from the Bangladesh Bank and the time series econometric technique, especially the ARDL model was applied since the two variables are not of the same order of integration. The findings of this study show that in Bangladesh, there is a possibility of a long-run relationship between remittances and GDP, but that there is no predictive causal relationship, neither in the short-run nor in long-run.

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