

Does Worker's Remittance promote Economic Growth in Bangladesh? : A Time Series Analysis

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Abstract: This study aims at investigating the relationship between gross domestic product and worker's remittance in the context of Bangladesh. A time series analysis, covering the data of 1987-2018, confirms that the data are stationary at their first difference form by ADF and PP test and cointegrated by Johansen procedure. The normalized Cointegration coefficients are showing stable and positive relation between gross domestic product and remittance and negative relationship between inflation and GDP. Results from VECM suggest that equilibrium will be restored by 43% in each period. Granger causality test substantiate that there exists bidirectional causality. Variance decomposition also supports the results of VECM. This study suggests that policy makers should take appropriate steps to increase worker's remittances to achieve the long run economic growth.

Keywords: Remittance, Gross Domestic Product, Co-integration, VECM, Granger Causality, Variance Decomposition, Bangladesh

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I. Introduction

Bangladesh is the 8th biggest remittance recipient country in the world. Workers' remittance is significant part of international capital flows (Jha, 2018). A majority of the remittances have been directed to Asian countries like India (approx. 62.7 billion USD in 2016), China (approx. 61.0 billion USD in 2016), the Philippines (approx. 29.9 billion USD in 2016), Pakistan (19.8 billion USD in 2016) and more (World Bank, 2017). According to World Bank, Bangladesh is now one of the largest recipients of remittance with almost \$15 billion as of June 2015. Remittances in Bangladesh increased to 1482.85 USD Million in May from 1331.33 USD Million in April of 2018. Remittances in Bangladesh averaged 1195 USD Million from 2012 until 2018, reaching an all-time high of 1491.36 USD Million in July of 2014. Remittance has the conditional impacts on both poverty & inequality. The national level simulations indicate that remittance decreases the head count poverty by 2.3% & 3.3% in the developing countries. In developing countries there can be many indicators that are closely related to remittances. Remittances in Bangladesh decreased to 1316.93 USD million in June of 2018. Reaching an all-time high of 1504.98 USD Million in May of 2018 and a record low of 856.87 USD Million in September of 2017 (Bangladesh Bank, 2017).

In Bangladesh the remittance has greater impact on economic growth, balancing balance of payment (BOP)¹, increasing foreign exchange reserves, enhancing national savings, increasing velocity of money². For about two decades remittance has been contributing around 35% of the export earnings. Currently the GDP growth rate in Bangladesh is 7.65% in fiscal year 2018 & was 7.28% in fiscal year 2017. Remittance constitutes 7.24% of Bangladesh GDP (March 8, 2018)³. The share of remittance inflow in Bangladesh was 7.5% in fiscal year 2007, it has reached about 9.5% in the fiscal year 2013. It stood 5.17% in fiscal year 2017. We can say that the growth effect of remittance in Bangladesh is increasing gradually & it has subsequent impact on income inequality. A World Bank analysis said, Remittance is the key driver of economic growth in Bangladesh (Rahman, 2018).

Remittances are considered as one of the essential sources of external funds for developing countries. Bangladesh is a developing country in South Asia & very well familiar in the world for its large amount of

¹ Balance of payment is the statement of all transactions made between entities in one country & the rest of the world over a defined period of time.

² Velocity of money is the rate at which money is exchanged from one transaction to another.

³ Remittance constitutes 7.24 percent of Bangladesh's GDP. (2018). Retrieved from <http://www.theindependentbd.com/post/140496>

emigration & worker's remittance. Bangladesh receives 2.6% of global remittance flow. The country ranked 8th among developing countries & 10th as globally remittance receiving country in 2013 with the remittance earning of 13.86 billion U.S. dollar. From the estimation of 2014-15 fiscal years, the transfer of remittance from the migrant workers is too high; it had turned into 15.31 billion U.S. dollar. The GDP growth rate of Bangladesh was then 7.9%, which is very significant growth of Bangladesh economy. The growth of remittance in 2015 was very moderate of about 4.4%.⁴ Currently remittance inflow occurred of about 17.39% rise in the fiscal year 2017-18. Since remittance seems to be a key factor of economic prosperity, we want to analyze the nexus between economic growth and remittance in Bangladesh.

II. Literature Review

Remittance makes direct contribution, to raise household to increase their consumption of local goods & services. Besides, it creates employment opportunity, social infrastructure service increase (Adhikari, 2016).

Garip (2010) has shown in an analysis that, remittances in developing countries amount to 240 billion US dollar annually; it has potential to disrupt the distribution of income & create a new system of social satisfaction. Migration & remittances are connected. The link between household wealth & migration remittance behavior varies over the different stages of individual's migration career. Migration & remittance flows create a divide between households with & without migrants. Inequality is higher in communities with higher migration prevalence.

According to Milanovic (1987) the time pattern of migration it seems that both the migration & return to the home country were led by the migrants belonging to higher income groups with the onset of the process of migration the level of inequality increased substantially. The consideration regarding the effect of worker's remittance on income distribution in the home country has not yet received.

According to Mourao (2016) significant number of migrants do not earn high incomes it tends to significantly affect migrants' abilities to send money back to their home country. According to the study of Pakistan economy of years (1976-2006) shows the linkages between income inequality, international remittances & economic growth. It found that, there is U-shaped relationship between income inequality & economic growth, in case of Pakistan. It reveals that, income inequality initially declines economic growth & after a certain period of time, it increases the growth. The contribution of international remittance is inverted U-shaped but it is insignificant. The inequality & international remittances contribute to economic growth in both short run & long run (Shahbaz, Rehman, & Mahdzan, 2014).

There are many available literature regarding the remittance flow and economic growth in developing countries. Different studies exhibits different results based on country heterogeneity. Majority of the available studies illustrate a linear positive relationship between workers remittance and economic growth. Giuliano and Ruiz-Arranz (2005) carried out a study with International Monetary Fund (IMF) to find out the relationship between remittance and growth. They have used the data of 100 countries and applied the Generalized Method of Moments (GMM) for cross country data series. The study found that economic growth is heavily influenced by remittance flow in less developed countries. It also suggests that economic growth is promoted through capital accumulation.

Few studies have tried to address the impact of workers remittances on economic growth as well as poverty alleviation and income inequality. Aggarwal et al. (2006) argued in a study that remittances have a significant positive effect on bank deposits and credit to GDP ratio. Taylor (1992), Faini (2001), Taylor (1999) and Spatafora (2005) found positive relationship in their studies between remittance and economic growth.

Anote on "G8 outreach event on remittance" has been prepared to demonstrate the impact of remittances on economic development and found that remittances are the most important source of financial development (Ratha and Mohapatra, 2007). In many developing countries, remittance is the main source of financing and it also contributes in reducing poverty as well as the living standard of people.

But in another study Chami et al. (2003) claimed that there is a negative relationship between economic growth and remittances. They used a sample of 113 countries and found that remittance earning family members are discouraged to work more and their productivity also declines. So production process gets slower as well as economic growth. Siddique et al. (2012), Das and Chowdhury (2011), Datta and Sarkar (2014) found causal relationship among remittances and economic growth in Bangladesh. They also argued that remittances have both short run and long run relationship with economic growth.

⁴Retrieved from:

https://www.researchgate.net/publication/312904482_Remittance_Inflows_and_Its_Contribution_to_the_Economic_Growth_of_Bangladesh

III. Methodology and Empirical Results

3.1 Data

To verify the purpose of this study we have selected the following variables: Gross domestic product (GDP), Remittances (REM) and Inflation (INF). To ensure robust estimation process data from 1987 to 2018 has been used. Data were collected from the World Bank (2018) and BMET (2018) all the variables are converted into logarithmic form to normalize the data for analysis purpose. GDP is measured in million US dollar, Remittance is measured in million US dollar and inflation rate is in percentage. The specified time series model can be written as:

$$\ln GDP_t = \beta_1 + \beta_2 \ln REM_t + \beta_3 \ln INF_t + u_t$$

Where,

$\ln GDP_t$ = Natural logarithm of GDP at t time; $\ln REM_t$ = Natural logarithm of remittance at time t .

$\ln INF_t$ = Natural logarithm of inflation at time t ; u_t = Error term.

3.2 Unit Root Test

Guzrati (2003) demonstrated that the variable should be stationary in time series analysis because if variable is non-stationary it will provide spurious regression and the coefficient might not have an asymptotic distribution. Normal statistical tests are invalid with the presence of unit root in the variable because of time varying variance (Rahman and Cheem, 2013). Most widely used testing procedure for unit root in times series literature are Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test. To check stationarity, the ADF test is performed using the following regression.

$$\Delta y_t = \alpha_1 + \delta y_{t-1} + \sum_{i=1}^k \beta_i \Delta y_{t-i} + \epsilon_t$$

In the equation, k is the number of lag which is determined by the Akaike Information Criteria (AIC). The null hypothesis is set in the sense that the variable under consideration has unit root and the rejection of null hypothesis means that the variable is stationary. Now, the PP test is performed using the following equation:

$$\Delta y_t = \pi y_{t-1} + \beta_i D_{t-i} + \epsilon_t$$

Test results evident in Table-01 suggest that all the variables are non-stationary in their level form and stationary in their first differenced form. This implies that all the variables are integrated of order one i.e. I(1). As all the variables are I(1) it is required to apply Johansen procedure to identify the Cointegration between remittance and gross domestic product.

Table-01: Results of Unit Root Test

Variables	ADF		PP	
	Level	1 st diff:	Level	1 st diff:
LGDP	1.815624 (0.9994)	-3.550899** (0.0172)	1.713007 (0.9992)	-3.623066** (0.0148)
LREM	0.29422 (0.9746)	-5.60503*** (0.0002)	0.33923 (0.9771)	-5.06827*** (0.0002)
LINF	-0.94454 (0.7682)	-10.24704*** (0.0001)	-0.994248 (0.7510)	-10.20566*** (0.0001)

Note: *** denotes 1% significance level, ** denotes 5% significance level and * denotes 10% significance level. p-values are in parentheses

3.3 Johansen Cointegration Approach

To identify the cause and impact relationship between variables under the consideration we need to ensure that they are cointegrated in the long run. Johansen Cointegration method developed by Johansen (1988) and Johansen and Juselius (1990) is used to detect the long run relationship among variables. In Johansen method, trace and maximum Eigen value test are used to determine the number of cointegrating vectors. The equation for Trace statistics and Eigenvalue statistics can be represented as follows:

$$\lambda_{Trace}(r) = -T \sum_{i=r+1}^g \ln(1 - \hat{\lambda}_i)$$

$$\lambda_{Max}(r, r + 1) = -T \ln(1 - \hat{\lambda}_{r+1})$$

Here, T is the sample size and λ_i is the i^{th} largest canonical correlation. In Trace test the null hypothesis is $r = 0$ i.e. the series are not cointegrated and the alternative hypothesis is $r \geq 1$. In Eigenvalue test the null hypothesis shows cointegrated vectors are equal to r and alternative hypothesis shows cointegrated vectors are equal to $r+1$.

Table-02: Test results of Cointegration

Hypothesized No. of CE(s)	Trace Statistic	0.05 Critical Value	p-value	Max-Eigen Statistic	0.05 Critical Value	p-value
None*	38.65935	29.79707	0.0037	23.66587	21.13162	0.0215
At most 1	14.99348	15.49471	0.0594	13.68096	14.26460	0.0617
At most 2	1.312515	3.841466	0.2519	1.312515	3.841466	0.2519

Note:
Trace test and Maximum Eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The test results of Cointegration based on both trace statistics and maximum eigenvalue statistics are presented in Table-02. Both the trace statistics indicates that there exists one cointegrating vector at 5% level of significance. Finally the existence of cointegrating vector implies that there is a strong stable long run relationship among the variables.

The normalized cointegrating coefficients are presented in table -03. The sign of normalized cointegrating coefficients implies that the long run relationship between GDP and Remittance is positive and significant. On the other hand inflation and GDP are negatively associated in the long run which is also significant.

Table-03: Normalized cointegrating coefficients

LGDP	LREM	LINF
1.000000	-0.546651	0.391863
	(0.02987)	(0.07590)

Note: Standard error in parentheses

This result is normalized on GDP. Due to normalization process, the signs are reversed to enable proper interpretation. The normalized Cointegration equation can be written as:

$$LGDP = 0.55 LREM - 0.39LINF$$

The coefficients are interpreted as follows:

- A 1% increase in remittance can cause 0.55% increase in GDP of Bangladesh.
- A 1% increase in inflation can cause 0.39% decline in GDP of Bangladesh.

3.4 Vector Error Correction Model (VECM)

As variables are cointegrated we now want to look into the short run dynamics of the model by using a vector error correction model (VECM) rather than using a vector autoregressive model (VAR). VECM model can be specified as follows:

$$\Delta LGDP_t = \mu_{11} + \mu_y V_{t-1} + \sum_{i=1}^k \delta_{11,i} \Delta LGDP_{t-i} + \sum_{i=1}^k \delta_{12,i} \Delta LREM_{t-i} + \sum_{i=1}^k \delta_{13,i} \Delta \ln GDP_{t-i} + u_1$$

Table-04: Results of Error Correction Model

Error Correction	D(LGDP)	D(LREM)	D(LINF)
ECM _{t-1}	-0.436828 (0.58607) [-0.74535]	-0.159115 (0.12846) [-1.23865]	-2.367753 (0.56946) [-4.15790]
D(LGDP(-1))	-0.784171 (2.17323) [-0.36083]	-0.463492 (0.47634) [-0.97302]	3.575579 (2.11163) [1.69328]
D(LREM(-1))	1.429821 (1.06328) [1.34472]	0.143454 (0.23306) [0.61553]	-1.823152 (1.03315) [-1.76466]
D(LINF(-1))	0.127045 (0.17653) [0.71966]	0.067282 (0.03869) [1.73883]	0.156818 (0.17153) [0.91423]
C	-0.090868 (0.18788) [-0.48365]	0.119788 (0.04118) [2.90884]	-0.083342 (0.18255) [-0.45653]

Note: standard errors in () and t-statistics in []

From the results obtained from VECM are presented in table-04. The estimated error correction term has the correct sign. The coefficient of error correction term implies that 43% deviation of GDP from its long run equilibrium is corrected by itself in each year.

3.5 Granger Causality Test

As these variables are also associated in the short run, table-05 presents the results of the short run granger causality test. This is based on standard F statistic that tests jointly the significance of the coefficients of the explanatory variables in their first differences.

Table-05: Results of Granger Causality Test

Null Hypothesis	F-Statistic	Prob.	Granger Causality
LREM does not Granger Cause LGDP	14.6917	0.0007	Yes
LGDP does not Granger Cause LREM	7.82148	0.0094	Yes
LINF does not Granger Cause LGDP	0.53045	0.4727	No
LGDP does not Granger Cause LINF	1.01683	0.3222	No
LINF does not Granger Cause LREM	0.10699	0.7461	No
LREM does not Granger Cause LINF	2.06388	0.1623	No

Results suggest that there is bi-directional causality between GDP and remittance which implies that lagged values of GDP cause remittance and at the same time lagged values of remittance cause GDP.

3.6 Variance Decomposition

We use forecast error variance decomposition for further analysis of short-run dynamic properties of GDP. Variance decomposition represents the amount of attributes each variable contributes to other variable in a VAR model. The result of variance decomposition is given in Table-06

Table-06: Variance Decomposition of LGDP

Period	S.E.	LGDP	LREM	LINF
1	0.405685	100.0000	0.000000	0.000000
2	0.444453	87.86175	12.01300	0.125254
3	0.458257	86.93007	12.09294	0.976987
4	0.505846	88.81929	9.960944	1.219770
5	0.516240	86.47817	12.34570	1.176138
6	0.520365	85.40177	13.31833	1.279900
7	0.529800	84.54403	13.82549	1.630478
8	0.534894	83.20223	15.01363	1.784146
9	0.543401	82.93780	15.21708	1.845119
10	0.553380	82.24992	15.82991	1.920169

The results of Table-06 show that the dynamic contrast in GDP explains 100% of the components of variation in the first period when the shock by a standard deviation of one in the variable itself, and in the second period it goes to 87.86% of the error prediction of the variability. During the second period 12.01% and 0.13% variation in GDP is due to variation in remittance and inflation respectively. The increase in the proportion attributable to variation in remittance continues to fluctuate with a tendency to increase that up to about 15.83% in the period of the tenth. It is observed that both in the long run and short run remittance has strong impact on GDP compared to inflation rate.

IV. Conclusion

Remittance is becoming an important tool of economic development in Bangladesh. It has a long run impact on the economic growth. At the first phase, it can be downward but gradually it is at the increasing trend. Remittance can be greatly useful to alleviate poverty, debt, income inequality & creating huge employment.

This paper has empirically tested the existence of long run stable relationship and of the causal direction between GDP and remittance. By examining the data of Bangladesh from 1987 to 2018, it has been confirmed that this two variables have long run relationship. VECM suggests that 43% deviation from equilibrium will be corrected by GDP itself in each period. Furthermore, bidirectional causality is confirmed by using granger causality test. The paper recommend that Bangladesh government should ease the way of receiving remittance from foreign country so that people living abroad can send more remittance. Because remittance is an important source of private capital flow which in turn contributes to stimulate gross domestic product. Since inflow of capital has multiplier effect on poverty alleviation, mobilization of savings, investment boosts up, Capital accumulation and so on, government should take necessary action to increase remittances.

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