SANEM Annual Economists' Conference –2017

on

"Managing Growth for Social Inclusion"

Organiser: ***South Asian Network on Economic Modeling (SANEM)***

Venue: BRAC Centre Inn Auditorium, Dhaka

Date: February 18, 2017

What Drives Workers' Remittances Flow of Bangladesh? A Dynamic Panel Data Analysis

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INTRODUCTION

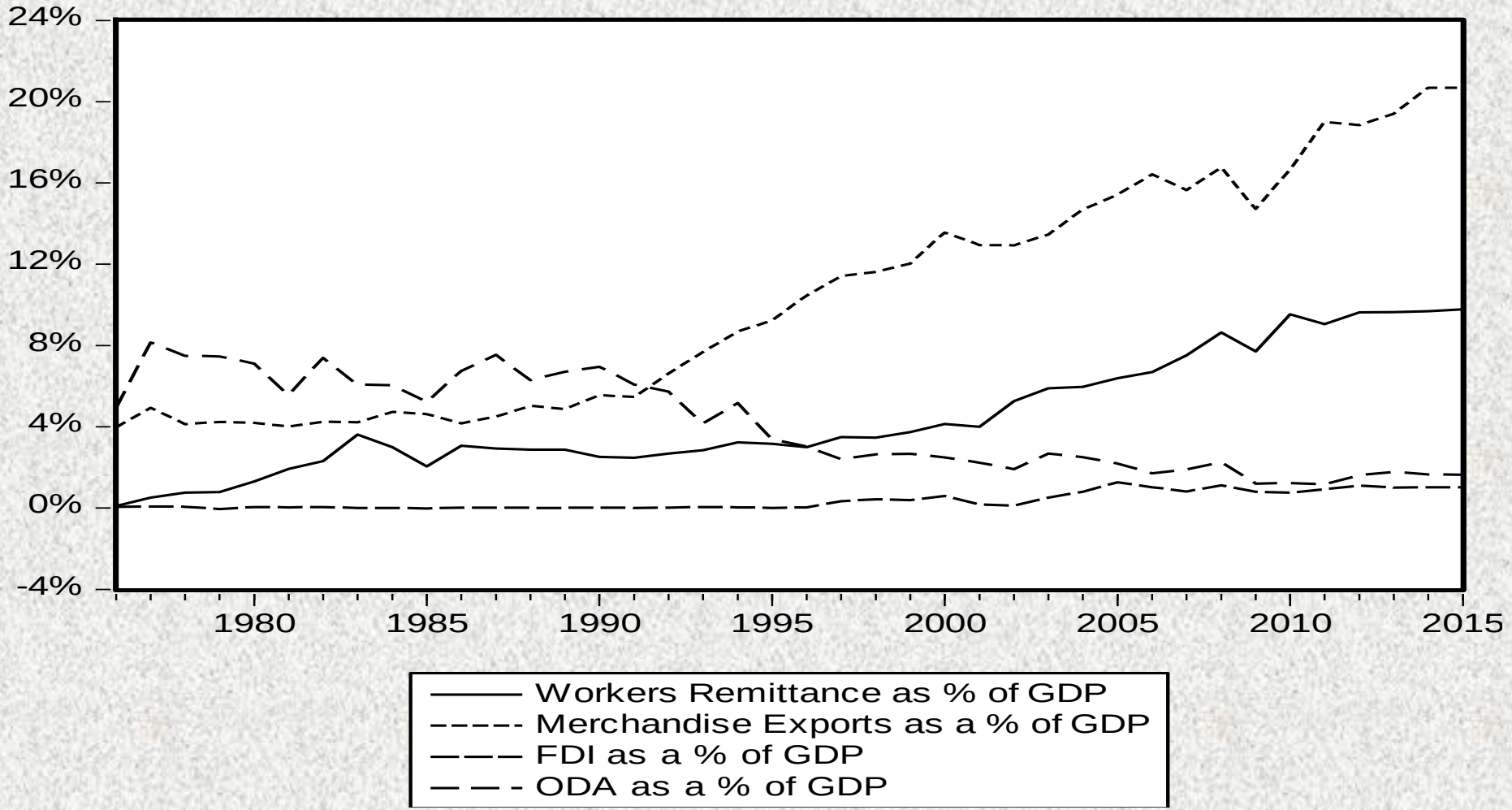
- The increasing trends of workers' remittance depend on the macroeconomic indicators, per capita GDP, per capita GNI, the official exchange rate, interest rate, inflation, as well as FDI, and technical progress of home and host countries.

- Technical progress (TP) considered to be a factor of technological advancement of increased foreign reserves of the home country.

- It is the second leading amount of remittance inflows in Bangladesh as shown in figure.

INTRODUCTION (Cont.)

Figure: Remittances Inflows Percentage of GDP in Bangladesh



INTRODUCTION (Cont.)

- Merchandise export, FDI and ODA) display unstable movement, remittances have maintained a relatively stable uptrend in spite of frequent economic shocks.
- In addition, global financial crises and the changes, migration pattern in the era of globalization has underscored the need for clearer understanding of the factors underlying a country's BOPs position.
- Most importantly, merchandise trade balance of Bangladesh may have deficits with many of its trading partner countries, but the overall current account balance of Bangladesh may be balanced due to the inflow of workers' remittances.

Research Question

How to identify the impact of factors driving remittances on bilateral workers' remittance inflows of fourteen major sending host countries to Bangladesh?


Review of the Literature

- Iqbal and Sattar (2005) and Kundu et al. (2012) used an economic growth model to estimate the relationship between real GDP and workers' remittance. Results from a Johanson co-integration test provided evidence that real GDP is most likely to have a long run relationship to workers' remittance.
- Chamon, Semblat and Morant (2005) of the IMF study find the results indicate that depreciation of the domestic currency and growth in the host country has a positive impact on remittance, while growth in the home country has a negative impact.
- Silva and Huang (2005) reveal that remittances have positive associations with home country currency depreciation and negative association with exchange rate volatility.

Review of the Literature (Cont.)

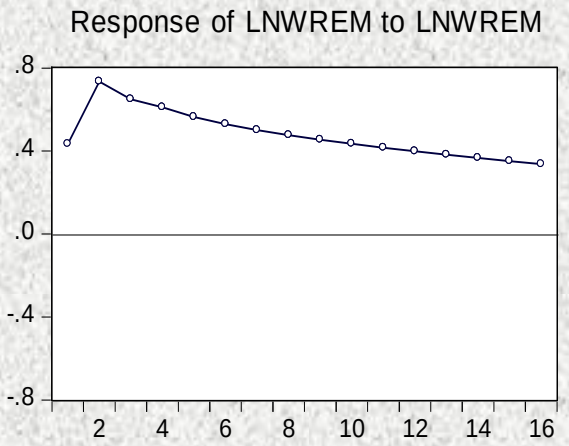
- Siddiqui and Abrar (2001) focused on the cost aspect of remittance transfer. They argue that the transfer cost of remittance is not a significant factor, rather the efficiency of workers, existence of smuggling, and exchange rate differentials which seem to be highly influential in choosing between formal and informal channels.
- Gibson, McKenzie, and Rohorua (2006) find the results of the survey runs sharply counter to the view of Siddiqui and Abrar (2001) regarding the transfer cost of remittance.
- Hyder (2002) also identifies level of efficiency and speed of transaction as important variables in explaining remittance behavior.
- Freund and Spatafora (2008) report identifies transfer cost of remittance from host to home countries as crucial factors affecting workers' remittance.

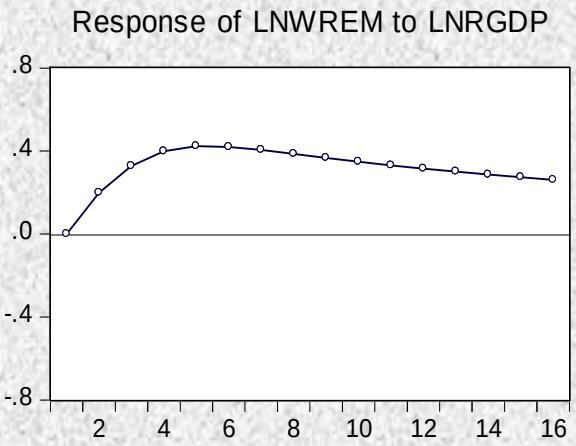
Review of the Literature (Cont.)

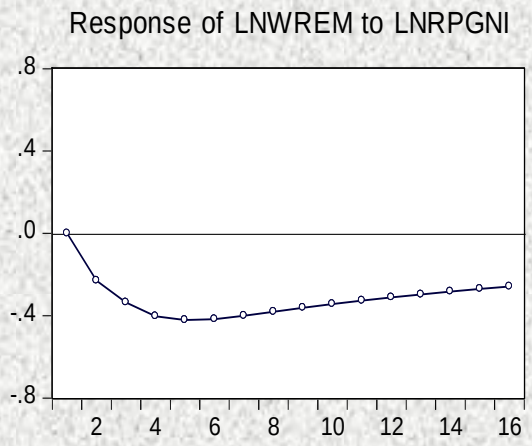
- IMF (2006) revealed that during 1981-2000 total recorded and unrecorded private transfers to Bangladesh amounted to USD 34.5 billion and USD 49.6 billion, respectively, meaning that the share of unrecorded remittances to Bangladesh was 59 percent of the total.
- Another study by the World Bank (2006) estimated the share of informal channels to be 54 percent. It is evident from these two studies that about 54 to 59 percent of total remittances were transferred through informal channels in Bangladesh.
- In view of the above analysis, the present study developed a simple empirical model of macroeconomic determinants of workers' remittance with technical progress has to emphasis on increased foreign reserves in Bangladesh.

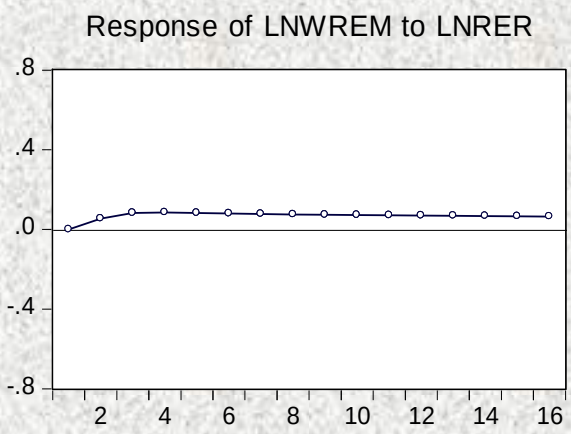
Factors Driving Remittances

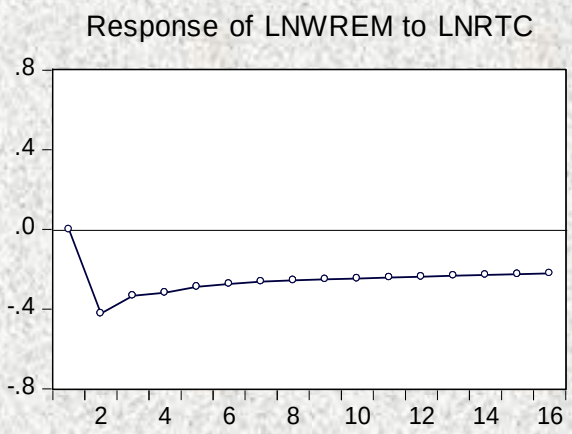
Figure: Impulse Response of Remittance to GDP, GNI, RER, RTC and TP

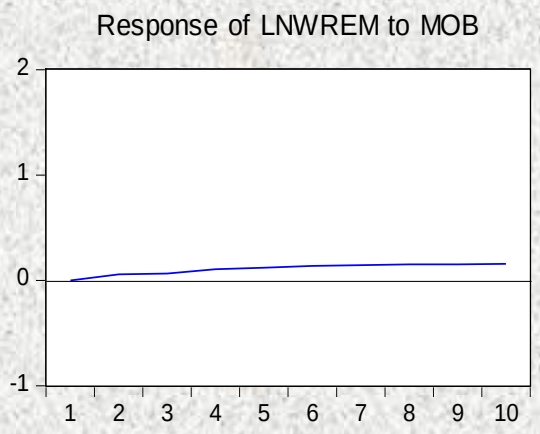












Methodology

Econometric Model:

Now we have developed the model effects of the macroeconomic determinants with the technical progress of the workers' remittances performance of Bangladesh.

$$WREM_i = WREM_i\left(\frac{Y_i}{Y_j}, \frac{y_i}{y_j}, \frac{RER_i}{RER_j}, RTC_{ij}, TP_{ij}\right)$$

$$WREM_i = WREM_i\left(RGDP_{ij}, RPGNI_{ij}, RER_{ij}, RTC_{ij,}, TP_{ij}\right)$$

To test empirically, ordinary least squares (OLS) regression is applied to log-linear transformed for estimation by the following way:

$$\ln\left(WREM_i\right) = \alpha_0 + \beta_1 \ln\left(RGDP_{ij}\right)_t + \beta_2 \ln\left(RPGNI_{ij}\right)_t + \beta_3 \ln\left(RER_{ij}\right)_t + \beta_4 \ln\left(RTC_{ij}\right)_t + \beta_5 TP_{ij} + u_{it}$$

Sources of Data

- Country-wise workers' remittances (US$) data during the study period have been collected from the *Bangladesh Bank* database.
- And rest of data on GDP, per capita GNI, exchange rates, transfer cost of remittance and technical progress are obtained during the period of 2000-2015 from the *World Development Indicators (WDI) and Migration and Remittances Factbook* from the World Bank database, 2016.

Validation of Econometric Model- A Dynamic Analysis
Panel Unit Root Tests

Unit Root Tests Statistics of the Variables of the Model at Level

Tests	LNWREM	LNRGDP	LNRPGNI	LNRER	LNRTC	TP
*Levin, Lin & Chu t**						
With Intercept	-6.75	1.10	1.59	-4.66	-2.56	-2.09
	(0.00)	(0.86)	(0.97)	(0.00)	(0.00)	(0.01)
With Intercept & Trend	-0.60	-0.58	-0.88	-11.87	-2.53	-2.33
	(0.27)	(0.28)	(0.18)	(0.00)	(0.00)	(0.00)
Breitung t-stat						
With Intercept						
With Intercept and Trend	1.67	2.64	1.96	0.55	2.23	0.50
	(0.95)	(0.99)	(0.97)	(0.71)	(0.98)	(0.69)
Im, Pesaran and Shin W-stat						
With Intercept	-1.75	1.61	1.13	-1.48	0.32	1.92
	(0.03)	(0.94)	(0.87)	(0.06)	(0.62)	(0.97)
With Intercept and Trend	2.37	3.03	1.71	-4.77	1.06	-0.20
	(0.99)	(0.99)	(0.95)	(0.00)	(0.85)	(0.41)
ADF - Fisher Chi-square						
With Intercept	57.89	21.86	25.35	39.03	29.88	22.13
	(0.00)	(0.78)	(0.97)	(0.08)	(0.36)	(0.84)
With Intercept and Trend	12.19	9.57	17.05	52.53	23.67	30.80
	(0.99)	(0.99)	(0.60)	(0.00)	(0.69)	(0.42)
PP - Fisher Chi-square						
With Intercept	46.12	11.49	38.31	62.42	37.92	23.72
	(0.03)	(0.99)	(0.09)	(0.00)	(0.09)	(0.78)
With Intercept and Trend	19.94	3.44	36.36	23.83	20.60	21.48
	(0.92)	(0.99)	(0.19)	(0.69)	(0.84)	(0.87)

Panel Unit Root Tests

Unit Root Tests Statistics of the Variables of the Model at First Difference

Tests	LNWREM	LNRGDP	LNRPGNI	LNRER	LNRTC	TP
*Levin, Lin & Chu t**						
With Intercept	-4.13	-2.79	-2.64	-15.23	-4.98	-6.14
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
With Intercept & Trend	-7.66	-5.09	-3.44	-13.12	-6.27	-5.62
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Breitung t-stat						
With Intercept						
With Intercept and Trend	-4.73	-3.31	-4.47	-5.79	-4.07	-3.74
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Im, Pesaran and Shin W-stat						
With Intercept	-4.11	1.42	-2.05	-7.70	-4.10	-5.04
	(0.00)	(0.04)	(0.02)	(0.00)	(0.00)	(0.00)
With Intercept and Trend	-4.73	-1.54	-2.02	-6.11	-3.86	-2.97
	(0.00)	(0.04)	(0.02)	(0.00)	(0.00)	(0.00)
ADF - Fisher Chi-square						
With Intercept	67.15	32.55	39.62	104.07	65.17	77.14
	(0.00)	(0.5)	(0.04)	(0.00)	(0.00)	(0.00)
With Intercept and Trend	77.96	36.23	41.03	87.16	62.90	52.95
	(0.00)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)
PP - Fisher Chi-square						
With Intercept	138.76	59.27	79.41	81.53	125.80	87.81
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
With Intercept and Trend	185.80	73.51	101.91	103.16	183.75	76.34
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Co-integration Tests

Summary of the Pedroni and Kao Panel Cointegration Tests

Alternative Hypothesis Tests: AR Coefs.	Statistic	*p*-value
1.Pedroni *v*-statistics		
Within-dimension Statistics		
Without intercept & trends	-3.79	0.99
With intercept & no trend	-0.48	0.68
With both intercept & trend	8.48	0.00
Within-dimension Weighted Statistics		
Without intercept & trends	-3.96	1.00
With intercept & no trend	-0.30	0.61
With both intercept & trend	5.51	0.00
2.Pedroni *ρ-statistics*		
Within-dimension Statistics		
Without intercept & trends	2.31	0.98
With intercept & no trend	3.18	0.99
With both intercept & trend	3.46	0.99
Within-dimension Weighted Statistics		
Without intercept & trends	2.51	0.99
With intercept & no trend	2.96	0.99
With both intercept & trend	3.33	0.99
Between-dimension Statistics		
Without intercept & trends	4.19	1.00
With intercept & no trend	4.45	1.00
With both intercept & trend	4.89	1.00
3.Pedroni PP-*statistics*		
Within-dimension Statistics		
Without intercept & trends	-1.62	0.05
With intercept & no trend	-1.73	0.04
With both intercept & trend	-2.52	0.00
Within-dimension Weighted Statistics		
Without intercept & trends	-1.62	0.05
With intercept & no trend	-2.83	0.00
With both intercept & trend	-4.58	0.00
Between-dimension Statistics		
Without intercept & trends	-2.67	0.00
With intercept & no trend	-7.63	0.00
With both intercept & trend	-9.72	0.00

Co-integration Tests (Cont.)

4.Pedroni ADF-*statistics*		
Within-dimension Statistics		
Without intercept & trends	**-2.26**	**0.01**
With intercept & no trend	**-2.31**	**0.01**
With both intercept & trend	**-3.60**	**0.00**
Within-dimension Weighted Statistics		
Without intercept & trends	**-2.07**	**0.01**
With intercept & no trend	**-3.49**	**0.00**
With both intercept & trend	**-4.85**	**0.00**
Between-dimension Statistics		
Without intercept & trends	**-3.89**	**0.00**
With intercept & no trend	**-4.39**	**0.00**
With both intercept & trend	**-6.70**	**0.00**
5. Kao Test		
ADF- without trend	**-6.33**	**0.00**

Co-integration Tests (Cont.)

Summary of the Johansen Fisher Panel Cointegration Tests

Series: LNWREM LNRGDP LNRPGNI LNRER LNRTC TP
Lags interval (in first differences): 1 1
Unrestricted Cointegration Rank Test (Trace and Maximum Eigenvalue)

Hypothesized No. of CE(s)	Fisher Stat.* (from λ_{trace} test)	Prob.	Fisher Stat.* (from $\lambda_{\max}$ test)	Prob.
No deterministic trend				
None	121.6	0.00	121.6	0.00
At most 1	465.2	0.00	345.5	0.00
At most 2	255.2	0.00	205.7	0.00
At most 3	94.40	0.00	88.10	0.00
At most 4	35.83	0.14	35.83	0.14
Linear deterministic trend				
None	19.41	0.88	19.41	0.88
At most 1	223.8	0.00	223.8	0.00
At most 2	341.3	0.00	248.3	0.00
At most 3	162.9	0.00	146.6	0.00
At most 4	64.80	0.00	64.80	0.00

Unrestricted Error Correction Model (UECM)

As there is the cointegration relationship between the variables, the Engle and Granger two-step method can be used to estimate the model using UECM.

Following Engle and Granger (1987) first step, the fixed effect estimator gives the panel regression equation a follows:

$$\ln(WREM_i) = \alpha_{0i} + \beta_1 \ln(RGDP_{ij})_t + \beta_2 \ln(RPGNI_{ij})_t + \beta_3 \ln(RER_{ij})_t + \beta_4 \ln(RTC_{ij})_t + \beta_5 TP_j + u_{it}$$

$$\ln(WREM_i) = 9.03 + 0.68 \ln(RGDP_{ij})_t - 0.30 \ln(RPGNI_{ij})_t + 1.50 \ln(RER_{ij})_t - 0.96 \ln(RTC_{ij})_t + 0.11 TP_j + u_{it} \quad (2)$$

(13.86) (7.38) (-3.27) (6.95) (53.07) (3.67)

In the second step, stationarity of the residuals of the estimated equations are tested by the panel unit root test.

Unrestricted Error Correction Model (Cont.)

With the existence of a cointegration relationship between the variables of the model and based on Engle-Granger two-step results above, the error correction model estimated in panel framework is:

$$\Delta \ln(WREM_i) = \alpha_{0i} + \beta_1 \Delta \ln(RGDP_{ij})_t + \beta_2 \Delta \ln(RPGNI_{ij})_t + \beta_3 \Delta \ln(RER_{ij})_t + \beta_4 \Delta \ln(RTC_{ij})_t + \beta_5 \Delta TP_j +$$

$$\lambda\left[\ln(WREM_i) - \alpha_{0i} - \beta_1 \ln(RGDP_{ij})_{t-1} - \beta_2 \ln(RPGNI_{ij})_{t-1} - \beta_3 \ln(RER_{ij})_{t-1} - \beta_4 \ln(RTC_{ij})_{t-1} - \beta_5 TP_{j,t-1}\right] + u_{it}$$

$$\Delta \ln(WREM_i) = 0.24 - 0.09 \Delta \ln(RGDP_{ij})_t + 0.18 \Delta \ln(RPGNI_{ij})_t + 0.74 \Delta \ln(RER_{ij})_t + 0.90 \Delta \ln(RTC_{ij})_t - 0.01 TP_j -$$

(12.62) (-2.98) (2.68) (3.95) (32.82) (-5.83)

$$0.37\left[\ln(WREM_i) - 9.03 - 0.68 \ln(RGDP_{ij})_{t-1} + 0.30 \beta_2 \ln(RPGNI_{ij})_{t-1} - 1.50 \ln(RER_{ij})_{t-1} + 0.96 \ln(RTC_{ij})_{t-1} - 0.11 TP_{j,t-1}\right] + u_{it}$$

(5.18) (-13.86) (-7.38) (3.27) (-6.95) (53.07) (-3.67)

(3)

Values in parentheses represent the *t*-statistics for the respective coefficients.

GMM Estimation

summary statistics of the one-step and two-step GMM estimation. It is evident that the estimation results, using the GMM methods, are consistent with the results of the unrestricted error correction model (Blundell and Bond, 1998 and 2000).

Explanatory Variables	One-Step GMM Estimators	Two-Step GMM Estimators
∆ LNWREM(-1)	0.137 (0.00)	0.143 (0.00)
∆ LNRGDP	0.473 (0.02)	0.687 (0.03)
∆ LNRPGNI	-0.299 (0.02)	-0.483 (0.02)
∆ LNRER	1.966 (0.00)	1.950 (0.00)
∆LNRTC	0.807 (0.00)	0.813 (0.00)
∆ TP	0.008 (0.00)	0.007 (0.00)
Instrument rank *J*-statistics	110 314.59	15 14.52

Empirical Results
Estimation of the Long-Run Model

Dependent Variable: LNWREM(-1)

Method: Panel Least Squares

Sample (adjusted): 2001 2015; Total panel (balanced) observations: 225

White cross-section standard errors & covariance (no d.f. correction)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNRGDP(-1)	0.68	0.09	7.380	0.00
LNRPGNI(-1)	-0.30	0.09	-3.275	0.00
LNRER(-1)	1.50	0.21	6.947	0.00
LNRTC(-1)	-0.96	0.02	-53.08	0.00
TP(-1)	0.11	0.03	3.667	0.00
C	9.03	0.65	13.85	0.00

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.92	Mean dependent var	18.83
Adjusted R-squared	0.91	S.D. dependent var	2.454
S.E. of regression	0.27	Akaike info criterion	0.337
Sum squared resid	15.46	Schwarz criterion	0.641
Log likelihood	-17.95	Hannan-Quinn criter.	0.459
F-statistic	931.5	Durbin-Watson stat	0.493
Prob(F-statistic)	0.00		

Conclusions

- The study finds the existence of cointegration, that is, stable long-run relationship between workers remittance of Bangladesh and its determinants. Short-run dynamics also show convergence of workers remittance to its long run equilibrium, using Unrestricted Error Correction Mechanism (UECM) and Generalised Method of Moments (GMM) estimator. The robustness check of the model ensures the validity of the specification of the extended model.

- Analysis of the trend and pattern of the technical progress suggests that the coefficient of the technical progress has positive impacts on the workers' remittance flow from major host countries (of Bangladeshi migrants') to Bangladesh and highly significant. This implies that, currently workers' remittance flows of Bangladesh have been mildly affected by the factors of technical progress.

Thank you all for your patient attention