MPRA

The macroeconomic determinants of remittances in Bangladesh

Hasan, Mohammad Monirul

Institute of Microfinance (InM), Dhaka, Bangladesh

February 2008

The Macroeconomic Determinants of Remittances in Bangladesh

Mohammad Monirul Hasan*
Institute of Microfinance (InM)

Email: monir1021@gmail.com

Abstract

This paper examines the macroeconomic determinants of workers' remittances in Bangladesh. Various regressions in the paper find that the macroeconomic variables such as inflation, interest rate, exchange rate of Bangladesh and GDP of the five remittance sending countries have significant impact on remittance. In the analysis it is found that if the domestic interest rate goes up by 1%, on average, then the remittance will increase by 1.94%. Therefore, remittance in Bangladesh is very responsive to changes in the domestic interest rate. Again, if the GDP of the rest of the five countries increases by 1%, then remittance will increase by 3.06 %

Introduction

In recent decades remittances have become an important source of income for many developing countries. Remittances are not only used as a mechanism for the survival of the poor in developing countries but also as a risk sharing mechanism, a stable source of investment and for future consumption smoothing**.** Every year a huge number of labor workers are going abroad and sending remittances in Bangladesh which is one of the major sources of our national income. This paper is concerned about the time series econometric analysis of the determinant of remittance inflow in Bangladesh. BMET (Bureau of Manpower, Employment and Training) recorded the statistics of labor workers and the remittances. The variables that we have taken are domestic inflation rate, domestic interest rate, exchange rate and the weighted average of GDP of the five countries. Throughout the paper it is stated that Bangladesh as the home country and the other five countries (Saudi Arabia (KSA), United Arab Emirates, Kuwait, Malaysia, and Oman) as the host countries (remittance sending countries). In our regression analysis we have taken time series data and log-linear functional from. The data that we have used in our analysis are taken from UNCTAD, Bangladesh Bank's Economic Trends, BMET, and Bangladesh Economic Review 2004. After operating regression analysis in software Stata, we got the result significant. Observing the obtained result we can illustrate that the macroeconomic variables of the home and host countries have significant impact on the inflow of remittances in Bangladesh.

❖ Literature Review :

Recent papers find that macroeconomic variables have an impact on remittances. For example El-Sakka and Mcnabb (1999) in a study for Egypt find that the black market premium and interest rate differentials are important variables explaining remittances. In the same way, Elbadawi and Rocha (1992) using data for six countries show that macroeconomic variables play an important role in determining remittances. In their paper Elbadawi and Rocha (1992) used fixed effects panel estimation techniques.

Recently, also using fixed effect panel estimation techniques Higgins *et al.* (2004) found that exchange rate uncertainty (a measure of risk) is an important determinant of remittances. Their results also show that unemployment in the host country and the exchange rate are significant determinants of remittances. Faini (1994) concentrates on the issue of the effect of real exchange rate depreciation on remittances. His main contribution is that real exchange rate depreciation of the home currency has a positive effect on remittances. Other findings indicate that home country income is negatively related to remittances.

Katseli and Glytsos (1986) in a study using data from Greece find that remittances are negatively related to inflation in the home country, host country income and host country interest rates. In another study, Glytsos (1997) distinguishes between remittances sent by temporary migrants and remittances sent by permanent migrants. His results suggest that temporary migrants are more likely to remit for investment and future consumption smoothing. Permanent migrants are more likely to remit for altruistic purposes.

Most of the studies that addressed the issue of worker remittances stressed their impact on the countries of origin; their incomes, balance of payments, employment etc. El-Sakka (1998), for example, conducted a study on the Egyptian workers' remittances. He stressed the fact that the ultimate goal of worker transfers was to finance the consumption of durable goods. El-Sakka also found in his study that interest and exchange rates parities between the origin and the residence countries played important roles as determinants of flows.

- *Specification of the The model:*

In the following econometric research it is exercised **log- linear** forms of regression for the convenience. The superiority of the Log –Linear model is that the coefficients of the variable measure the elasticity of regressand with respect to regressors.

Here the parameters b, c, d, and e will show the elasticity of the regressand with respect to the regressors respectively.

3

The model used in this study is a version of the following:

$$REM_t = A + b\ INFDt + c\ INTRD_t + d\ EXR_t + e\ GDPW_t + u_t \quad \ldots\ldots(1)$$

Where:

$$b < 0\ ;\ c > 0\ ;\ d > 0\ ;\ e > 0\ .$$

taking log-linear form

$$LREM_t = A + b\ LINFDt + c\ LINTRD_t + d\ LEXR_t + e\ LGDPW_t + u_t \quad \ldots\ldots(2)$$

REM   Remittance inflow in US dollar

INFD   Domestic Inflation Rate

INTRDR   Domestic Rate of Interest

EXR   Exchange rate of Bangladesh

GDPW   Simple Average of GDP of five Countries.

* Here A represents the constant term.

If the inflation rate of the home country (Bangladesh) increases, it will show the negative effect on remittance inflow. Again there is a positive response on the remittance inflow if the interest rate of the home country increases relatively than the host countries. If the exchange rate of the home country (Bangladesh) depreciates then remittance inflow will increase. Faini (1994) found that the real exchange rate depreciation of the home currency has a positive effect on remittances. If the GDPW increases, the remittance inflow will also increases.

❖ Estimation of the model:

• Testing Unit Root Problem:

To test the stationary assumption unit root test is performed here. The correlogram and the graph of Autocorrelation and partial autocorrelation from Stata show that LREM is nonstationary. This also can be proved by using the Augmented Dickey-Fuller (ADF) unit root test which shows that the variable is nonstationary. But taking the first difference of the LREM and do the same process again the stationary nature of the

4

variable is found. So it can be said that the variable LREM is I (1) i.e. integrated of order 1. The same process was performed for the other 4 variables and found that those variables are also I (1) in nature. The first difference of the variables LINFD, LINTRD, LEXR and LGDPW are significant at 5% level so all the variables of the model are I (1). Now to test the spurious relationship of the variables cointegration test is applied to observe whether the variables are spurious or not. Now if it is found that the variables are not spurious, it can be said that they are cointegrated, then we can apply usual OLS technique for the estimation of the model.

Table: Augmented Dickey-Fuller (ADF) unit root test:

Variables	Test	Test Statistic	1%Critical Value	5%Critical Value	10%Critical Value	Observ.	Decision*
FD_LREM	Z(t)	-3.910	-3.750	-3.000	-2.630	25	I(1)
FD_LINFD	Z(t)	-6.173	-3.750	-3.000	-2.630	25	I(1)
FD_LINTRD	Z(t)	-3.446	-3.750	-3.000	-2.630	25	I(1)
FD_EXR	Z(t)	-4.007	-3.750	-3.000	-2.630	25	I(1)
FD_LGDPW	Z(t)	-3.342	-3.750	-3.000	-2.630	25	I(1)
e (for cointegration test)	Z(t)	-3.343	-3.743	-2.997	-2.629	26	Variables are cointegrated

* The results are significant at 5% critical value.

- **Test for Cointegration:**

Whether the nonstationary times series produces a spurious regression with another nonstationary time series, a cointegration test is necessary to check this relationship. Here it is used the Engle- Granger (EG) or Augmented Engle-Granger (AEG) test to see the relationship. To perform this test one should first find out the residual of model and then check the Augmented Dickey-Fuller (ADF) unit root test to see whether the residual contains unit root or not. In this analysis it is seen that the variables are cointegrated as the calculated value of the residual e is grater than the critical value at 5% level of significance (showed in the above table). As the variables are cointegrated, OLS technique can be used to estimate the model.

- **The Granger Causality Test:**

To see the bilateral causality among the variables it is used granger causality test and for the multivariate model it is used VAR model. After finding the Basic VAR it is tested and find that both LREM and LINFD do not Granger cause each other. On the other hand LINTRD and LGDPW Granger Causes the LREM but not opposite is not true. Again LTOT do not Granger causes LREM. So here it is found that there is one way causation that which is expected from the model after analysis the regression result. The result is attached in the appendix.

❖ Evaluation of estimates:

After operating the regression analysis we have got the following result:

LREMt = -73.2144 -.179727 LINFDt + 1.94227 LINTRDt + 0.250491 LEXRt + 3.064862 LGDPWt

LREM	Coefficient	Standard Error	t	P > |t|	95% confidence interval	
Constant	-73.21439	8.417689	-8.70	0.000	-90.67161	-55.75718
LINFD	-.1797266	.1172624	-1.53	0.140	-.422914	.0634608
LINTRD	1.942271	.2827664	6.87	0.000	1.355849	2.528693
LEXR	.250491	.4453794	0.56	0.580	-.6731692	1.174151
LGDPW	3.064862	.3027231	10.12	0.000	2.437053	3.692672

Number of obs = 27

F(4, 22) = 63.67   **Prob > F** = 0.0000

R-squared = 0.9205

Adj R-squared = 0.9060

Root MSE = .27951

Source |	SS	df	MS
Model |	19.8989994	4	4.97474984
Residual|	1.71881855	22	0.078128116
Total |	21.6178179	26	0.831454536

* Note: This econometric result of the regression analysis has been attached in the appendix.

After operating OLS regression we come to the conclusion that this result is the best representation of our expected model. Now we will examine this result why this is the superior result. The superiority of the result can be seen by the following criteria:

- **Autocorrelation:** There is no pure autocorrelation in the model.

From the Lagrange Multiplier test of residual serial correlation (which is also known as the Breusch –Godfrey test (BG) test), it is seen that the Chi-square value is 2.862 with 1 df .We see here the null hypothesis, H_0= there is no serial correlation. Now the critical Chi Square value with df =1 at 5% level is 3.84. But the calculated value is only 2.862 which is less than the critical value. So the Null hypothesis cannot be rejected . That means there is no pure autocorrelation.

- **Functional Form:** The result of the functional form (F stat) is 2.53. The p value of the F version of Ramsey's RESET test using the square of the fitted values is 0.087 which is less then 10% level of significance.

- **Normality:** Based on the test of skewness and kurtosis of residuals the distribution of the error terms are clearly shown as normally distributed. The p value of obtaining 1.10 from the Chi-square distribution with 2 df is about 0.58, which is quite high.

- **Heteroscedasticity:** In Breusch-Pagan/Cook-Weisberg test for heteroskedasticity it is assumed the Null hypothesis that there is no heteroscedasticity in the model. But the calculated Chi-square value is 0.7076 which is very high so we cannot reject the Null that there is no heteroscedasticity. It can be said that there is homoscedasticity or have constant variance.

- **Multicollinearity:** From the pair correlation among the regressors it is observed that there is no multicollinearity. The pair wise correlations here are not above 0.48 except LREM and LGDPW (0.85).

- **Overall Significance of the model:** From the F statistics with df of numerator and the denominator 4and 22 respectively, it is seen that the value of F-test is 63.67 which shows the significance of the model. As the p value of F statistics is very low i.e. very close to zero [0.0000]. Therefore the model is a significant model.

❖ Forecasting:

In the above model, estimated values of the parameters show that if the domestic interest rate goes up by 1%, on average, and then the remittance inflow will increase by 1.94%. Therefore, remittance inflow in Bangladesh is very responsive to changes in the domestic interest rate. As log-linear model is a constant elasticity model, the coefficients of the variables are constant throughout. In similar way, if the GDPW increases by 1%, then remittance will increase by 3.06 %. This shows that remittance is very responsive to the changes in GDP of the stated five countries. If all the regressors become zero then the remittance inflow will be negative, i.e. -73.21439. Of course the mechanical interpretation of the intercept may not make much economic sense. Since it is found that the results are according to the priori expectation, the model seems correct.

❖ Conclusion:

The aim of the paper was to investigate whether the macroeconomic factors of the home and host countries can affect the remittance inflow in Bangladesh. Now the result seems to conclude that macroeconomic factors of home and host countries have significant impact on remittances. Inflation rates of Bangladesh have negative relationship with remittance inflow. Interest rates and exchange rate have positive relationship with remittance. The host countries GDP also show a positive relationship with remittance.

References

1. Elbadawi, I. A. and Rocha, R., 1992, Determinants of Expatriate Workers' Remittances in North Africa and Europe", *World Bank Working Paper Series* 1038.

2. El-Sakka, M. and MaNabb, R., 1999, The Macroeconomic Determinants of Migrant Remittances, *World Development*, 27, pp. 1493-1502.

3. Faini, R., 1994, Workers Remittances and the Real Exchange Rate: A Quantitative Framework, *Journal of Population Economics*, 7, pp. 235-245.

4. Glytsos, N., 1997, Remitting Behaviour of "Temporary" and "Permanent" Migrants: The Case of Greeks in Germany and Australia, *Labour*, 11, pp. 409-435.

5. Higgins, M., Hysenbegasi, A. and Pozo, S., 2004, Exchange-rate uncertainty and workers' remittances, *Applied Financial Economics*, 14, pp. 403-411.

6. Katseli, L. and Glytsos, N., 1986, Theoretical and Empirical Determinants of International Labour Mobility: A Greek-German Perspective, *Centre for Economic Policy Research Working Paper* 148.

7. Lucas, R. and Stark, O., 1985, Motivations to Remit: Evidence from Botswana, *The Journal of Political Economy*, 93, pp. 901-918.

8. Ratha, D., 2003, Worker's Remittances: An Important and Stable Source of External Development Finance in: *Global Development Finance*, pp.157-172 (World Bank).

9. Straubhaar, T., 1986, The Determinants of Workers' Remittances: The Case of Turkey, *Weltwirtschaftliches Archiv*, 122, pp. 728-740.

10. Swamy, G., 1981, International Migrant Workers' Remittances: Issues and Prospects, *World Bank Staff Working Paper* 481.

11. Taylor, J., 2004, Remittance Corridors and Economic Development: A Progress Report on a Bush Administration Initiative in: *Payments in the Americas Conference* (Federal Reserve Bank of Atlanta).