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Macroeconomic Impact of Remittances and the Dutch Disease in a Developing Country

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Abstract The magnitude of the flow of remittances to a developing country like Bangladesh and their rate of growth has become a significant factor in its economy. The huge flow of remittances affects the production sector and employment structure, as well as the scale of external trade competitiveness of the economy as measured by the real exchange rate (RER). Movement of the RER from its equilibrium position is very important and is also crucial in identifying the factors most influencing this movement. Using Johansen cointegration and Vector Error Correction models, this study has found that the flow of remittances is appreciating the RER and decreasing the external trade competitiveness of Bangladesh; thus, the procedure is slowly bringing about deterioration in the economy of Bangladesh, a process known as Dutch Disease. To counter this, a gradual relaxation of the trade barrier plus promotion of external trade diversification and diversion of the remittances flow from non-tradable sectors to priority investment areas will counteract the adverse consequences of remittances on the Bangladeshi economy in the long run.

Keywords Remittances, Dutch Disease, Real Exchange rate, Macroeconomic Policy

1. Introduction

The term 'Dutch Disease' was first used in the 26 November 1977 issue of *The Economist* to refer to unfavourable effects on the manufacturing sector of Netherlands following the discovery of natural gas during the 1960s[10]. As a result of these gas discoveries, the Dutch economy experienced a boost in its wealth, but this positive development in the natural resources sector had serious consequences for Dutch non-oil exports by making the Dutch guilder stronger; the manufacturing sectors gradually became less competitive. This particular economic process has come to be known as Dutch Disease.

The undesirable symptoms of Dutch Disease are mainly connected with natural resource discovery, but a sharp increase in natural resource prices, in foreign assistance and in foreign direct investment can also start this economic disease. It can occur when any expansion or economic development results in a large inflow of foreign currency; we can include the flow of worker's remittances in this context.

Economic globalisation is the factor which has been increasing the movement of migrant workers than ever before and therefore, the workers' remittances have also been increasing significantly. UN Department of Economic and Social Affairs (UNDESA) data indicate that there were some 214 million international migrants worldwide in 2010 (cited in[19]) and in 2011, estimated flow of global remittances reached US$483 billion of which developing countries are accounted for US$351 billion or about three-fourth of the total remittances[9]. Therefore, workers' remittance is one of the major sources of foreign exchange earnings for a large number of developing countries and exceeds the private capital inflows and foreign aid in recent years[21].

In 2010, South Asia received inflows of remittances equivalent to US$82.6 billion, which exceeded the net private capital inflows of US$80.7 billion and was equivalent to 25% of total remittances to developing countries. Bangladesh is considered as one of the major manpower exporting countries in South Asia and remittances started to play a vital role in economic development of the country from the early 2000s. Bangladesh accounted for about 2.5% of the global remittances and 13.5% of the total remittances coming to South Asia in 2008. Workers' remittances increased from US$24 million in 1976 to over US$1.65 billion in 2011 and accounted for over 10% of GDP of the country[9].

Despite the immense importance of the remittances income for Bangladesh economy, there are very few quantitative studies of the possible effect of remittances, especially at the country specific level. Therefore, the objective of the paper is to analyse the effects of remittances on trade competitiveness to assess whether the economy of Bangladesh has been adversely infected by the

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Dutch disease measured by the movements of the real exchange rate (RER) of the country.

The remainder of the paper is organised as follows: Section 2 represents the literature review on the effects of remittances inflows and the determinants of real exchange rates; Section 3 discusses the issues related to data and the methodology used in the study. Section 4 presents the econometric results and Section 5 draws the conclusion and policy recommendation of the study.

2. Literature Review

The debate on the impact of workers' remittances actually starts with the discussion of adverse macroeconomic effects of external transfers by Keynes[15] and Ohlin[17]. Generally, large inflows of income from foreign aid or remittances create wealth for an economy, support economic advancement and reduce poverty levels. The assumption behind this expectation is based on simple common sense: that while money cannot purchase happiness, it is a good down payment[20]. It is also supported on a variety of strands of economic development theory. Development economists have argued for a long time that poor countries must experience a 'big push' to break out of a self-feeding circle of poverty[18],[16]; thus, large cash inflows accruing from remittances or aid should overcome all sorts of obstacles to economic development and generate the required 'big push'.

However, many empirical studies[1],[2],[3],[4],[6],[7],[9],[12] suggest the opposite: that a significant capital inflow may lead to appreciation in the RER, which will undermine the competitiveness of the export sector: the so-called Dutch Disease effect.

The real exchange rate model illustrates that the equilibrium real exchange rates (ERER) are influenced by the 'fundamentals' or the real variables both in the short and long run, whereas nominal variables have only short run effect[11]. Terms of trade, international transfers, including foreign aid and remittances and world real interest rates are the major external fundamentals[8],[11]. Within an economy, trade restrictions, exchange and capital controls, government expenditure are the domestic policy related fundamentals whereas technological progress and productivity gain are important domestic non-policy fundamentals. The movement of the RER from its sustainable long run position due to changes in real variables has significant consequences for policy evaluation as it can imply either gain or loss of external competitiveness. However, the nominal variables, such as nominal depreciation and domestic credit expansion can be used as policy devices to correct the misalignment of RER from its equilibrium value in the short run[8].

3. Data and Methodology

The annual data for 1971 to 2011 is used for this study. But the annual data for most of the RER fundamentals was unavailable for Bangladesh. We also constructed a real exchange index, where the trade-weighted nominal exchange rate (E_{TW}) is deflated by the ratio of foreign price (P_f) to domestic price (P_d). Thus, a fall in this ratio indicates a real appreciation and loss of international competitiveness for a country and vice versa. Following a Chow Test of structural break in data (Table 1), a dummy variable (Dummy) is included in the model to take into account of the structural break in all equation in 1994. The most data series are measured in natural logarithms and expressed in ratio to GDP except for technological progress, TECP, which is the real per capita GDP of Bangladesh measured in US dollar following[4].

The effect of remittances flow on the international trade competitiveness of Bangladesh is specified by the following RER model:

$$LNREER=\alpha+\beta_1 LNRREMTT+\beta_2 X_t+\varepsilon_t \quad (1)$$

Where t, is the time period from 1971 to 2011, LNREER is the key explanatory variable referring to the natural log of the ratio of remittances flow to GDP. The vector of control variable, X_t, consists of terms of trade (LNTOT), trade openness (LNOPEN), technological progress (TECP) and the nominal variables, money supply (LNM2) and nominal devaluation (ND). ε_t is the error term.

Table 1. Chow Breakpoint Test: 1994

F-statistic	9.673227	Prob. F(4,30)	0.0000
Log likelihood ratio	31.48105	Prob. Chi-Square(4)	0.0000
Wald Statistic	38.69291	Prob. Chi-Square(4)	0.0000

Note: Null Hypothesis: No breaks at specified break points. Varying regressors: All equation variables. Equation Sample: 1971-2011

The Johansen[13] Vector Error Correction Model (VECM) has been adopted for the empirical analysis of the study due to its stronger ability to incorporate the potential long run dynamic relation and better forecasting power. Regression analysis produces efficient estimates if the variables are stationary i.e. I(0). As a prerequisite of the cointegration analysis, the presence of persistent trends in data is tested for a unit root by using Augmented Dickey Fuller (ADF), Dickey Fuller GLS (GLS AD) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests. Results of the tests with a constant and a trend are not reported here because of the limited space. But these are available upon request. However, it is found that all variables used in this study are non-stationary in levels, i.e. they are not I(0), however, all-time series are integrated in order one, I(1), or stationary of their first differences.

Following the stationarity test, the presence and number of cointegration vectors are examined by Likelihood Ratio statistics (LR) and Trace test, which suggest the existence of a long run relationship between the dependent variable (LNREER) and remittances flow (LNRREMTT) and other independent variables. The empirical model of real exchange rate of Bangladesh can be represented by the

following equation:

$$LNREER=\lambda_0+\beta_1 LNRREMTT+\beta_2 LNTOT_t+\beta_3 LNOPEN_t + \beta_4 TECP_t+ \beta_5 LNM2_t+ \beta_6 ND_t+ \varepsilon_t \quad (2)$$

It is difficult to test for cointegration for a full real exchange rate model as it produces too many cointegrating relationships which are hard to interpret[5],[14]. Following reference[5], different versions of equation (2) has been estimated with fewer variables using Hendry type general to specific modelling approach.

4. Econometric Results

The results of alternative versions of equation (2) are presented in Table 2 and 3. Long run elasticities relating to the key explanatory variables and their t-ratios along with the cointegration tests are presented in Table 2. It appears from the tests that the null hypothesis of no cointegrating vector is rejected based on the sufficiently large values of the test statistics. The tests results indicate the presence of at least one cointegrating vector for the alternate equation at the 1% significance level. Since the variables are cointegrated in the long run, there exists a short run dynamic adjustment toward its long run equilibrium. Therefore, it can be concluded that the model is a fair representation for most of the cases, since the eigen-value statistics drop sharply for alternative hypothesis.

Table 2. Johansen's cointegration: Long run estimation

Variables: LNREER, LNRREMTT, TECP, LNOPEN, DUMMY, @TREND(72)		
Hypothesis	r=0	r ≤ 1
Alternative	r=1	r=2
Eigen-value	0.80	0.53
λ - Trace	120.02*	61.66
λ - max	58.36*	27.44

LNREER=-0.70LNRREMTT+0.26TECP+2.38LNOPEN-0.86DUMMY-0.03@TREND(72)--(2.1)
(-3.12) (10.66) (2.58) (-2.12) (-1.66)

Note: Trace test indicates 1 cointegrating equation at the 0.05 level. Max-eigenvalue test indicates 1 cointegrating equation at the 0.05 level. * denotes rejection of the hypothesis at the 0.05 level and p values are used. Figures in parenthesis represent the t-statistics

The results in equation (2.1) suggest that an increase in the main independent variable, remittances flow, has a significant adverse effect on the trade competitiveness (LNREER) of Bangladesh by appreciating it. It also suggests that increased technological progress (TECP) indicates the Rybczynski principle of RER depreciation. Normally, a TECP-type non-policy domestic fundamental variable increases the efficiency and productivity of the tradable sector. Increased productivity induced by technological progress increases factor availability. By reducing the cost and price of tradables, increased productivity makes the tradable sector more competitive and tends to depreciate the RER. In this situation, the supply effects of technological progress offset the demand effects; so equation (2.1) indicates that a one percentage point increase in technological progress (TECP) significantly depreciates the RER by 0.26%.

The trade openness (LNOPEN) in equation (2.1) also shows the expected sign. According to theory, an increase in trade openness depreciates the RER; our result follows this expectation. Increasing trade openness by reducing trade restrictions like tariffs and quotas lowers the relative price of tradables to non-tradables and improves the competitiveness of a country in the external trade. Equation (2.1) shows that a one percentage point increase in trade openness (LNOPEN) significantly depreciates the RER by 2.38%. Moreover, considerations of a structural break as DUMMY and TREND are also significant at the conventional 5% level. Thus, all the variables of equation (2.1) represent themselves as long-run fundamental determinants of the RER of Bangladesh. Thus, the result from equation (2.1) suggests the inflow of remittances is having a significant Dutch Disease effect in Bangladesh by appreciating the RER of the country.

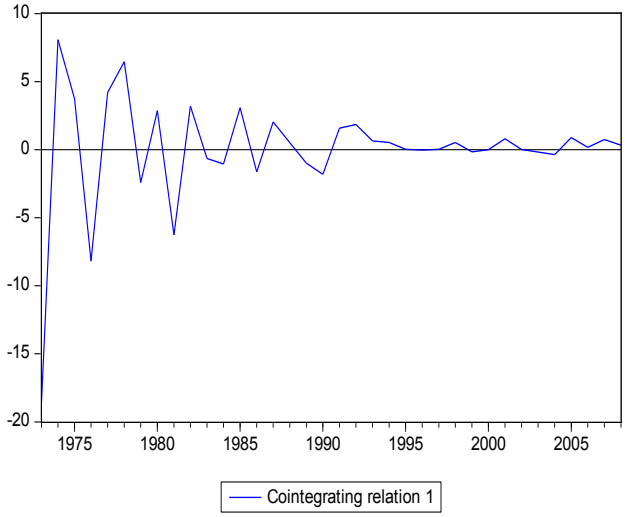

Figure 1. Cointegration graph for the real exchange rate equilibrium

The final dynamic Error Correction Model of RER is reported in Table 3 together with most common diagnostics tests. The results are satisfactory and indicate that all equations have performed well. The lagged error correction term in all equations is statistically significant and having the expected negative sign confirming that there is a cointegrating relationship between the dependent and independent variables.

The value of the error correction term in all equations suggests that in the absence of other interventions, actual RER converges at the rate of about 10% per annum to its long run equilibrium.

Table 3. Error Correction Model of real exchange rate for Bangladesh

VARIABLES	Equation 3.1 $\Delta LNREER_{t-1}$	Equation 3.2 $\Delta LNREER_{t-1}$	Equation 3.3 $\Delta LNREER_{t-1}$
ECM_{t-1}	-0.09* (-3.73)	-0.09* (-3.41)	-0.08* (-2.95)
$\Delta LNRREMTT_{t-1}$	0.0075 (0.52)	0.0372** (2.22)	-0.0384 (-0.7301)
$\Delta LNOPEN_{t-1}$	0.0356 (0.70)	0.1175*** (1.6372)	---
$\Delta LNTOT_{t-1}$	-----	---	0.1783*** (1.5559)
$\Delta TECP_{t-1}$	0.008* (4.23)	0.00524* (3.8089)	0.01829* (2.6748)
$\Delta LNM2_{t-1}$	-----	-----	-0.4485* (-2.8744)
ΔND_{t-1}	---	-0.1378 (-0.5851)	---
Constant	0.007 (0.7157)	-0.0038 (-0.2891)	0.0389* (1.7761)
DIAGNOSTICS:			
R-squared	0.55	0.59	0.59
Adj. R-squared	0.49	0.48	0.38
F-statistic	7.0524	5.67	2.28
Akaike AIC	-3.051	-3.0263	-3.068
Serial Correlation LM	18.30 {0.36}	24.78 {0.42}	23.19 {0.50}
Heteroskedasticity	185.81 {0.47}	206.46 {0.25}	348.41 {0.47}

Note: i) *, ** and *** indicate significant at 1%, 5% and 10% levels respectively. ii) Figures within parenthesis, ( ), represent the t-statistics; iii) Figures within { } are p values for the residual diagnostic checks under the null of no serial correlation, no heteroskedasticity for the LM and heteroskedasticity, respectively.

5. Conclusions and Recommendations

The main purpose of this study is to discover whether recent economic developments in Bangladesh are symptomatic of Dutch Disease or not. More specifically, it investigates the impact of the inflow of workers' remittances on the economy through the affect on RER. The (Johansen & Juselius 1990) cointegration test and VECM methodology are employed to determine both the long- and short-run determinants of the RER in Bangladesh. Since a structural break is found for 1994 in the data set, we run the model[equation (2.1)] with a DUMMY variable, which reveals a significant impact of the political transformation of Bangladesh on its RER. The equation (2.1) also reveals that the flow of the remittances is a significant factor in the appreciation of the RER. The VECM of this study reveals the short-run determinants of RER of Bangladesh and after specifying three alternate models, it also finds significant error correction terms along with negative signs for all of them. Thus, all these equations indicate that domestic policies produce significant short-run impacts on the RER of Bangladesh. In this way the flow of remittances are having an adverse effect on the economy of Bangladesh through Dutch Disease, as postulated in the literature.

The results of this study indicate a number of policy implications. First of all, the presence of long-run cointegration between the RER and its determinants found in this study implies that it will be effective to target one of the variables to influence the behaviour of other variables in the long run. This justifies the policy actions of the authorities in Bangladesh who have chosen to keep the exchange rate nominally fixed or almost fixed for the last few years through foreign exchange market intervention. So, developing countries like Bangladesh can gain some positive benefits from this type of occasional intervention in the foreign exchange market.

Secondly, the significant effects of some of the fundamental determinants on its RER, such as the terms of trade, are beyond the direct control of policy makers. This study shows that the terms of trade significantly shrink the trade competitiveness of Bangladesh. Therefore, the authorities can reduce the impact of such determinants by developing policies to encourage the diversification of tradable goods in the long run.

Finally, in spite of the positive socio-economic effects of remittances, this study concludes that the huge inflow of remittances is having adverse effects on the RER which can be counteracted by the government of Bangladesh through the design and implementation of policies that can divert the remittances from the non-tradable sector to investment projects of the economy. Thus, the government can reduce the adverse Dutch Diseases effect of remittances flow in the economy by increasing the trade competitiveness of Bangladesh.

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