# Remittance and Dutch Disease Phenomenon: Case of Bangladesh and Pakistan

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## ABSTRACT

The paper has been designed to explore whether the impact of remittance on the real exchange rate causes any Dutch disease problem for Bangladesh and Pakistan. These two South Asian countries have been targeted to figure out if the outcomes are similar for the countries with almost the same economic structure. Johansen co-integration approach, Vector Error Correction Method (VECM), and Granger Causality test have been employed taking real exchange rate as regressand and remittance and other attributing variables as explanatory variables with an aim to address the study objective. The study has used data from the World Development Indicators database ranging from 1986 to 2019. The results for both countries reveal that remittance is significantly negatively related to the real exchange rate which implying the appreciation of the domestic currency. However, this appreciation causes the Dutch disease phenomenon for neither Bangladesh nor Pakistan.

**Key words:** Remittance, Real Exchange Rate, Dutch Disease, Vector Auto-regression, Johansen Co-integration Approach, Vector Error Correction method, Granger-Causality Test

## INTRODUCTION

The concept Dutch disease indicates a situation where the economic development of one sector adversely affects the development of other sectors. The term was first used by The Economist in 1977 to describe the unfavorable situation faced by manufacturing industry of Netherland due to the gas field discovery of 1959. As the term was used for the Dutch economy, it was named as Dutch disease. According to description of The Economist, Dutch economy earned a lot of foreign currency by exporting natural gas which in turn appreciated their domestic currency. This appreciation of currency hampered manufacturing sectors and increased unemployment in the economy. In a nutshell, what is good for one sector may not be good for other sectors? Corden and Neary (1982) developed a classical economic model in 1982 to explain the Dutch disease phenomenon by conceptualizing resource movement effect and spending effect within tradable and non-tradable sectors. According to this model (Corden and Neary, 1982), economy comprises of three sectors-two is tradable and one is non-tradable. Here they explain how the advancement of one tradable sector declines the growth of non-tradable sector.

Remittance is one of the major sources of foreign currency earnings for the developing countries like Bangladesh, Pakistan, Nepal and Sri-Lanka. Therefore, various policies are taken by the developing countries to increase their remittance inflows. In South Asia Bangladesh and Pakistan are two major remittance dependent countries. Both of these countries are labor dependent country. Because of the availability of cheap labors, Middle East and developed countries find it profitable for them to hire labor from these developing countries. As a result large amount of remittance is received by these countries. In 2019, total remittance received by Bangladesh was about $18 billion which was 6.1% of its total GDP and total remittance received by Pakistan was $more than 22 billion which was 8% of its total GDP. Therefore, remittance plays an important role in development of these countries. But according to Rabbi et al. (2013) and Makhlouf and Moughal (2010), this huge remittance inflow increases the supply of foreign currency in economy which has a negative impact on other economic variables like exchange rate. According to the Dutch disease problem, this huge earning of remittance sector can adversely affect other sectors. In spite of this important role of remittance in economic development, the impact of it's on other variables like exchange rate is still vague. Previous

analysis shows different results for different countries. However, the results were subject to the methods used in those analyses.

The objective of this study is to examine how the remittance inflow of migrant workers affects the export competitiveness of Bangladesh and Pakistan by changing the real exchange rate. The study will also explore whether this impact on export competitiveness leads to Dutch disease problem for any of the two countries. The findings of the study may help in future policy implications.

## LITERATURE REVIEW

Remittance is an important issue for both underdeveloped and developing countries. The reason behind this is that these countries depend largely on remittance for foreign currency inflow. This huge remittance dependency can lead a country towards Dutch disease phenomenon. Therefore this is a burning issue for the researchers to work on. There are a few numbers of studies regarding remittance, exchange rate and Dutch disease of different remittance dependent countries. These analyses were diverse from one another. Different researchers studied different countries considering various functional forms with different econometric approaches. This literature review is divided into two segments-one segment is concentrated on different cross country work and the second segment is focused on individual country issue.

Owusu-Sekyere et al. (2014) performed a research using the panel data of 34 nations of Sub-Saharan Africa from 1980 to 2008. In this study Owusu-Sekyere et al. (2014) used a theoretical framework which was mentioned by Montiel (1999, 2003) before. Function was formed considering Real Exchange Rate (RER) as dependent variable and remittance and other attributing variables as independent variables. The study used Feasible Generalized Least Squares (FGLS) estimation technique. The brief of the findings is that remittance inflow appreciated RER of all of these 34 countries. But this appreciation did not cause Dutch disease phenomenon.

A study of Hasan and Holmes (2013) on 24 highly remittance dependent countries used data ranging from 1987-2010. To explore the exact relationship of remittance with real exchange rate and how it causes Dutch disease, two econometrics tools were taken into consideration. One was panel cointegration techniques and the other was quantile regression analysis. Like Corden and Neary (1982) this research was mainly focused on two effects of capital inflow – resource movement effect and spending effect. The research concluded that remittance inflow caused appreciation of RER. All the 24 countries considered in this study experienced Dutch disease problem because of appreciation of RER.

Ratha and Moghaddam (2020) also probed how remittance inflow and Dutch disease was related by using the information of some major remittance recipients' countries named- China, India, Nigeria, Philippines, Lesotho, Pakistan, Mexico, Honduras, El Salvador, Egypt, Bangladesh from 1980- 2016. The paper examined the long run and short run relationship by using error correction modeling and bounds-testing approach of co-integration. The findings of the study were mixed in case of short run but the long run findings were apparent. In short run few country faced Dutch disease problem and few country not. But in case of long run Dutch disease problem was apparent.

Engle and Yoo (1987) conducted a study using the data of six Commonwealth countries from 1998 to 2011 to find out remittance and Dutch disease phenomenon. Augmented Dickey Fuller (ADF) method and Durbin-Wu-Hausman specification test were applied to check the stationarity and spuriosity of the regression. The study found that in all of these six countries, workers' remittance caused domestic exchange rate appreciation and thus reduced export. This ultimately resulted in Dutch disease.

Ratha (2013) used bound testing approach to study whether remittance of these five countries-Mexico, India, Philippines, Lesotho and China led to Dutch disease or not. The study used different periods' annual data within 1975 to 2011 to explore both long run and short run relationship. In this model, Real Effective Exchange Rate (REER) is regressed on remittance and other related variables. The results figured out that China experienced Dutch disease but only in long run. But, Philippines experienced it in short run. However, for other three countries the phenomenon was not valid.

Taguchi and Lama (2016) used the data of Bangladesh and Nepal from 1993 to 2013 to explore whether remittance causes Dutch disease. They considered vector auto regression estimation to examine two different economies. The result found that in Nepal remittance led to Dutch disease, in Bangladesh remittance caused RER appreciation but did not cause Dutch disease. They speculated that the reason might be because of different demand and policy structure.

The countries who have high poverty rate depend extensively on remittance. Eromenko (2016) performed a study on Kyrgyzstan and Tajikistan using data ranges 2002-2013 to determine the existence of Dutch diseases problem on these economy. Using Dynamic Least Squares (DOLS) approach, the study found the presence of Dutch disease in the economy of Kyrgyzstan and Tajikistan. It also emphasized the point that Dutch disease problem was imported from rich-resource countries to poor-resource countries. Here, RER was regressed on remittance, broad money, oil price, foreign reserves and government expenditure.

By applying Johansen cointegration and vector error correction models, Rabbi et al. (2013) examined the presence of Dutch disease paradox in Bangladesh. They used data of remittance and other relevant variables including real exchange rate from 1971 to 2011. The findings of the study revealed that remittance inflow appreciated RER of Bangladesh that in turn lowered its export competitiveness. It indicated the presence of Dutch disease in Bangladesh. The study suggested that Bangladesh can off-set the dire impact of Dutch disease by removing trade barriers, diversifying export and by diverting investment from non-tradable sectors.

Roy and Rahman (2014) also examined whether Dutch disease problem arise in Bangladesh due to remittance inflow. In keeping with Rabbi et al. (2013), they investigated using the Johansen cointegration and vector error correction approach to identify long run and short run relationship respectively. The study used monthly data within July 2003 to July 2013. Inflation was used in the place of real exchange rate to form the regression model. The reason behind considering inflation was that any change of RER can be described by the change in relative price of both tradable and non-tradable sectors. The findings confirmed that remittance put upward pressure on inflation and thereby caused appreciation of RER.

Amin and Murshed (2017) used data from 1980 to 2013 to study how remittance and real exchange rate were correlated. By using ARDL cointegration test and ARDL Granger causality test they found that although remittance was negatively correlated with real exchange rate, it did not give rise Dutch disease paradox.

Makhlouf and Moughal (2010) conducted a study on remittance and Dutch disease scenario of Pakistan using thirty years data. They employed Bayesian analysis through the Markov Chain Monte Carlo methods via Gibbs algorithm simulation. This helped to overcome the problem of degree of freedom loss. The results revealed that remittance appreciated RER and inflated the non-tradable sectors. The study found the existence of the symptoms of Dutch disease in Pakistan.

In a nutshell, various researches have been performed regarding remittance and Dutch disease phenomenon. As far known, no exclusive studies has been done in cross country analysis using vector autoregressive model, co-integration approach and causality test simultaneously. This study fills this gap by using Johansen cointegration approach, vector regression method, vector error correction approach and Granger causality test at a time to show the remittance and Dutch disease scenario more efficiently for both in case of Bangladesh and Pakistan. Besides, this study is different from other as it focuses on the economic structure of two countries to identify whether the results of the presence of Dutch disease paradox is same for similar structured countries. Therefore, one of the reasons behind considering the case of Bangladesh and Pakistan is that the economic structure of Bangladesh and Pakistan are quite similar except some anomaly. Although the growth rate of Bangladesh is much higher than the growth rate of Pakistan, both of them have similarity in case of Nominal GDP, export earnings and remittance received. Another reason is that their economy largely depends on remittance inflow. Therefore, this research paper specifically addressed the following questions:

- How remittance inflow affects the real exchange rate of Bangladesh and Pakistan? Is there any causal relationship between them?
- Does the change of real exchange rate result in Dutch disease phenomenon?
- Is the impact of the remittance inflow and the presence of Dutch disease paradox same for the countries who have quite similar economic structures?

This study has extended the findings of other research by using different methods and by focusing on another different aspect. Latest available data are used to conduct this analysis,

## DATA AND EMPIRICAL MODEL

Real Exchange Rate (RER) of a country depends on many variables especially on the variables via which foreign currency enters into domestic economy. In case of developing country, remittance is one of the major sources of capital inflow. Whenever foreign currency enters into domestic economy in a large amount, the value of foreign currency depreciates as its supply is higher than its demand. This means domestic currency appreciates. Hence, RER appreciates. This appreciation affects export and import of the country as the domestic products become more expensive and the foreign products become less expensive. So, the country loses its export competitiveness. This in turn results in Dutch disease. This study has used a number of variables that change real exchange rate to examine whether the above mentioned scenario happens in case of Bangladesh and Pakistan.

In line with most of the literature, mainly on the work of Montiel (1999), in this study RER is taken as a dependent variable and remittance, foreign aid, foreign direct investment, trade openness are taken as independent variables. So, the form of econometrics model is-

$$RER = \beta_0 + \beta_1(RM_t) + \beta_2(FDI_t) + \beta_3(FAid_t) + \beta_4(OPN_t)$$

Here, RER is Real Exchange Rate, RM is the worker's remittance inflow, FDI stands for foreign direct investment inflow, FAid is net official development assistance and official aid received by the domestic economy and OPN is the trade openness.

RER is measured by multiplying the nominal exchange rate with the price ratio of two countries. Following Amin and Murshed (2017), RER has been expressed as,

$$RER = NER_{\frac{m}{USD}} \times \frac{CPI_{US}}{CPI_{m}}$$

Where, RER= Real Exchange Rate

NER= Nominal Exchange Rate

m= represent corresponding country

$CPI_{US}$= Consumer Price Index of USA

$CPI_{BD}$= Consumer Price Index of corresponding country

All the information of variables used in calculating RER is collected from form the database of World Development Indicators (WDI).

In this study, amount of net personal remittance received has been used as remittance. The data has been collected from WDI and measured in current US dollar. Here, net personal remittance is the sum of personal transfers and employees' compensation. Personal transfers include all current transfer from non-resident individual to resident individual that is taken place both in cash or in kind. Compensation of employees includes the income of short-term non-resident workers.

Data of net inflows of net foreign direct investment has been acquired from WDI website which has been considered as FDI in this model. Here, Foreign Direct Investment indicates inflow of direct investment equity in the corresponding country. It comprises earnings' reinvestment and different types of capital including equity capital. Data has been considered in current US dollar.

Foreign aid is the sum of official development assistant and official aid received by the domestic country from donor countries. In this study, annual time series data of foreign aid has been used in terms of current US dollar. It has been collected from WDI data source. Different Development Assistant Countries (DAC) and non-development assistant countries offer loans, grants and aid which help in economic development of recipient country.

Trade openness affects the exchange rate of an economy by affecting the import and export. Thereby, it has been considered as an important independent variable in this regression model. If an economy follows open trade system, then there will be less trade barriers for the foreign countries. Foreign trading countries can easily export their products in a very low cost. It means the price of imported goods will be reduced which in turn reduce the exchange rate. Hence, amount of import and export will change. In this study, to compute trade openness, three variables are taken into consideration- total export, total import and total GDP. Here, trade openness has been calculated by taking the sum of total export and import, then expressing this sum as a ratio of total GDP of the corresponding country. This data has been also measured in terms of current US dollar.

In South Asia two major remittance receiving countries are Bangladesh and Pakistan. The study has taken the economy of these two countries into consideration. In this paper, impact of remittance has been thoroughly examined to find out whether the remittance inflow causes any Dutch disease phenomenon for these two countries by appreciating their exchange rate. The analysis has been done by using a large data set of 33 years (from 1986 to 2019).

## METHODOLOGY

### *Unit Root test (Augmented Dickey Fuller Test)*

There is always a possibility of the existence of non-stationarity in time series data. Presence of unit roots in data is one of the causes of non-stationarity. Unit root is a stochastic trend which may cause unpredictability. If unit root is present in the data, analysis may give spurious result. In spite of the un-correlation of data, the value of $r^2$ can be very high because of the presence of unit root. Therefore, it is important to find out the stationarity of the data before exploring the correlation between variables. Different approaches can be used to detect the existence of the unit root. Here, in this study, Augmented Dickey Fuller (ADF) test has been used. It is the modified version of Dickey Fuller (DF) Test. DF test has some problems. It may create autocorrelation problem. Hence, ADF has been developed to avoid the problem of autocorrelation.

Among three basic regression models, this analysis has used model with a constant term and trend variable. Trend variable has been used because if this deterministic term is excluded, it declines the strength of the test and results can be spurious. Moreover, trend term helps to avoid autocorrelation problem. The function of the regression model is considered in the following form-

$$\Delta Y_t = \mu + \theta Y_{t-1} + \varphi \Delta Y_{t-1} + \delta_t + u_t \dots\dots\dots [1]$$

This regression model has been derived from a simple Autoregressive model, AR (1), $Y_t = \mu + a_1 Y_{t-1} + u_t \dots\dots [2]$ which has been turned into a difference equation in the following way-

$$Y_t - Y_{t-1} = \mu + a_1 Y_{t-1} - Y_{t-1} + u_t$$

$$\Rightarrow \Delta Y_t = \mu + (a_1 - 1) Y_{t-1} + u_t$$

$$\Rightarrow \Delta Y_t = \mu + \theta Y_{t-1} + u_t \dots\dots [3]$$

After that equation-3 has been modified by adding trend term and then this equation has been expressed as the functional form of the considered regression model (1).

From equation-2, it can be said that if the coefficient of autoregressive model AR (1) is equal to 1, or not significantly different from 1, then the time series is

considered to be non-stationary. So, it will be stationary if the coefficient $a_1$ is not equal to or close to 1. In other words the time series is stationary if $\theta$(as $a_1 - 1 = \theta$ ) is equal to 0.

Therefore, the hypothesis has been set as-

Null hypothesis, $H_0$: $\theta = 0$

Alternative hypothesis, $H_1 : \theta \neq 0$

If $\theta = 0$, do not reject the null hypothesis, it means the time series, $Y_t$ is considered to be non-stationary. If $\theta \neq 0$, $Y_t$is stationary. Statistical software STATA has been used to conduct unit root test.

***Johansen Co-integration test***

In time series analysis, it is a very common that the two or more time series are correlated. Engle- Granger co-integration test and Johansen co-integration test are two popular tests for identifying cointegration. However, in case of Engle-Granger test, a dependent variable has to be chosen. It is basically a two-step test where at first residuals (errors) has been constructed based on static regression and then the residual has been tested for unit root by using ADF or others unit root test approaches. According to this test, the time series is co-integrated, if the residual is stationary. However, different issues are created in case of choosing dependent variable and predicting residual. Unlike Engle-Granger test Johansen Cointegration test allow more cointegrating relationship. In Johansen test all the variables are taken as endogenous variable (Izquierdo and Montiel, 2006). It is also considered as an updated version of Engel-Granger test.

Therefore, Johansen Cointegration test is used in this study to examine the co-integration among the time series. It uses the likelihood estimation method for finding out cointegration. In this research, after determining the level of integration at which the variables are stationary, optimal lag length has been defined. The study has used both Akaike's Information Criterion (AIC) and Hannan and Quinn's Information Criterion (HQIC) for optimal lag length selection. After that Johansen test has been performed on the level forms of the variables using this lag length. Among the two types of Johansen test, the study has used Johansen test with trace statistics. However, there is only little difference between them. Hypothesis has been set according to the Johansen trace test-

Null hypothesis, $H_0$: There is no cointegrating equation

Alternative hypothesis, $H_1$: There is at least one cointegrating equation

At 5% level of significance if the trace statistics exceeds the critical value, null hypothesis will be rejected and conclude that there is at least one co-integrating equation. If opposite happens, null hypothesis will not be rejected. Existence of co-integration emphasizes the long run relationship among time series. Hence, any short run effect in the individual series will eventually converge with time. STATA software has been used to perform the analysis.

***Vector- Error Correction Model (VECM)***

Vector error correction model is an effective model for determining how one time series can affect another. It is useful to find out both short run and long run effect. It can be used if the variables have a stochastic trend. So, only if the null hypothesis is rejected in Johansen test, VECM will be used. Error correction indicates that an under or over value of previous period will be compensated or corrected by the prediction of current period. The lag length of Johansen co-integration test and VECM should be same. Here, the test is performed on the level form of variables using STATA.

***Granger Causality test***

To find out the causality between variables, Granger causality test has been used. In this study it has been used to determine the causal relationship between RER and REM. It has been examined whether RER can be predicted from REM and REM can be predicted from RER. Following pair of regression has been considered to use the Granger Causality test-

$$RER_t = c_1 REM_{t-i} + c_2 RER_{t-j} + u_{1t} \ldots . [4]$$

$$REM_t = c_3 REM_{t-i} + c_4 RER_{t-j} + u_{2t} \ldots . [5]$$

Where $u_{1t}$ and $u_{2t}$ are asummed to be uncorrelated. Hypothesis set for these two equations are stated below.

First hypothesis,

$H_0$: Lagged (2 lagges)REM does not cause RER

$H_1$: Lagged (2 lagges)REM cause RER

Second hypothesis,

$H_0$: Lagged (2 lagges)RER does not cause REM

$H_1$: Lagged (2 lagges)RER cause REM

Before estimating Granger causality test, Vector Autoregression (VAR) model has to be developed using the lag length. From this VAR model, using statistical software (STATA), Granger causality test has been performed in this study.

## RESULTS

***Augmented Dickey Fuller Unit Root Test***

Unit root test has been performed using STATA software. Following Table-1 represent the result in case of Bangladesh-

Table 1: Augmented Dickey Fuller test for Unit Root (for Bangladesh)

| Integrated of zero order, Levels I(0) (with Intercept) | | | | | |
|---|---|---|---|---|---|
| Name of variables | Without Trend | | With Trend | | Decision |
| | ADF test statistics | MacKinnon approximate p-value | ADF test statistics | MacKinnon approximate p-value | |
| RER | -0.535 | 0.8849 | -0.588 | 0.9796 | Non stationary |
| REM | 1.859 | 0.9985 | -1.171 | 0.9163 | Non stationary |
| FDI | -0.795 | 0.8205 | -2.388 | 0.3860 | Non stationary |
| FAID | 0.443 | 0.9830 | -0.699 | 0.9732 | Non stationary |
| OPN | -1.448 | 0.5593 | -1.463 | 0.8413 | Non stationary |
| Mackinnon Critical Values for Rejection of Null Hypothesis of a Unit Root [For Levels I (0)] | | | | | |
| Critical value | Without Trend | | With Trend | | |
| 1% | -3.589 | | -4.184 | | |
| 5% | -2.930 | | -3.516 | | |
| 10% | -2.603 | | -3.188 | | |
| Integrated of order one, Levels I(1) (With Intercept) | | | | | |
| Name of variables | Without Trend | | With Trend | | Decision |
| | ADF test statistics | MacKinnon approximate p-value | ADF test statistics | MacKinnon approximate p-value | |
| dRER | -3.875 | 0.0022 | -4.434 | 0.0019 | Stationary |
| dREM | -2.819 | 0.0557 | -3.382 | 0.0538 | Stationary |
| dFDI | -6.751 | 0.0000 | -6.665 | 0.0000 | Stationary |
| dFAID | -8.031 | 0.0000 | -9.406 | 0.0000 | Stationary |
| dOPN | -5.263 | 0.0000 | -5.351 | 0.0000 | Stationary |
| Mackinnon Critical Values for Rejection of Null Hypothesis of a Unit Root [For First Difference I (1)] | | | | | |
| Critical value | Without Trend | | With Trend | | |
| 1% | -3.593 | | -4.190 | | |
| 5% | -2.932 | | -3.519 | | |
| 10% | -2.603 | | -3.190 | | |

From Table-1, it can be seen that all the variables are non-stationary for all critical values when no integration has been taken. But when first difference has been taken, except remittance, all the variables become stationary at all critical values. Remittance is stationary at 5% and 10% level of significance. Therefore, spurious result can be avoided as all the variables become stationary at I (1).

Now, same unit root test has been conducted for Pakistan and the results have been summarized in table-2.

Table 2: Augmented Dickey Fuller test for Unit Root (for Pakistan)

| Integrated of zero order, Levels I(0) (with Intercept) | | | | | |
|---|---|---|---|---|---|
| Name of variables | Without Trend | | With Trend | | Decision |
| | ADF test statistics | MacKinnon approximate p-value | ADF test statistics | MacKinnon approximate p-value | |
| RER | -1.600 | 0.4838 | -1.506 | 0.8270 | Non stationary |
| REM | 3.303 | 1.0000 | -0.963 | 0.9489 | Stationary without trend |
| FDI | -0.795 | 0.8205 | -2.388 | 0.3860 | Non stationary |
| FAID | -2.207 | 0.2036 | -3.397 | 0.0518 | Stationary with trend |
| OPN | -1.931 | 0.3176 | -2.457 | 0.3496 | Non stationary |
| Integrated of order one, Levels I(1) (With Intercept) | | | | | |
| Name of variables | Without Trend | | With Trend | | Decision |
| | ADF test statistics | MacKinnon approximate p-value | ADF test statistics | MacKinnon approximate p-value | |
| dRER | -3.421 | 0.0103 | -3.283 | 0.0690 | Stationary |
| dREM | -3.166 | 0.0220 | -4.601 | 0.0010 | Stationary |
| dFDI | -6.751 | 0.0000 | -6.665 | 0.0000 | Stationary |
| dFAID | -6.264 | 0.0000 | -6.167 | 0.0000 | Stationary |
| dOPN | -5.640 | 0.0000 | -5.546 | 0.0000 | Stationary |

Using Mackinnon Critical Values for Rejection from Table-1, it can be seen that in case of zero order of integration null hypothesis of non-stationarity cannot be rejected for RER, FDI and OPN. But at I (1), all the variables are stationary. So, the problem of non-stationarity has been resolved at I(1).

***Johansen Co-integration test***

Both Akaike's Information Criterion (AIC) and Hannan and Quinn's Information Criterion (HQIC) for lag selection have given 4 as optimal lag length for both the data of Bangladesh and Pakistan. So, in this study 4 has been taken as optimal lag length. To use Johansen procedure 5% level of significance has been considered. In case of Bangladesh, the result of table-3 has revealed that the trace statistics has been exceeded the critical value at 5% level of significance for more than 4 ranks. It indicates that there are maximum 4 co-integrating equations. Eigenvalue approach has also given the same conclusion but with different values of max statistics and critical values. Therefore the null hypothesis of no cointegrating equation has been rejected.

Table 3: Johansen Co-integration result (For Bangladesh)

| Maximum Rank | Trace Statistic | 5% critical value |
|---|---|---|
| 0 | 233.3243 | 68.52 |
| 1 | 120.0760 | 47.21 |
| 2 | 61.4201 | 29.68 |
| 3 | 22.8667 | 15.41 |
| 4 | 7.5738 | 3.76 |

The tabulated summary of the result of Johansen cointegrating test for Pakistan has been given below in Table-4. The result of Pakistan has disclosed that the trace statistics has surpassed the critical value for maximum 3 ranks. So, there are maximum 3 cointegrating equations. Decision will be same if eigenvalue approach has been considered.

Table 4: Johansen Co-integration result (For Pakistan)

| Maximum Rank | Trace Statistic | 5% critical value |
|---|---|---|
| 0 | 209.7648 | 68.52 |
| 1 | 91.6712 | 47.21 |
| 2 | 39.6932 | 29.68 |
| 3 | 15.0737 | 15.41 |
| 4 | 0.0009 | 3.76 |

***Vector Error Correction Model (VECM)***

As co-integrating equations are present in the study, error correction model can be used. Error correction version of Johansen co-integration test has been estimated using Vector Error Correction model to identify the long run relationship among the variables. The result of vector error correction model has been summarized (for Bangladesh) on the following table along with the generated value of the coefficients of variables.

Table 5: Long run equation result of Johansen Normalization Restriction (Bangladesh)

| Beta | Coefficients | Z- statistic | P>\|z\| |
|---|---|---|---|
| RER | 1 | . | 0.000 |
| REM | 3.42e-08 | 5.67 | 0.000 |
| FDI | 8.63e-07 | 19.92 | 0.000 |
| FAid | -7.55e-07 | -17.30 | 0.000 |
| OPN | -6440.383 | -17.38 | 0.000 |

Here, restriction is placed on the target variable RER. RER is considered as a dependent variable. Sign must be considered reverse during interpretation. From the table-5, it can be seen that remittance inflow and FDI has a negative impact on real exchange rate. It means other thing remaining unchanged, if remittance increases, value of RER declines. If the Real Exchange Rate reduces, domestic currency appreciates. So, if remittance inflow and foreign direct investment inflow increases, it raises the supply of foreign currency in domestic market which eventually appreciates the local currency. On the other hand Foreign Aid and trade openness has a positive impact on real exchange rate. It means RER increases which indicates the depreciation of local currency. The same result was found by Rabbi et al. (2013) and Amin and Murshed (2017) for trade openness and remittance. The coefficients are statistically significant at 1% level.

Table 6: Long run equation result of Johansen Normalization Restriction (Pakistan)

| Beta | Coefficients | Z- statistic | P>\|z\| |
|---|---|---|---|
| RER | 1 | . | 0.000 |
| REM | 3.97e-08 | 5.16 | 0.000 |
| FDI | -4.16e-07 | -9.84 | 0.000 |
| FAid | -3.66e-08 | -1.14 | 0.254 |
| OPN | -60.26472 | -0.51 | 0.610 |

From Table 6, it can be noticed that in the economy of Pakistan, remittance inflow has a negative impact on real exchange rate. Therefore, local currency appreciates if remittance inflow increases. On the other hand, FDI, FAid and OPN positively affect the value of RER. It means if foreign investment, foreign aid inflow and trade openness increases, domestic currency will depreciate. In next section it has been analyzed whether this appreciation of local currency reduces the export by lowering export competitiveness.

***Granger-causality test***

Granger-causality test has been conducted to explore the causal relationship between real exchange rate and remittance both in long run and in short run. Here Granger causality test has been run based on Vector Auto-regression (VAR) for both 2 and 4 lag value. The result of the test is summarized on the table given below.

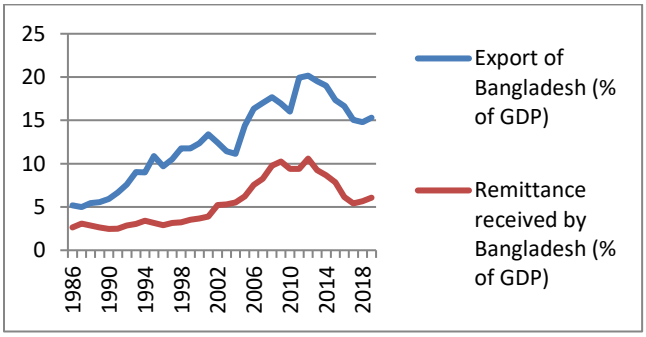
Table 7: Granger-Causality test result (Bangladesh and Pakistan)

| Granger-Causality Wald test result for Bangladesh | | | |
|---|---|---|---|
| At lag (2) | | | |
| **Equation** | **Excluded** | **F statistic** | **Prob > F** |
| RER | REM | 1.4272 | 0.2426 |
| REM | RER | 0.44848 | 0.6433 |
| At lag (4) | | | |
| Equation | Excluded | F statistic | Prob > F |
| RER | REM | 1.1584 | 0.3490 |
| REM | RER | 1.7997 | 0.1666 |
| **Granger-Causality Wald test result for Pakistan** | | | |
| At lag (2) | | | |
| **Equation** | **Excluded** | **F statistic** | **Prob > F** |
| RER | REM | 1.0933 | 0.3050 |
| REM | RER | 2.0421 | 0.1493 |
| At lag (4) | | | |
| **Equation** | **Excluded** | **F statistic** | **Prob > F** |
| RER | REM | 2.721 | 0.0702 |
| REM | RER | 1.001 | 0.4291 |

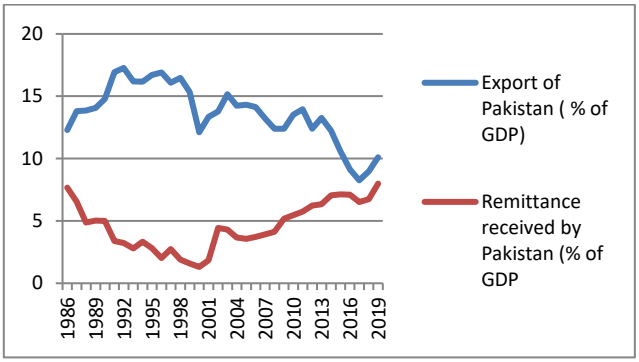
First test has been done by using lag-2 and the second test has been done by using lag-4. Both of the findings clearly show that there is no causal relationship between real exchange rate and remittance both in case of Bangladesh and Pakistan. As the probability here is always more than 5%, we cannot reject the null hypothesis for both of the cases. Therefore, it can be concluded that real exchange rate does not cause remittance. Similarly, remittance does not cause real exchange rate either.

***Remittance Inflow and Export of Bangladesh and Pakistan***

Both in Bangladesh and Pakistan, remittance inflow causes the appreciation of domestic currency. So, this appreciation can lead to Dutch disease phenomenon by reducing the export competitiveness. This basically means that if the value of domestic currency increases it in turn reduces the amount of export and increases the amount of import. Therefore, the Dutch disease will occur, if remittance reduces export of the economy. But the export scenario of Bangladesh and Pakistan does not imply that.




Graph 1: Export and Remittance of Bangladesh (% of GDP)




Graph 2: Export and Remittance of Pakistan (% of GDP)

From the above line graph, it can be seen that both the export and remittance of Bangladesh and Pakistan are increasing. But if Dutch disease exists in the economy, it will negatively affect the export of the economy. This upward pattern of export and remittance indicate that though remittance has a negative impact on real exchange rate which causes the appreciation of local currency, it does not imply Dutch disease phenomenon.

## CONCLUSION

The target of this paper was to examine whether remittance inflow of a country causes Dutch disease phenomenon by changing its real exchange rate. The study has taken the case of Bangladesh and Pakistan into consideration. By using Johansen co-integration, vector error correction and VAR Granger-causality test, the study has found that remittance received by Bangladesh and Pakistan from its emigrant workers causes the appreciation of domestic currency. But this appreciation of domestic currency does not lead to Dutch disease phenomeno. Therefore, the study has not found the presence of Dutch disease phenomenon in the economy of Bangladesh and Pakistan. The results go in line with the findings of Taguchi and Lama (2016) and Amin and Murshed (2017) but contradict the findings of Rabbi at al. (2013) and Makhlouf and Moughal (2010). It may be because of the impact of other variables on real exchange rate. The study has also found that trade openness and foreign aid reduce the value of domestic currency. Hence, the adverse impact of one variable may be compensated by the positive impact of other variable. Therefore, trade liberalization strategy of Bangladesh and Pakistan may help them to overcome the negative impact of remittance on exchange rate. Effective fiscal and monetary policies also play a great role to avoid Dutch disease. However, for the developing country like Bangladesh and Pakistan, remittance plays a great role in economic development. If the country uses its remittance in an effective way, it will help in its economic development. Therefore, efficient policy should be taken by the government of Bangladesh and Pakistan to use their huge remittance inflow in a feasible way so that it can enhance the sustainable economic development of the country.

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