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Do Remittances Cause Dutch Disease in the Recipient Country?

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Abstract: This study examines how remittances affect the currency of a recipient country. Using a four-variables structural vector autoregressive (SVAR) model, we find that an appreciation in domestic currency through remittances will reduce its recipient country's international trade competitiveness and thus decrease its exports. Conversely, a depreciation in the remittance recipient country increases trade competitiveness and thus increases its exports. The results imply that remittance recipient country experiences Dutch diseases.

Keywords: Remittance, Appreciation, Depreciation, Exports.

JEL Classification: F13, F14, F31, O24.

1. Introduction

Remittances play a great role in shaping the economy of recipient countries, especially developing countries. According to the World Bank (2017), migrants sent $429 billion in remittances in 2016 to their native countries, which is predicted to increase in upcoming years. Remittances are one of the most stable and reliable types of foreign exchanges in developing countries, even more so than foreign development investment (FDI) and foreign aid (Ahmed and Martinez-Zarzoso, 2016). Like other types of foreign exchange, remittances have a positive impact on poverty reduction and economic development in the recipient country (Fajnzylber and Lopez, 2008; Popkova et al., 2018; Abdel-Halim and Bino, 2019; Singer, 2010). However, some other studies have claimed that large inflows of remittances to developing economies have sometimes unintended consequences on the economy through their impacts on the country's exchange rate. For example, a higher net inflow of remittances implies a higher supply of foreign currency, which appreciates the currency of the recipient country. An appreciation of the recipient country's currency implies a loss of the trade competitiveness, making exports more expensive. Therefore, remittance inflow has positive impacts as well as negative impacts on its recipient countries. This study examines the effect of remittances on the domestic exchange rate and thus on the export sector within a macroeconomic framework of Bangladesh.

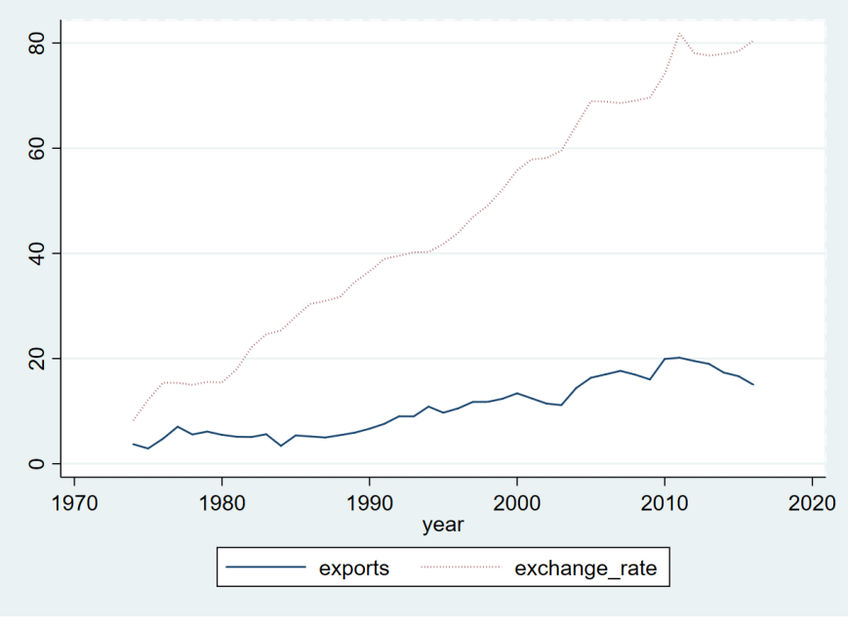
The reasons are to consider Bangladesh as a representative country in the study are as follows. First, Bangladesh has been one of the largest remittance-recipient and manpower exporting countries in recent decades. Second, Bangladesh is also a moderately open economy. The total trade-to-GDP ratio have averaged 20% over the last few decades. Amuedo-Dorantes and Pozo (2004) argue that international trade highly depends on exchange rates. In contrast, Yang (2008) and Lartey et al. (2012) argue that exchange rate of a recipient country is affected by its remittance inflows. Therefore, it would be interesting to examine the effect of remittance inflows that Bangladesh have on its exports and trade through the exchange-rate channel.

Bangladesh received around 2.5% of total remittance flow in the world and 13.6% of the total remittances received in South Asia. A higher remittance inflow to Bangladesh implies a higher supply of foreign currency, which implies an appreciation of the domestic currency. This appreciation

deteriorates the international trade competitiveness of Bangladesh and thereby discourages domestic exports.

Figure 1 shows that the trends of the nominal exchange rate and exports-to-GDP ratio, where exchange rates represents the Bangladeshi currency against the US dollar. A higher nominal exchange rate of Bangladesh currency implies that domestic currency has depreciated, making exports less expensive to their trading countries and thus increases its exports. This depreciation is shown to have occurred until 2012. Figure 1 also shows that an appreciation of Bangladesh currency decreases its exports. Remittances thus decrease exports of the recipient country, a phenomenon which is referred to as Dutch disease (Acosta et al., 2009; El-Sakka and McNabb, 1999; Owusu-Sekyere et al., 2014).

Figure 1: Trends of the nominal exchange rate and exports-to-GDP ratio



Note: This Figure shows the trends of nominal exchange rate and exports-to-GDP ratio. Nominal exchange rate is measured in terms of domestic currency per US dollar. An increased in nominal exchange rate implies the depreciation of the domestic currency, which increase the exports-to-GDP ratio and vice versa.

Although most empirical studies focus on microeconomic aspects,[1] the few central macroeconomic arguments have been focused on whether remittances cause Dutch Disease. This study examines whether remittances cause Dutch diseases within a macroeconomic framework and finds that net inflow of remittance decreases exports through exchange-rate channel in the recipient country. Previous studies examine the effect of remittances on domestic exports. The main contribution of this study is to consider the simultaneity to show relationships among remittance, exchange rates, and exports of the recipient country. The relationship between remittances and the exchange rate of the recipient country is likely to influence the exports. At the same time, exports will influence the domestic income of that country. By using a four-variable structural vector autoregressive (SVAR) model, this study shows a graphical presentation of how remittances simultaneously influence both the exchange rate and exports of the recipient country.

[1] For example, effects of remittance on household income, poverty alleviation, and education (Bansak et al., 2015), health Zhunio et al. (2012).

The rest of the paper is structured are as follows: Section 2 represents data and variable definition, Section 3 represents the methodology used in this study, Section 4 represents the estimation procedures and impulse responses of the exchange rate and exports to the remittance shocks, and Section 5 concludes the study.

2. Literature Review

To explain the effect of remittances on exports, the theoretical underpinning model is the Salter–Swan–Corden–Dornbusch paradigm. The model shows the mechanism of how an increase in capital inflows could cause a real exchange rate appreciation. Remittance inflow is synonymous to the capital inflows and both inflows increase income in the recipient countries. A higher income increases aggregate demand, which culminates in higher relative prices of non-tradable goods with a given price of the tradable sector (spending effect), which causes further movement of resources toward in the non-tradable sector from the tradable sector (resource movement effect). A rise in the relative price of non-tradable goods corresponds to a real exchange rate appreciation, which decreases exports of the tradable sectors.

To explain the adverse effect of a growing sector, Corden and Neary (1982) considers three sectors: booming sectors, tradable sectors, and non-tradable sectors. When demand for labor and output occur in a booming sector at the expense of a tradable sector, it is resource movement effect. This increases income, which would be partially spent on products of non-tradable sector. Therefore, non-tradable sector will also employ more workers and produce more outputs at the expense of tradable sector (spending effect). These incidences indicate that a growing sector of an economy would hurt an established tradable sector. Remittance inflows not only boost the economic development but also adversely affect the exports through exchange-rate channel. Remittance-recipient countries experience Dutch disease through real exchange rate appreciation, reducing the growth in tradable sectors, and increase the growth in non-tradable sectors.

There are several studies which show the evidence of Dutch disease in an economy although there are relatively few studies that connect remittances to Dutch disease. Acosta et al. (2009) argued that remittances may increase the reservation wage of individuals in the recipient countries, which could exert pressure on employees to increase wages. Assuming no change in world prices, this pressure could further lead to hurt in a tradable sector because there is a higher production costs as domestic wages increase. Additionally, he showed that remittance flows decrease exports as remittances cause an appreciation of the domestic currency. Bourdet and Falck (2006) also found that remittance inflows to Cape Verde cause to appreciate the real exchange rate of domestic currency, which deteriorates trade competitiveness, thus preventing the development in export sector of a recipient country.
The effect of remittances on exports may be different in developing countries than in developed countries. Beja (2011) argued that remittances cause Dutch disease in the middle-income countries but not in the upper- and low-income countries. He further argued that the middle-income countries can protect their economies from getting the disease through proper planning. However, if the middle-income countries get infected, and their condition is not managed well, Dutch disease could hurt their economies. Owusu-Sekyere et al. (2014) also found the effect of remittance inflows on real exchange rates in sub-Saharan Africa (SSA). However, they argued that the real exchange rate appreciation can be mitigated by demand management policies.

Previous studies have showed how remittance inflow affects exchange rates and ultimately causes Dutch disease. This is a one-way causal effect of remittances on the exchange rate of a recipient country. However, there are also studies that have examined the effect of exchange rates on remittances. For example, El-Sakka and McNabb (1999) argued that remittances are more sensitive to exchange rate under managed-floating regimes than under fixed-exchange-rate regimes. Therefore, not only do

remittances influence the exchange rate but also exchange rate influences remittances. However, previous studies have not addressed the two-way causal relationship between remittances and exchange rate.

Vargas-Silva (2009) addressed the simultaneity to examine the two-way causality between remittance and exchange rates. Using a structural vector error correction (SVEC) model, he found that remittances increase domestic money demand by reducing the liquidity constraint. A higher money demand for transaction purpose might increase the aggregate demand for foreign goods that may also lead to an appreciation of the real exchange rate in a remittance-recipient country. However, real exchange rate does not truly represent the purchasing power of a domestic currency.

A fluctuation in real exchange rate influences the international trade competitiveness of a country. To examine the adverse effect of remittances on the trade competitiveness of Bangladesh, Chowdhury and Rabbi (2014) found that remittances significantly appreciate the real exchange rate and deteriorate external trade competitiveness. An appreciation in the real exchange rate of a domestic currency against foreign currency implies an increased export price. Higher export prices, relative to import prices, imply an improvement in the terms of trade. Chowdhury and Rabbi (2014) found that an improvement in the external terms of trade discourages the total exports in the absence of a diversified export sector even though remittances improve other economic and development indicators. However, they do not consider the simultaneity among macroeconomic variables. The relationship between remittances and the exchange rate of the recipient country is likely to influence the exports. At the same time, exports will influence the domestic income of that country. These imply that macroeconomic indicators are simultaneously related. Unlike previous studies, this study incorporates the simultaneity among remittance, exports, and the exchange rate of its recipient country.

3. Data

This study uses four endogenous variables: remittance, exports, domestic income, and exchange rate within a macroeconomic framework. The first three series are collected from World Development Indicators and the last series is collected from International Banks for Settlement.

Remittance is measured as the ratio of personal transfers and compensations received from the domestic people to the Gross Domestic Product (GDP). Personal transfers are all types of financial transfers in cash or in kind between resident and nonresident individuals. Compensation of employees are the income of the workers who are employed in an economy where they are not resident and of residents employed by nonresident entities. Compensation of employees has three main components: wages and salaries in cash, wages and salaries in kind, and employers' social contributions. Compensation of employees is recorded gross and includes amounts paid by the employee as taxes or for other purposes in the economy where the work is performed. Exports are measured as ratio of monetary values of all goods and services sold to the rest of world and GDP. The goods include value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. Domestic income is measured by the annual growth rate.

Instead of nominal exchange rate or bilateral exchange rate, this study uses the real effective exchange rate (REER) as the exchange rate. REER is a measure of the value of a currency against a weighted average of several foreign currencies divided by a price deflator or index of costs. An increase in REER implies that exports become more expensive and imports become cheaper; therefore, an increase indicates a loss in trade competitiveness. Unlike nominal or real exchange rate, REER considers the trade-weighted average of bilateral exchange rate of the trading partners, adjusting with relative price

levels between two trading partner-countries. All variables are annual, and the duration of data used in this study is 1974-2017.

Table 1 shows the summary statistics of the variables. On average, Bangladesh receives approximately 4.50% of GDP as remittance, 10.63% of total GDP as exports. This indicates that remittance significantly influence Bangladesh economy with other sectors. In addition, Figure 1 shows trends of REER and exports in Bangladesh. An increased REER increases exports and a decreased REER deceases exports.

Table 1: Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
Remittance	4.580	2.916	0.185	10.588
Exchange rate	123.382	16.433	98.338	173.388
Exports	10.630	5.264	2.895	20.162
Domestic income	4.785	2.041	-4.088	7.281

4. Empirical Model

The study uses a four-variable structural VAR (SVAR) model. The system of equations representing the VAR can be written in the vector form as follows:

$$B_{0t}x_t = B_1 x_{t-1} + B_2 x_{t-2} + \dots\dots\dots\dots + B_p x_{t-p} + u_t, \quad (1)$$

where $x_t = [rem_t, reer_t, expt_t, y_t]'$ is endogenous variables: remittances, real effective exchange rates (REER), exports, and per capita growth rate, respectively. The $u_t = u_t^{rem}, u_t^{reer}, u_t^{expt}, u_t^{y}]'$ is the vector of structural shocks: remittance shocks (u_t^{rem}), exchange rate shocks (u_t^{reer}), export shocks (u_t^{expt}), and domestic output shocks (u_t^{y}), respectively. It is assumed that $E(u_t)$=0 and $E(u_t u_t') = \Sigma_u$, and assumed that the structural shocks are uncorrelated.

Following Giannni and Gannani (1997), Equation 1 can be rewritten as follows:

$$B(L)x_t = u_t \quad (2)$$

where $B(L) = B_0 + B_1 L + B_2 L^2 + \cdots + B_p L^p$ is the autoregressive lag order polynomial p. Equation 1 can be rewritten as follows:

$$x_t = A_1 x_{t-1} + A_2 x_{t-2} + \dots\dots\dots\dots + A_p x_{t-p} + \epsilon_t \quad (3)$$

where ϵ_t is the shocks from the reduced model, $A_i = B_0^{-1} B_i$ for $i = 1,2,\dots,p$ and $\epsilon_t = B_0^{-1} u_t$.

To examine the response of contemporaneous shock in the reduced model to the endogenous variables of the structural model, we make the following assumptions. First, following Lartey et al. (2012), we assume that exchange rate influences immigrant to send more money to their domestic country. For example, a lower inflow of remittance implies a lower supply of foreign currency. This causes a depreciation in domestic currency, which implies that foreign currency has more value in their domestic currency. This implies that $b_{12} \neq 0$. Remittance is not affected export and domestic income representing by GDP growth. This implies that $b_{13} = 0$ and $b_{14} = 0$. In the second equation, following Amuedo-Dorantes and Pozo (2004), we assume that remittance also influences the exchange rate of the remittance recipient country, but domestic export and GDP do not influence the exchange rate. This implies that $b_{23} = 0$ and $b_{24} = 0$. In the third equation, by using the definition of GDP, we assume

that remittance and domestic GDP do not influence the export; however, remittance is influenced by the exchange rate. This implies $b_{31} = 0$ and $b_{34} = 0$ but that $b_{32} \neq 0$. The last equation represents the GDP response. we assume that GDP is influenced by exchange rate and export of the domestic country but not by the remittance as it is assumed as extraneous to the domestic GDP. This implies $b_{41} = 0$ but that $b_{42} \neq 0$ and $b_{44} \neq 0$.

These restrictions are imposed on the contemporaneous relations between the structural shocks and the reduced form VAR residual. This identification scheme is represented in matrix form in Equation 4. Therefore, the shocks from reduced form VAR can be recovered as follows:

$$\begin{bmatrix} \epsilon_t^{rem} \\ \epsilon_t^{reer} \\ \epsilon_t^{expt} \\ \epsilon_t^{y} \end{bmatrix} = \begin{bmatrix} 1 & b_{12} & 0 & 0 \\ b_{21} & 1 & 0 & 0 \\ 0 & b_{32} & 1 & 0 \\ 0 & b_{42} & b_{43} & 1 \end{bmatrix} \begin{bmatrix} u_t^{rem} \\ u_t^{reer} \\ u_t^{expt} \\ u_t^{y} \end{bmatrix}. \tag{4}$$

5. Empirical Analysis

Table 2 shows the results of stationary test by using the Augmented Dicky-Fuller (ADF) test. All variables except the growth rate are stationary after taking the first difference. It is important to make sure that all the estimates of VAR are stable. If all the eigenvalues Table 2: Stationary Test by using ADF statistic variable statistic have modulus that is less than one, then VAR estimation procedure is stationary and stable (Kilian and Lütkepohl, 2017). Also, we use Schwarz Bayesian Information Criteria to select the maximum lags to be included in the model. The optimal lag order is found to be two. Following (Kilian and Lütkepohl, 2017), VAR(2) is also found stable.

Table 2: Unit Root Test

Variables	Statistics
Remittance	-4.377(1)***
exchange rate	-4.990(1)***
Exports	-6.424(1)***
domestic income	-8.068(0)***

Note: This Table shows the ADF test statistics for variables used in the study. It is shown that remittance, exchange rate, and exports are non-stationary, and these are stationary after first difference. The growth rate is stationary after the first difference. Parentheses show the number of differences used to make the series stationary.
*. **, *** indicate $p < 0.05$, $p < 0.01$, $p < 0.001$ respectively

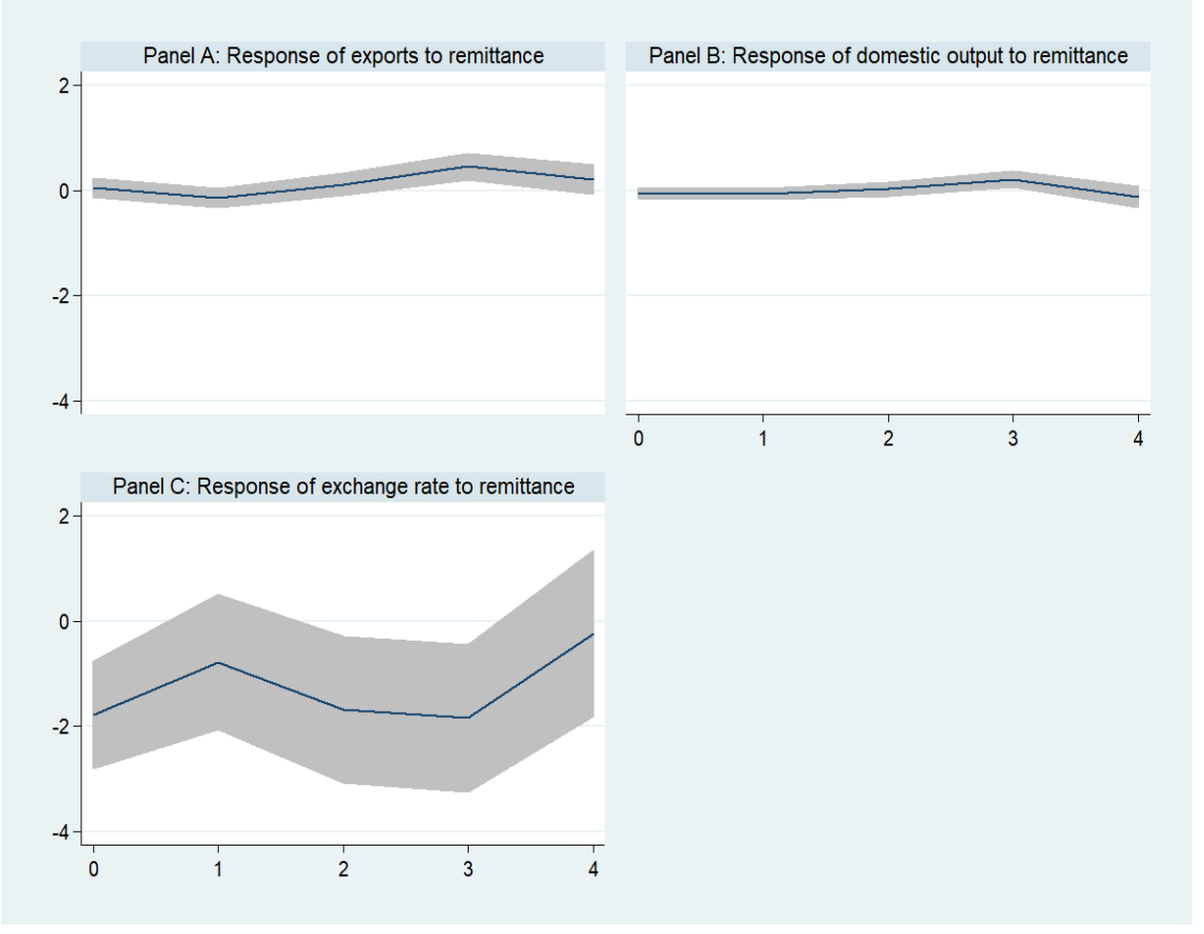
Table 3 shows the estimated coefficients in Equation 2. The estimated parameters support the assumption in equation 3. The estimates of b_{12} is positive and statistically significant. This implies that increasing the REER indicates that domestic currency depreciates, making foreign currency more valuable. When migrants find that their remittances will have higher values in their domestic country, they send more remittances. Table 3 also shows that the estimate of b_{32} is also negative and statistically significant. This implies that an increase in the REER implies an increase in exports. The likelihood test of over identifying restriction shows that null hypothesis is rejected at 5% level of significance. As we would expect from the significant coefficient in the exactly identified VAR, the over-identifying restriction is clearly rejected.

Table 3: Contemporaneous coefficients in the structural model

Coefficients	Estimate	Standard error
b_{12}	-5.421401***	1.41855
b_{21}	-3.221001***	0.96678
b_{31}	-0.019142***	0.00340
b_{42}	-0.130528***	0.01525
b_{43}	-1.048357***	0.07760
Over-identifying restriction test $\chi^2_{(1)}$,	20.8349	

Using Equation 4, this study examines an SVAR model and show the impulse response function (IRF) of remittance to real exchange rate, export, and GDP in Figure 2. Figure 2 shows how a one standard

Figure 2: The impulse response function of remittance



Note: This Figure shows that impulse responses of exchange rate, exports, and domestic income to remittance shocks in Bangladesh. The shaded regions represent the one standard deviation bootstrap confidence bands based on 1000 replications.

deviation shock of remittance influences the exchange rate, export, and GDP. Panel A shows that exchange rate is increasing in the first period, decreasing until third period, and finally increasing after the third to the fourth period. An increase in REER implies an appreciation in domestic currency that causes exports to become expensive and decrease. Comparing Panels A and C show this trend until the first period and from the third period to the fourth period. In contrast, from the second period to the third period, a decrease in the REER implies a depreciation of the domestic currency (Panel C), which represents a gain in trade competitiveness and therefore exports increase (Panel A).

6. Conclusion

Remittance influences the exchange rate of the recipient country: when remittances cause an appreciation, exports decrease, and when remittances cause a depreciation, exports increase. This finding is consistent with Dutch disease. It is highly likely to experience the Dutch disease results from remittances through the exchange-rate channel in the remittance-recipient countries. The study helps policy makers to set appropriate policies in addressing the shocks raised from the remittance inflow. For example, the government could diversify the investment opportunities by boosting the production in the non-tradable sectors to relocate employment in the adversely affected sectors. Government could also create new export industries and implement relevant policies, which would not be as negatively affected by the exchange rate.

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