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CONTENTS

Do Oil Prices Determine Remittances from the Gulf Countries to Bangladesh?

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Abstract

Most Bangladeshi migrants are employed in several oil-rich Gulf countries. Therefore, not surprisingly, Bangladesh receives the highest amount of remittances from these countries. Given the importance of oil production in these Gulf countries, it is reasonable to believe that oil prices may be an important determinant of remittance flows to Bangladesh. This is the first study that empirically examines the dynamic relationship between oil prices and remittances from the Gulf countries to Bangladesh. The autoregressive distributed lags (ARDL) bounds testing is applied to a time series dataset that covers the period from 1980-81 to 2017-18. Results suggest a robust positive association between oil price and remittance flows from the Gulf countries to Bangladesh, after controlling for domestic macroeconomic factors. These results have important policy implications not only for Bangladesh but also for other remittance recipient countries.

***Keywords*:** Remittances, oil price, Gulf countries, ARDL

Introduction

Over the last four decades, remittances have been one of the most important sources of foreign currencies in Bangladesh. According to the World Bank-KNOMAD (2019), total remittances constituted approximately 5.4% of Bangladesh's GDP in 2018. In terms of its size, remittances have risen from a modest USD 18.8 million in 1976 to USD 15.6 billion in 2018, making Bangladesh one of the top ten remittance-recipient countries in the world (World Bank, 2020). By the mid-1990s, remittances surpassed both foreign direct investment (FDI) and official development assistance (ODA) and became the second largest source of foreign currencies after export earnings (Figure 1). For the last two decades, academics and scholars made the effort to understand the macroeconomic impact of remittances in Bangladesh. These studies mainly focus on the dynamic relationship between remittances and the domestic macroeconomic variables such as economic growth (Hassan, Chowdhury, and Bhuyan, 2016; Kumar and Stauvermann, 2014; Paul and Das, 2011; Paul, Uddin, and Noman, 2011; Siddique, Selvanathan, and Selvanathan, 2012), domestic financial development (Chowdhury, 2011), consumption (Das and Chowdhury, 2019), investment (Hossain and Hasanuzzaman, 2013; Das and Chowdhury, 2019) and trade competitiveness (Chowdhury and Rabbi, 2014).

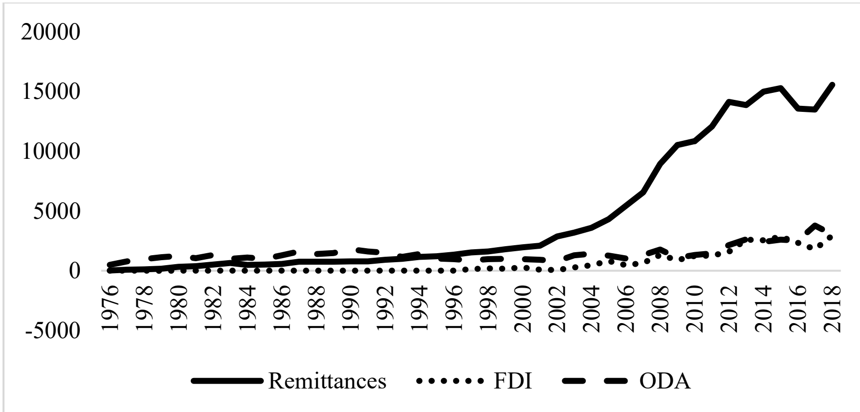

Figure 1: External Financial Flows to Bangladesh
Source: World Bank (2020)

Although the existing literature on the macroeconomic impact of international remittances in Bangladesh is vast, the dynamic association between remittances and external factors have not been studied extensively. The price of oil is one of those external factors. The rapid increase in oil prices due to the OPEC crisis in 1973 and the associated rise in demand for migrant workers in the Gulf countries led to labor migration from Bangladesh. In 2019, approximately 80% of total migrant workers were in the Gulf countries (Bureau of Manpower Employment and Training, 2020). Not surprisingly, the lion's share of Bangladeshi remittances comes from these countries. Figure 2 shows the recent time series data on remittances inflows from the Gulf countries. During the 2016-2017 fiscal year, over USD 7.3 billion of remittances came to Bangladesh from the Gulf countries (Bangladesh Bank, 2020). Most recent data from February 2020 suggests that 57% of total remittance inflows to Bangladesh were from the Gulf countries.

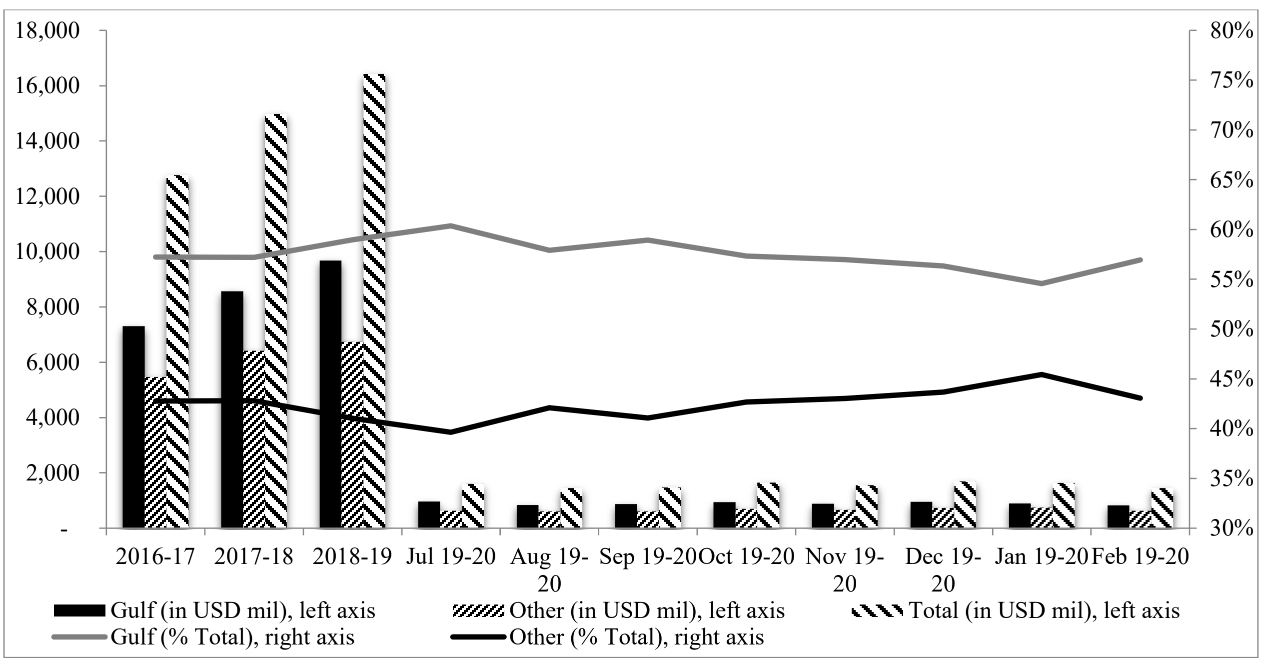

Figure 2: Recent Trends of Remittance Flows to Bangladesh from the Gulf Countries
Source: Bangladesh Bank (2020)

Given the above trends, one expects that remittance inflows to Bangladesh may be sensitive to oil prices. However, no study has investigated this relationship for this country. The aim of this paper is to address this void in the literature. I will examine the dynamic relationship between inward remittances to Bangladesh from the Gulf countries and oil prices, after controlling for several factors, including domestic economic activity, inflation, and financial development. The dataset used in the paper covers the period from 1980-81 to 2017-18. I use the autoregressive distributed lags (ARDL) technique to examine the remittance-oil price nexus. Results suggest that there is a strong positive association between remittances from the Gulf countries to Bangladesh and oil prices. The rest of the paper proceeds as follows. The next section provides a brief discussion on remittances and oil prices. The one after this presents the data and empirical strategy. The one that follows discusses the findings, and the last section concludes the paper.

Remittances and Oil prices

In the existing literature, the relationship between remittances and oil prices has been examined from two distinct perspectives. A first group of studies have investigated this relationship from a home, or migrant country's point of view. Lueth and Ruiz-Arranz (2007) is one of the first studies that modeled oil prices as a determinant of remittance flows to Sri Lanka. They applied cointegration, vector error correction model (VECM), and impulse response function (IRF) techniques to a quarterly dataset from 1996 to 2004. They found long-run evidence of one cointegrating relationship among variables, including remittance inflows and oil prices. Findings from the IRF suggested that a rise in oil price positively impacted remittances in Sri Lanka. They, therefore, argued that greater economic activity in the host countries due to an oil price rise helped Sri Lankan migrant workers send more money to their home country. Gupta (2005) did not find any statistical impact of oil prices on remittances in India. On the contrary, Khodeir (2015) found a negative association between remittance inflows to Egypt and global oil prices. Khodeir (2015) argued that although a rise in oil prices increased migrants' income, a rise in the cost of living and consumption in the host country led to workers sending lower amounts of remittances back to the home country. Thus, there is no clear evidence on how the relationship between remittances and oil prices plays out in the home country.

The second set of studies examines the dynamic relationship between oil prices and remittance outflows from a host country perspective. Umair and Waheed (2017) used a time series dataset from 1973 to 2014 to examine the determinants of remittance outflows from Saudi Arabia to Pakistan. They applied the ARDL method and found that oil prices were not statistically significant in determining remittance outflows. Others presented an opposing view. Naufal and Termos (2009) used a panel dataset of Gulf Cooperation Council (GCC) countries from 1971 to 2004. Using both ordinary least squares and fixed effects techniques, they found the coefficient of oil prices in the remittance outflow regression to be between 0.24 and 0.37. This means that remittance outflows tend to have a positive and inelastic relation to oil prices. Akçay (2019) found a coefficient of 0.70 while examining the relationship between remittance outflows from Oman and an upward movement of oil prices. Thus, it can be argued that the outflow of remittances from Oman is relatively elastic with respect to the positive movements in oil prices. Further, Akçay (2019) found no statistical significance between remittance outflows and the negative movement of the oil price. Other studies that found similar results are Snudden (2018) and De, Quayyum, Schuettler, and Yousefi (2019).

From a home country's perspective, it is important to note that a positive relationship between remittance outflows and oil prices in the oil-producing countries may give us an indication of the potential relationship between remittance inflows and oil price in the home country. In this paper, I use time-series data to test this hypothesis for Bangladesh – one of the largest recipients of remittances flowing from the Gulf countries. The novelty of this paper is to focus on the home country and to unpack the dynamic relationship between remittances from the Gulf countries and oil prices. This study is the first to analyze the issue for Bangladesh.

Data and Methods

Data

To examine the impact of oil prices (OIL) on real remittance inflows from the Gulf countries (REM), I use annual data from 1980-81 to 2017-18. The length of the time-series dataset is constrained by the availability of the data on remittances and other variables. Further, I control for economic activity by including real GDP (Y), financial development by including broad money to GDP ratio (FIN), and price movements by including inflation (π) in the behavioral equation. These variables are transformed by applying the natural logarithm and denoted as LNOIL, LNREM, LNY, LNFIN, and LNπ respectively. Therefore, the behavioral equation estimated in this paper takes the following form:

$$LNREM = F(LNY, LNOIL, LNFIN, LN\pi) \quad (1)$$

I collected data on Y, FIN, and π from the World Development Indicators published by the World Bank (2020). The data on REM was collected from the Bangladesh Economic Review 2019, published by the Ministry of Finance (2019). The data on OIL was collected from the BP Statistical Review of World Energy 2019 published by British Petroleum (2020). OIL is the price of Dubai crude oil. REM is personal transfers and the compensation of workers from six Gulf countries including Saudi Arabia, United Arab Emirates, Qatar, Oman, Bahrain, and Kuwait. The nominal value of remittances is divided by the GDP deflator to estimate the real value of remittances. Y is measured in 2010 constant US dollar terms. The nominal value of broad money is divided by current GDP to estimate FIN.[1] Finally, π is the percentage change in GDP deflator. The REM variable is in the fiscal year format, while the other variables are in the calendar year format. I convert them into fiscal year format by taking the average value of the previous and current years.

Methods

The empirical technique used in this paper consists of unit root testing and the ARDL bounds testing. To examine the orders of integration of the variables, I first use the Augmented Dickey Fuller (ADF) unit root test (Dickey and Fuller, 1979). This test has three versions: with intercept, with trend and intercept, and without trend and intercept. I carry out all three versions but present results only from the last one due to space constraints.[2] If variables are integrated of order 0 or 1, the next step is to apply the ARDL bounds testing method as proposed by Pesaran and Shin (1998) and Pesaran, Shin, and Smith (2001).

The ARDL bounds test is based on the calculation of an *F*-test statistic, which is compared against its lower, I(0) and upper bound, I(1) critical values. This test assumes a null hypothesis (H_0) $ß_1 = ß_2 = ß_3$ against the alternative hypothesis (H_a) that $ß_1$, $ß_2$, and $ß_3$ are not simultaneously zero. The null hypothesis is rejected when the estimated *F*-test statistic is greater than the upper bound critical value. We cannot draw any conclusion if the *F*-test statistic lies between the I(0) and I(1) critical values. If the *F*-test statistic lies below I(0) critical value, the null hypothesis of no levels relationship is not rejected. I use both Schwarz Bayesian Information Criteria (SBIC) and Akaike Information Criteria (AIC) to select an optimal lag length. If the *F*-test establishes a long-run level relationship between OIL, REM, and other control variables, then in the next step, I proceed to estimate the relationship using a single equation error correction framework. Finally, to check for robustness, I estimate a battery of diagnostic tests including the Jarque-Bera Normality test, the Breusch-Godfrey Serial Correlation Lagrange Multiplier test, the Breusch-Pagan-Godfrey Heteroskedasticity test, and several stability tests including the Ramsey regression equation specification error test (RESET), the cumulative sum of recursive residuals (CUSUM), and the cumulative sum of squares recursive residuals (CUSUMQ).

Numerous scholars justified the use of the ARDL method over standard cointegration techniques such as the Johansen approach (see, for example, Akram and Das, 2020). Below is a summary of some of the advantages of the ARDL method. First, this technique can be used in the presence of all I(0), all I(1) or a combination of I(0) and I(1) variables. Therefore, this approach does not require *a priori* knowledge of the integration properties (Narayan, 2004). Second, the standard Johansen test is based on a vector autoregression (VAR) model. This specific cointegration test uses a single ARDL equation that reduces the estimated number of parameters. Third, unlike the standard cointegration techniques, different variables within the ARDL framework can take different optimal numbers of lags. Fourth, scholars argued that the ARDL approach to cointegration avoids the problems of serial correlation and endogeneity because this technique is free of residual correlation (Ghatak and Siddiki, 2001; Jalil, Mahmood, and Idrees, 2013; Narayan, 2004; Marques, Fuinhas, and Menegaki, 2016). Finally, and perhaps most importantly, this technique performs better with a small sample size (Bahmani-Oskooee and Fariditavana, 2015; Jalil, Feridun, and Ma, 2010; Narayan and Narayan, 2006; Murthy and Okunade, 2016). Given that the dataset used in this paper has only 38 observations, ARDL is the appropriate cointegration technique to identify the relationship between oil prices and remittances.

Results

Table 1 reports findings from the ADF unit root test results for the levels and first differences of the series LNOIL, LNREM, LNY, LNπ, and LNFIN. The null hypothesis of unit roots is rejected at levels for both LNπ and LNFIN implying that these variables are integrated in order 0. For the other three variables, i.e., LNOIL, LNREM and LNY, the null hypothesis of unit roots is not rejected at levels but rejected at the first differences. Therefore, these variables are integrated in order 1 and it is evident that none of the series under investigation are integrated in order 2 or higher. This makes the ARDL bounds testing appropriate. I proceed with the *F*-test before estimating the long run equation as defined in equation (1).

Table 1: ADF Unit Root Tests

Variable	Test Statistic
LNREM	-2.07
ΔLNREM	-4.94***
LNY	0.15
ΔLNY	-3.96**
LNOIL	-2.60
ΔLNOIL	-4.24**
LNFIN	-3.54*
ΔLNFIN	-
LNπ	-4.06**
ΔLNπ	-

Note: 1. ***, ** and * imply statistical significance at the 1%, 5% and 10% level respectively; 2. The null hypothesis of the ADF test is that the series contains unit roots.
Source: Author's calculation.

The next table presents the ARDL bounds test results. The *F*-test statistic is higher than the *F*-test upper bound critical value (7.16 versus 4.44) at the 1% level of significance. Therefore, the null hypothesis is rejected by the *F*-test. Hence, in the next step of the analysis, I estimate the long-run and short-run relationships between the variables.

Table 2: ARDL Bounds Test: *F*-test Statistic

Equation	Test Statistic	
LNREM = F(LNY, LNOIL, LNFIN, LNπ)	7.16***	
Upper and Lower Bounds		
Level of Significance	**I(0)**	**I(1)**
10%	1.90	3.01
5%	2.26	3.48
1%	3.07	4.44

Note: *** implies statistical significance at the 1% level.
Source: Author's calculation.

Table 3 presents the results from the ARDL regression. According to the SBIC, the selected ARDL model is (2, 2, 0, 2, 0). The same model is chosen when the AIC is used to select the optimal lag length. Therefore, the results remain unchanged. The variables ΔLNY, ΔLNFIN, and their first lag, along with the first lag of ΔLNREM are included in the short-run equation. These variables are statistically significant at least at the 5% level. As expected, the error correction term in the short-run equation is negative and significant at the 1% level. The size of the coefficient is -0.46, suggesting that approximately 46% of any deviation from the long-run equilibrium is corrected within the first year. In other words, it can be argued that it will take a little over two years for the dependent variable to return to the equilibrium due to a change in other variables.

The main focus of the ARDL approach is the long-run equation. The results suggest that the coefficient of LNOIL is positive and statistically significant at the 1% level. The size of this coefficient is 0.578. Thus, on average, a 1% increase in Dubai crude oil price tends to increase remittance flows from the Gulf countries to Bangladesh by approximately 0.58%. This result supports earlier findings of Lueth and Ruiz-Arranz (2007) for Sri Lanka but contradicts findings of Gupta (2005) for India and Khodeir (2015) for Egypt. The association between LNY and LNREM in the long run equation is positive and statistically significant at the 1% level, with a coefficient of 0.56. Therefore, a 1% increase in domestic GDP is associated with a 0.56% of remittances to Bangladesh from the Gulf countries. This relationship shows the importance of remittances' pro-cyclical behavior in Bangladesh, which is previously noted by Paul and Das (2011) and Paul, Uddin, and Noman (2011). The other two variables, i.e., LNπ and LNFIN, do not seem to have any long-run impact on remittance flows.

Table 3: ARDL Bounds Tests: Long-Run and Short-Run Dynamics

Variable	Coefficient
Long-Run Equation	
LNY	0.56*** (0.06)
LNOIL	0.58*** (0.17)
LNFIN	-0.27 (0.34)
LNπ	-0.24 (0.28)
Short-Run Equation	
Error Correction Term	-0.46*** (0.07)
ΔLNREM (First lag)	0.38*** (0.12)
ΔLNY	-6.45** (2.57)
ΔLNY (First lag)	7.79*** (2.65)
ΔLNFIN	-1.45*** (0.35)
ΔLNFIN (First lag)	1.01*** (0.34)
Number of observations	37
Selected Model	ARDL (2, 2, 0, 2, 0)
Time Period	1980-81 to 2017-18

Note: 1. *** and ** imply statistical significance at the 1% and 5% level, respectively; 2. Standard error is in parenthesis.
Source: Author's calculation.

In the next step, I conduct a series of robustness tests. Table 4 presents results from the normality, serial correlation, and homoskedasticity of the residuals tests. Additionally, I present findings from the RESET test to examine if non-linear combinations of the fitted values explain the response variable. As evident from the table, the null hypotheses of normality, no serial correlation, and homoscedasticity are not rejected at conventional levels of statistical significance for the ARDL model estimated in the paper. Further, from the RESET test, we see that the null hypothesis of the correct specification is not rejected.

Table 4: Diagnostic Test

Test	Test Statistic
Jarque-Bera Normality Test	0.54 (0.76)
Breusch-Godfrey Serial Correlation Lagrange Multiplier Test	1.00 (1.00)
Breusch-Pagan-Godfrey Heteroskedasticity Test	0.81 (0.62)
Ramsey RESET Test	0.68 (0.50)

Note: 1. p-value is in parenthesis; 2. None of the test statistics is significant even at the 10% level.
Source: Author's calculation.

Finally, I report the CUSUM and CUSUM of squares to examine of the stability of the estimated ARDL model. These figures are presented in Figure 3 and Figure 4. From these figures, it is evident that the parameter and variance are both stable.

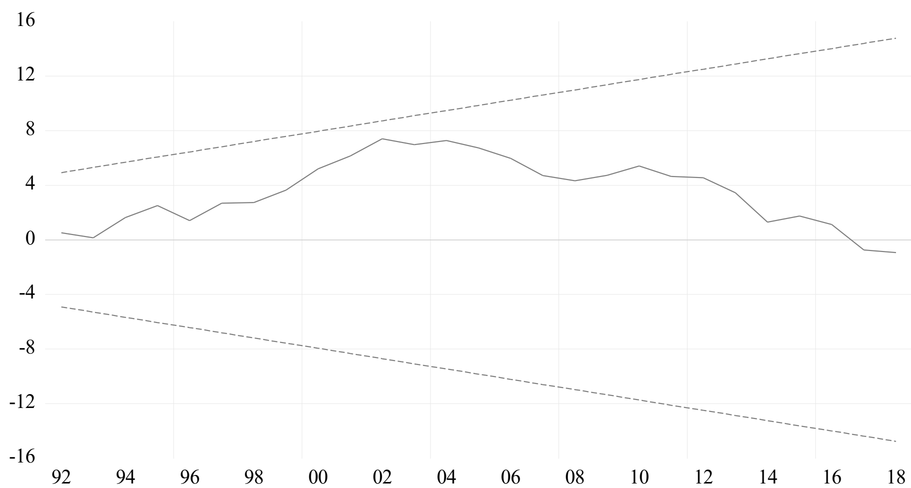

Figure 3: Cumulative Sum of Recursive Residuals
Source: Author's Calculation

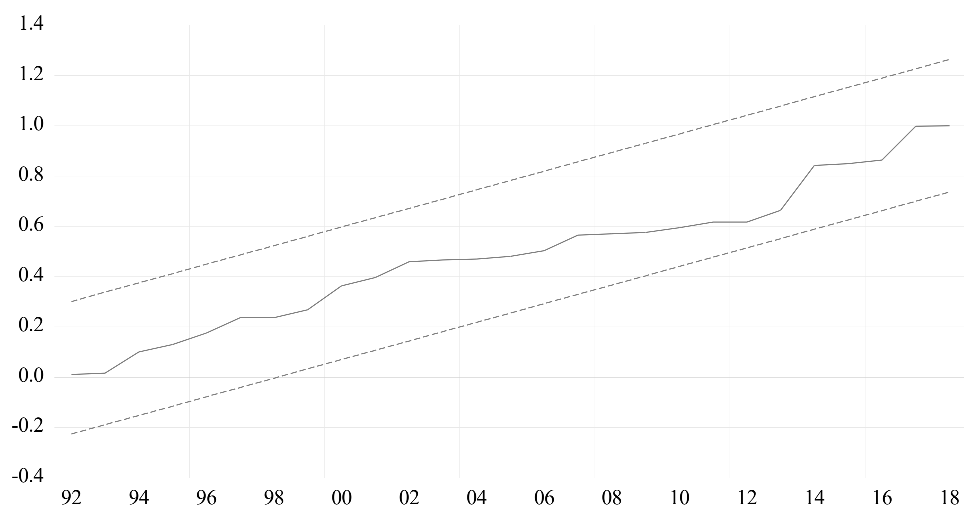

Figure 4: Cumulative Sum of Squares of Recursive Residuals
Source: Author's Calculation

Conclusion

Economists have long established that remittances are important for Bangladesh's economic development. The lion's share of this country's remittances comes from oil-rich countries in the Gulf region. Because of the large magnitude of remittance inflows to Bangladesh and its development impact, researchers have demonstrated the dynamic relationship between remittances and other domestic macroeconomic variables, such as economic growth, investment, consumption, and financial development. However, very little attention has been paid to how important external factors are in determining remittance inflows to Bangladesh. This study is the first to demonstrate how oil prices, which are determined externally, are associated with remittances from the Gulf countries to Bangladesh. Using time series data from 1980-81 to 2017-18, I find evidence of a positive relationship between remittance inflows and oil prices in the long run, after controlling for other macroeconomic factors. I use the ARDL bounds testing approach to examine this relationship. Additionally, results reinforce findings from previous studies that remittances are pro-cyclical in nature.

Although the findings in this study are based on some statistical assumptions, several policy suggestions can be made from them.[3] First, it is important for Bangladesh to reduce its reliance on remittances. The price of oil is not only an exogenous factor for Bangladesh, it can change abruptly due to geopolitical events or other reasons. In recent days, we have seen numerous crises such as the Russia-Saudi Arabia oil price war and COVID-19, both of which impacted the price of oil negatively. In situations like these, it is possible that remittance flows will be detrimentally affected in Bangladesh. Therefore, the government and households should prepare themselves in the event of a sudden decline in remittance inflows. Some of these potential negative shocks can be addressed by creating incentives for remittances that are used to accumulate capital in the domestic economy. This can be done by making the domestic economy more business-friendly, reducing red-tape, and providing tax breaks. Second, to ensure a sustainable flow of remittances, the government should search for foreign labor markets outside oil producing countries. This will diversify the choice for migrant workers to work in other economies that do not rely on the oil industry. Third, according to the International Organization for Migration (IOM, 2018), only 31% of migrant workers receive employment opportunities in skilled occupations. Most migrants do not have the required training to be qualified for jobs that are recognized by host countries. In this regard, it is important for the government of Bangladesh to allocate resources to create vocational institutions to provide training that corresponds to the external demand for labor. Further, incentives should be provided to existing training institutes to ensure high-quality training as often required by industries in foreign countries. This paper fills an important gap in the existing literature on this topic. Future research should undertake similar studies for other large remittance recipient countries.

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Endnotes

[1] The sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveler's checks; and other securities such as certificates of deposit and commercial paper.

[2] All three versions produced similar results, which are available upon request.

[3] Domestic policies to support migrants can vary for different migrant groups. For example, Bangladeshi migrants in North America or Western Europe face different socio-economic conditions than those of migrants in the Gulf countries. Indeed, migrants in Gulf countries are typically temporary workers, while migrants in other parts of the world may be permanent immigrants. However, because the bulk of remittances comes from the Gulf countries, I present the policies which are most relevant to migrants in the Gulf countries.

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