IOSR Journal of Economics and Finance (IOSR-JEF)
e-ISSN: 2321-5933, p-ISSN: 2321-5925.Volume 10, Issue 4 Ser. III (Jul. – Aug 2019), PP 07-16
www.iosrjournals.org

Nexus between Remittances, FDI and Economic Growth of Nepal and Bangladesh: An ARDL Bound Test Approach

IpsuKhadka,Umme Salma
M.A. in Development Economics, South Asian University, New Delhi, India.
M.A. in Development Economics, South Asian University, New Delhi, India &
Lecturer in Economics, Premier University, Chattogram, Bangladesh
Corresponding Author: Umme Salma

Abstract: *The objective of this study was to find the nexus between economic growth, foreign direct investment (FDI), and remittances in Nepal and Bangladesh. By using the time series data of Nepal for period 1996-2017 and of Bangladesh for period 1976-2017, this research found that economic growth, FDI, and remittance do share a long run relationship. Annual percentage growth rate of GDP at market prices based on constant local currency, personal remittance received as a percentage of GDP and FDI net inflows as a percentage of GDP has been used as proxy for economic growth, remittance, and FDI respectively. This study made use primarily of Augmented Dickey-Fuller Test to check for stationarity of variables, then performed the Auto-Regressive Distributive Lag (ARDL) bound test to derive the short and long run relationship. Various diagnostics tests were performed to make sure the models did not suffer from any major issues. From the stationarity tests, it was found that the variables were integrated of order 0 and 1 and hence, ARDL approach was used for checking for cointegration. It was found that economic growth, FDI, and remittance were in fact cointegrated for both countries, and this relationship was strongest when economic growth was taken to be a function of FDI and remittance. Based on this, the long run and short run dynamics amongst the variables was found. In terms of Nepal, although cointegrating relationship was found, the effect of FDI and remittance was not found to be individually statistically significant in the long run. In terms of short run dynamics, we found that any error will be adjusted by more than 100% i.e. 196% in short run, indicating that disequilibrium will be adjusted fast and within less than a year. For Bangladesh, unlike in Nepal's case, in the long run, FDI had a significant effect on economic growth. In the short run, we found that any disequilibrium in the system is corrected within less than a year as the error correction coefficient was -1.28.Overall, findings for both countries were quite similar and it was found that foreign direct invest and remittance affect economic growth in long run and short run, though further analysis needs to be done including more variables such as the role of inflation, role of financial sectors, exports, imports, etc.*

Keyword: *Economic Growth, FDI, Remittance, Co-integration, ARDL Approach*

Date of Submission: 25-07-2019 Date of Acceptance: 10-08-2019

I. Introduction

Remittances and FDI are two major instruments to generate employment and boosting economic growth of developing countries like Bangladesh and Nepal,although there are difference in how these economies use these resources. In these countries remittances flow is significantly larger than total foreign direct investment. They also help to sustain the balance of payments (BOP) by bringing in foreign currency (World Bank). Developing countries, emerging countries and countries in transition have come to consider FDI as a source of economic development and modernization, income growth and employment (OECD, 2002).

Remittance is funding that is sent or transferred to another party usually abroad. It can be sent to another country via a wire transfer, mail, draft or check. Remittances can be used for any type of payment such as an invoice but, it's typically used to pay family members back in a person's home country. This research has used 'personal remittances, received (as a percentage of GDP)' when referring to remittance. "Personal remittances comprise personal transfers and compensation of employees. Personal transfers consist of all current transfers in cash or in kind made or received by resident households to or from nonresident households. Personal transfers thus include all current transfers between resident and nonresident individuals. Compensation of employees refers to the income of border, seasonal, and other short-term workers who are employed in an economy where they are not resident and of residents employed by nonresident entities. Data are the sum of two items defined in the sixth edition of the IMF's Balance of Payments Manual: personal transfers and compensation of employees."

World Bank estimates that remittances to developing countries will increase by 10.8% to reach $528 billion in 2018. The new record level follows a robust growth of 7.8% in 2017. According to a WB report, Bangladesh has been recognized as the ninth highest recipient of remittances in the year 2018 with $15.9 billion, ranking third in South Asia- after India whose remittance is $79.5 billion and Pakistan ranked $20.9 billion. The bank also said that Bangladesh experienced strong upticks of 17.9% in 2018, reports UNB. World Bank reports that in Bangladesh, after a steep decline in 2016 (-11.5%), remittances were flat in 2017 but are showing a brisk uptick in 2018 (17.9%). Beside this, the Himalayan nation Nepal featured in the work Bank's top 20 remittance recipients in 2018, for inflows. According to the WB data, Nepal received remittance inflows worth USD 8064 million in 2018, standing at the top 19th recipient among world nations. The country registered a 16% year-on-year rise in remittance inflows in 2018 compared to USD 6928 million in 2017. Global remittance include flows to high-income countries, are projected to grow by 10.3% to $689 billion, the bank furthered.

Generally economic growth is an increase in the production of economic goods and services, compared from one period of time to another. It can be measured in nominal or real(adjusted for inflation) terms. Traditionally, aggregate economic growth is measured in terms of gross national product (GNP) or gross domestic product (GDP), although alternative matrices sometime used. This research follows the definition of GDP growth (annual %), "Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2010 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources."

According to World Bank report "The Bangladesh Development Update April, 2019: Towards Regulatory Predictability", Bangladesh is among the five fastest-growing economies of the world. Despite insufficient private sector investment, with a 7.3% GDP growth projection in the FY2019. As per the projection of the global lender, Bangladesh is the fifth in the rank of fastest growing economies after Ethiopia, Rwanda, Bhutan and India respectively. On the other hand in a progressive update for Nepal, the World Bank recorded Nepal's economic growth at 5.9% in the current fiscal year 2018-19 from a June 2018 forecast of 4.5%.Comparatively, WB reported that Nepal achieved an estimated economic growth rate of 6.3%. However, WB's growth projection is lower than Nepal's economic growth rate in FY 2017-18. The report also projects a consistent 6 percent for the next three fiscal years.

In general, foreign direct investment (FDI) is an investment made by a firm or individual in one country into business interests located in another country. It takes place when an investor establishes foreign business operations or acquires foreign business assets. In this research it is defined as net inflows as a percentage of GDP. Foreign direct investment, net inflows (% of GDP): "Foreign direct investment are the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is divided by GDP."

Bangladesh is such an LDC with absolute advantage to attract FDI. Though beginning of its FDI attraction was not so good before 1980s due to nationalization movement of government soon after the independence. A misconception was there that is allowing foreign direct investment means preserving foreign interest. To get satisfactory amount of FDI, Bangladesh has to complete identifying potential sectors, preparing specific project proposal, potential FD investors, etc. Bangladesh foreign direct investment (FDI) increased by 812.0 USD MN in December 2018, compared with an increase of 720.0 USD MN in the previous quarter. In the latest report of Bangladesh, current account recorded a deficit of 141.7 USD MN in December 2018.Bangladesh direct investment export abroad expanded by3.3 USD in 2018. On the other hand, Nepal has been developing institutional and legal infrastructure to ease doing business since the 1980s with an objective of attracting FDI. FDI inflows is however, very low despite its great importance to Nepalese economy. Nepal's Foreign Direct Investment (FDI) increased by 24.7 USD MN in January 2019, compared with an increase of 13.6 USD MN in the previous quarter. The data reached an all-time high of 80.1 USD MN in January 2018 and a record low of –6.0 USD MN in April 2006.

Whether there is a connection between these three economic variables remittance, FDI and economic growth is important to find for the developing nations of Nepal and Bangladesh. To examine the nexus between remittance, FDI and economic growth of Nepal and Bangladesh and to compare the connection between these two different countries, this research organized in different chapters:Chapter I contains the brief introduction of the variables in question, chapter II reviewsexisting literature, chapter III briefs on the methods used in research, the data sources and the description of variables, chapter IV comprises the detailsof data analysis and the result, and finally chapter V contains conclusion and recommendation. Acknowledgement and references have been added to the end of the paper.

II. Review of Literature

D. Chamlagai (2015) examines the effectiveness of aid, labor and FDI on the economic growth of Nepal by using ARDL bound testing approach for the year 1970- 2014. The empirical results points out that remittances and labor are very important driving forces for economic growth in both the long-run and short-terms of Nepal economy. He also found that, investment, FDI and AID do not have any important driving forces for economic growth in both the long-run and short-run period in the case of the Nepal economy. Error-correction modeling was used to confirm the existence of a stable long-term relationship and approve a deviation from the long-term equilibrium following a short-term shock, which is corrected by almost 16 percent after each year. Remittance is becoming the major source of livelihood for people of rural and urban households K.R. Dhungel (2012). He examined the relationship between remittances and economic growth of Nepal. The ARDL bound test confirms that the variables are cointegrated and became stationary after first difference. It means variables have long-run relationship. The empirical result reveals that 1% increase in remittance increases the GDP by 0.36% in the long-run. Similarly, the gross fixed capital formation, secondary school enrollment and thetrade openness and per capita GDP have positive relationship. It implies that 1% increase in capital, labor and trade openness increases the per capita GDP by 0.82%, 0.46% and 0.30 percent in the long-run respectively.

Matiur Rahman(2009), by using annual data from 1976 to 2006 re-examines the effects of exports, FDI and expatriates' remittances on real GDP of Bangladesh, India, Pakistan and Sri Lanka. The Autoregressive Distributive Lag (ARDL) model results reveal that, close similarities of long-run and short-run dynamics of the variables between Bangladesh and India. The result applied to Pakistan and Sri Lanka in terms of their short-run dynamics with no significant long-run causal flaws. All the variables are non-stationary in levels in three countries excepting Pakistan. The ARDL procedure confirms cointegrating relationship among variables in these three countries. Research also found that there are close economic and policy similarities between Bangladesh and India. At the same time, Pakistan and Sri Lanka have more in common on these fronts.

Despite its importance in policy making in developing countries like Bangladesh, there is absence of any study regarding the effect of remittances on the level of investment. To fill up the gap A.K.M.N. Hossain and S.Hasanuzzaman (2012), examine the cointegrating property and stability of the relationship among these variables using the ARDL bound testing approach combined with CUSUM and CUSUMSQ tests. Their findings show that both remittances and trade openness positively and significantly influence the level of investment in Bangladesh, meaning that contrary to most conclusions found in the literature, migrant remittances in developing countries are not entirely spend in basic consumption needs. They further found that foreign aid has very little and insignificant impact on investment. Finally, they found long-run unidirectional causal relationship running from remittances to investment indicating that favorable policies to increase the flow of remittance will promote investment in Bangladesh. S. Akter (2016) using time series data of 1990-2013 found that, a significant positive relationship between workers' remittances and economic growth in Bangladesh.

Similar research work done by S.T. Jawaid and S.A.Raza (2012). The study investigates the effect of workers' remittances on economic growth of five South Asian countries namely Pakistan, India, Sri Lanka and Nepal by employing long time series data from 1975 to 2009. Cointegration results confirm that there exist significant positive long run relationship between remittances and economic growth in India, Bangladesh, Sri Lanka and Nepal while, significant negative relationship exist between remittances and economic growth in Pakistan. Causality analysis shows bidirectional causality between remittances and economic growth in Nepal and Sri Lanka. On the other hand, unidirectional causality exist, runs from remittances to economic growth in Pakistan, India and Bangladesh.

R.R.Kumar (2011), using ARDL bound approach to cointegration, he explored the role of financial services, information and communications technology, remittance inflow and export liberalization vis-a-vis growth in Nepal over the periods 1975-2010. The result shows that financial development, ICT, remittance inflows and openness are instrumental in improving income level both in the long-run. Positive outcomes are also noted in the short-run with exception of negative lagged effects. Consequently, besides the need for stable macroeconomic policies and effective institutional structures.

There is little literature of finding a connection between FDI, remittances and economic growth specifically for Nepal and Bangladesh and it a connection that is dire for developing countries' economy. Further, although there have been individual researches for Nepal and Bangladesh, there seems to be no comparative study of the two countries. Hence, this study aims to fulfill those gaps.

III. Research Methodology

3.1 Data source and description of variables

This study makes use of time series data of economic growth, remittance and foreign direct investment of Nepal and Bangladesh. For economic growth, annual percentage growth rate of GDP at market prices based on constant local currency has been used. Remittance and FDI has been normalized by the GDP i.e., personal remittance received as a percentage of GDP and FDI net inflows as a percentage of GDP has been used for remittance and FDI respectively.

Data availability for the two countries differed. Nepal's analysis has been performed using annual time series data of 22 years i.e. from 1996 to 2017 while Bangladesh's analysis has been performed using 42 years of annual time series data i.e. from 1976 to 2017. All data has been extracted from the World Bank website. Analysis has been performed using E-views 10 and Micro fit 5.0.

3.2 Methods used in the research

First, we check for stationarity of the variables involved. For this purpose, several techniques can be used such as Dickey-Fuller test, Augmented Dickey-Fuller Test (ADF), Philip-Perron (PP) test, etc. We have used ADF for the purposes of this study. However, the main part of the analysis i.e. actually checking the relationship between the variables is completed with the help of the Auto-Regressive Distributive Lag (ARDL) bound test. Finally, some diagnostics tests will be performed to make sure that the models used are free from issues such as autocorrelation, heteroskedasticity, etc.

Augmented Dickey-Fuller Test:

The OLS method leads to inappropriate estimation when the series is nonstationary. Therefore, we cannot use the OLS method in time series analysis. To check the stationarity, we use the ADF test. The stationary means the means and variance of the series are constant over time. The general form of the Augmented Dickey-Fuller test appears in the following forms:

$\Delta Yt = \alpha Y_{t-1} + \sum_{j=1}^{m} \gamma i \, \Delta Y_{t-j} + et$ …… (No Constant)

$\Delta Yt = \mu + \alpha Y_{t-1} \sum_{j=1}^{m} \gamma i \, \Delta Y_{t-j} + et$ …… (With Intercept)

$\Delta Yt = \mu + \mu_{1t} + \alpha Y_{t-1} + \sum_{j=1}^{m} \gamma i \, \Delta Y_{t-j} + et$ …… (With Intercept and Trend)

Where μ is constant. Slope coefficients are α, μ_{1t} , and γ while the et stands for the error terms.

The hypothesis of the test is:

H0: $\alpha = 0$ (Series is stationary)

Ha: $\alpha \neq 0$ (Series is not stationary)

If the p-value is less than 0.05, we reject the null hypothesis, i.e., series is not stationary and vice versa. Moreover, we can compare the calculated value of the Augmented Dickey-Fuller test with the critical value of the test. If the calculated value is less than the critical value, we reject the null hypothesis and conclude that the series is non stationary. If the calculated value is greater than the critical value, then we conclude that the series is stationary.

Auto-Regressive distributive lag model

We use the ARDL approach for testing the long run relationship between economic growth, remittance, and FDI. The ARDL approach has been chosen because it has some advantage over other conventional methods. "The conventional cointegration test methods such as Johansen-Juselius (1990) are not appropriate to the current situation as they require the same order of integration. The ARDL/Bounds testing methodology of Pesaran and Shin (1999) and Pesaran et al. (2001) is perfectly suited to the current situation. The ARDL/Bounds testing methodology has several features that give it some advantages over conventional cointegration testing. Firstly, as opposed to the conventional cointegration procedures such as Johansen and Juselius (1990), this method can be used with a mixture of I (0) and I (1) data series. Secondly, it involves just a single equation set up, making it simple to implement and interpret. Thirdly, different variables can be assigned different lag lengths as they enter in this model. Lastly, this test is relatively more efficient in small sample sizes."(Singh, 2017)

The ARDL model used in this study is expressed as follows as Equations 1, 2 and 3 respectively:

$$\Delta EG_t = a_{01} + b_{11} EG_{t-1} + b_{21} FDI_{t-1} + b_{31} REMIT_{t-1} + \sum_{i=1}^{p} a_{1i} \, \Delta EG_{t-i} + \sum_{i=1}^{q} a_{2i} \, \Delta FDI_{t-i} + \sum_{i=1}^{q} a_{3i} \, \Delta REMIT_{t-i} + u_t$$

$$\Delta FDI_t = a_{02} + b_{12}EG_{t-1} + b_{22}FDI_{t-1} + b_{32}REMIT_{t-1} + \sum_{i=1}^{p} a_{1i}\,\Delta FDI_{t-i} + \sum_{i=1}^{q} a_{2i}\,\Delta EG_{t-i} + \sum_{i=1}^{q} a_{3i}\,\Delta REMIT_{t-i} + u_t$$

$$\Delta REMIT_t = a_{03} + b_{13}EG_{t-1} + b_{23}FDI_{t-1} + b_{33}REMIT_{t-1} + \sum_{i=1}^{p} a_{1i}\,\Delta REMIT_{t-i} + \sum_{i=1}^{q} a_{2i}\,\Delta FDI_{t-i} + \sum_{i=1}^{q} a_{3i}\,\Delta EG_{t-i} + u_t$$

EG= Economic growth rate of the country (i.e. change in GDP)
FDI = Foreign direct investment as a percentage of GDP
REMIT = Remittance inflow as a percentage of GDP
It is to be noted that these 3 variables will be subscripted by B to represent Bangladesh and N to represent Nepal in the data analysis section.
u_t stands for the error terms and Δ stands for the difference operator in the model.

The first step in the ARDL bounds approach is to estimate the three equations. The estimation of the three equations tests for the existence of a long-run relationship among the variables by conducting an F-test for the joint significance of the coefficients of the lagged levels of the variables, i.e.:
H_0: $b_{1i} = b_{2i} = b_{3i} = 0$
H_1: $b_{1i} \neq b_{2i} \neq b3i \neq 0$ for i= 1, 2, 3.

Two sets of critical values for a given significance level can be determined (Pesaran et al., 2001). The first level is calculated on the assumption that all variables included in the ARDL model are integrated of order zero, while the second one is calculated on the assumption that the variables are integrated of order one. The null hypothesis of no cointegration is rejected when the value of the test statistic exceeds the upper critical bounds value, while it is accepted if the F-statistic is lower than the lower bounds value. Other ways, the cointegration test is inconclusive. The use of this approach is guided by the short data span. We choose a maximum lag order of 2 for the conditional ARDL vector error correction model by using the Akaike information criteria (AIC). (Belloumi, 2014)

After checking the cointegration of the series, the next step is to estimate the following long run and short run equations based on the cointegration results. For our purposes we have used the following long run and short run equations respectively:

$$EG_t = a_{01} + \sum_{i=1}^{p} a_{1i}\,\Delta EG_{t-i} + \sum_{i=1}^{q} a_{2i}\,\Delta FDI_{t-i} + \sum_{i=1}^{q} a_{3i}\,\Delta REMIT_{t-i} + u_t$$

$$\Delta EG_t = a_{01} + \sum_{i=1}^{p} a_{1i}\,\Delta EG_{t-i} + \sum_{i=1}^{q} a_{2i}\,\Delta FDI_{t-i} + \sum_{i=1}^{q} a_{3i}\,\Delta REMIT_{t-i} + \mu ECT_{t-1} + u_t$$

where,μ is the speed of adjustment.

IV. Data Analysis and Results

This section of the study provides the results of all the tests. We first test the stationarity of the series and then we check the long run and short relations between the variables.

4.1 Unit root test results

The unit root test ADF has been used for data of Nepal and Bangladesh. The ADF equation has been tested without constant or trend, with constant only, and with constant and trend. AIC was used to select the lag order in the ADF test equation automatically. P values significance level is shown by *1% and **5%. Although ARDL model doesn't require pretesting, it is required to make sure that the variables are not integrated or order 2 or higher since ARDL model only accommodates variables of either I(0) or I(1).

4.1.1Unit root test results for Nepal

Variables	Unit root test in Level			Unit root test in First difference			Result
	No constant or trend	With constant only	With constant and trend	No constant or trend	With constant only	With constant and trend	
EG_N	-0.2329	-5.4996*	-5.3497*	-5.5309*	-5.3253*	-5.1328*	I(0)
FDI_N	-0.8727	-1.7655	-2.3217	-5.6177*	-5.4911*	-4.6811*	I(1)
$REMIT_N$	1.2993	-0.9118	-2.2931	-3.2596*	-3.7196**	-5.6559*	I(1)

Table 1: Unit root test using ADF for Nepal
Source: Author's calculation using eviews 10

In terms of Nepal, economic growth is integrated of order zero while FDI and remittance is integrated of order one.

4.1.1Unit root test results for Bangladesh

Variables	Unit root test in Level			Unit root test in First difference			Result
	No constant or trend	With constant only	With constant and trend	No constant or trend	With constant only	With constant and trend	
EG_B	0.0554	-5.1629*	-8.3007*	-13.2349*	-13.1284*	-12.9658*	I(0)
FDI_B	-0.7475	-1.3948	-2.9873	07.7011*	-3.0659**	-3.5509**	I(1)
$REMIT_B$	-1.2866	-2.0716	-4.3378*	-4.3804*	-4.3773*	-1.2140	I(0)

Table 2: Unit root test using ADF for Bangladesh
Source: Author's calculation using eviews 10

In terms of Bangladesh, we see that economic growth and remittance is integrated of order zero while FDI is integrated or order one.
Since both countries have a mix of I(0) and I(1) in terms of the variables, ARDL model to test for cointegration is appropriate.

4.2 ARDL Bound Testing Results

One of the main purposes of estimating an ARDL model is to use it as the basis for applying the "Bounds Test". The null hypothesis is that there is no long-run relationship between the variables – EG, FDI and REMIT.

If the statistic lies between the bounds, the test is inconclusive. If it is above the upper bound, the null hypothesis of no level effect is rejected. If it is below the lower bound, the null hypothesis of no level effect can't be rejected. The critical value bounds are computed by stochastic simulations using 20000 replications. Since we have three variables, three separate unrestricted error correction model is run taking each of the three variables are the dependent variable in three separate models. From those models, the F-statistics are calculated and compared with the lower and upper bounds.

4.2.1ARDL Bound Testing Results for Nepal

For Nepal, as seen in Table 3, the null hypothesis of no cointegration is rejected only in the first model where EG_N i.e. the economic growth is the dependent variable. Hence, we will pursue this model in the rest of the analysis for Nepal.

Model	Dependent variable	Independent variable	F statistic	Lower Bound	Upper Bound	Result
1	EG_N	FDI_N, $REMIT_N$	9.3905	4.5695	5.8444	Cointegration
2	FDI_N	EG_N, $REMIT_N$	3.6068			No cointegration
3	$REMIT_N$	EG_N, FDI_N	0.80319			No cointegration

Table 3: Result of Bound Test for Nepal
Source: Author calculations by Microfit (5.0)

4.2.2 ARDL Bound Testing Results for Bangladesh

For Bangladesh, as seen in Table 4, the null hypothesis of no co-integration is rejected in the first and second models where EG_B and FDI_B are the dependent variables respectively. The F statistic of 22.6233 for the first model is much higher than the upper bound while the F statistic of 7.0956 for the second model is only slightly higher than the upper bound. Further, in all our literature review, economic growth has been a function of FDI and remittances rather than the other models. Hence, we will pursue this model in the rest of the analysis for Bangladesh as well.

Model	Dependent variable	Independent variable	F statistic	Lower Bound	Upper Bound	Result
1	EG_B	FDI_B, $REMIT_B$	22.6233	4.1556	5.2670	Cointegration
2	FDI_B	EG_B, $REMIT_B$	7.0956			Cointegration
3	$REMIT_B$	EG_B, FDI_B	3.1033			No cointegration

Table 4: Result of Bound Test for Bangladesh
Source: Author calculations by Microfit (5.0)
This means that the null hypothesis is rejected and we find there is cointegration between the economic growth, FDI and remittance in Nepal as well as Bangladesh.

4.3 Long run coefficient estimation
Having the variables under consideration cointegrated the next task is to estimate the long run model.

4.3.1Long run coefficient estimation for Nepal
The long run estimation results through ARDL (2, 0, 0) model associated with Nepal is reported in Table 5.
Estimated Long Run Coefficients using the ARDL Approach
ARDL(2,0,0) selected based on Akaike Information Criterion
****
Dependent variable is $EG_{N,t}$
20 observations used for estimation from 1998 to 2017
****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
$FDI_{N,t}$	1.4741	.90813	1.6233[.125]
$REMIT_{N,t}$	-.012274	.020269	-.60557[.554]
INPT	.040388	.0036019	11.2129[.000]

****
Table 5: Long run coefficients estimation based on AIC for Nepal
Source: Author calculations by Microfit (5.0)

The long run model corresponding to ARDL (2,0,0) for the economic growth rate of Nepal can be written as :
$EG_{N,t} = 0.040388 + 1.4741*FDI_{N,t} – 0.012274*REMIT_{.N,t}$
In the given model, both coefficients of FDI and remittance are found to be insignificant to explain the economic growth of Nepal. This does not necessarily mean that the model is bad as the variables are cointegrating as we have seen from the F statistic in the previous table. Hence, the variables might be affecting each other in short run if they are not in long run.

4.3.2Long run coefficient estimation for Bangladesh
The long run estimation results through ARDL (1,1,0) model associated with Bangladesh is reported in Table 6.
Estimated Long Run Coefficients using the ARDL Approach
ARDL(1,1,0) selected based on Akaike Information Criterion
****
Dependent variable is EG_B
40 observations used for estimation from 1978 to 2017
****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
$FDI_{B,t}$	2.2163	.66098	3.3530[.002]
$REMIT_{B,t}$	-.092315	.12220	-.75546[.455]
INPT	.044885	.0037641	11.9243[.000]

****
Table 6: Long run coefficients estimation based on AIC for Bangladesh
Source: Author calculations by Microfit (5.0)

The estimated coefficients of the long run relationship is significant for FDI_B and not significant for $REMIT_B$. This means that FDI of Bangladesh has a positive significant impact of the economic growth of the country (indicated by EG_B).
The long run model corresponding to ARDL (1,1,0) for the economic growth of Bangladesh can be written as :
$EG_{B,t} = 0.044885 + 2.2163*FDI_{B,t} – 0.092315*REMIT_{B,t}$
Overall, we see that FDI has a positive influence on the economic growth of the country (though significant only for Bangladesh), and remittance is have a negative effect on the economic growth (though not found to be statistically significant for either country).

4.4 Short run coefficients from ECM based on AIC

The results of the shortrun dynamic coefficients associated with the long-run relationships obtained are presented below. Here ECM (-1) is most important and should be negative and significant. Although a value between 0 and -1 is ideal which ensures that there is convergence in the model which indirectly means that there is a significant long run relation, a figure between 0 and -2 is accepted in literature.

4.4.1 Short run coefficients from ECM based on AIC for Nepal

Error Correction Representation for the Selected ARDL Model
ARDL(2,0,0) selected based on Akaike Information Criterion

****

Dependent variable is $dEG_{N,t}$
20 observations used for estimation from 1998 to 2017

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
$dEG_{N,t-1}$	.72648	.26550	2.7363[.015]
$dFDI_{N,t}$	2.8722	1.7278	1.6624[.117]
$dREMIT_{N,t}$	-.023915	.039431	-.60649[.553]
ecm(-1)	-1.9484	.34069	-5.7189[.000]

****

R-Squared	.73611	R-Bar-Squared	. 66573
S.E. of Regression	.015409	F-Stat. F(4,15)	10.4602[.000]
Mean of Dependent Variable	.0014286	S.D. of Dependent Variable	.026653
Residual Sum of Squares	.0035617	Equation Log-likelihood	57.9536
Akaike Info. Criterion	52.9536	Schwarz Bayesian Criterion	50.4643
DW-statistic	2.1885		

****

Table 7: Short run coefficients from ECM based on AIC for Nepal
Source: Author calculations by Microfit (5.0)

The coefficient on the lagged error-correction term (ECM (-1)) is significant at 1% level with the expected negative sign, which confirms the result of the bounds test for cointegration. Its value is estimated to -1.9484 which implies that the speed of adjustment to equilibrium after a shock is very high. Approximately 195% of disequilibria from the previous year's shock converge back to the long-run equilibrium in the current year.

In the short run, only lagged value of economic growth is significant at 5% level and has an important impact on economic growth at time t. Economic growth and FDI have a positive impact but not significant. The impact of remittance is negative but not significant.

However, the overall model is significant at 1% as given by F-statistic's p value. The R square 0.736 indicating 74% of variation in economic growth is explained by the given repressors in short run.

4.4.2 Short run coefficients from ECM based on AIC for Bangladesh

Similar to the results of Nepal, the error-correction coefficient is negative, significant, and greater than -1 for the Bangladeshi model as well, as shown in Table 8. The error-correction coefficient is -1.2797 which implies that about 128% of any movements into disequilibrium are corrected for within one period. Basically, it means that it takes less than a year to correct any disequilibrium of economic growth.

Among the rest of the variables showing the short run component, FDI has a positive effect and remittance has a negative effect on economic growth of Bangladesh in short run, though these relationship are not statistically significant. For Bangladesh, we had seen earlier that in the long run FDI has a significant positive impact on economic growth.

In terms of this model, the model is statistically significant at 1% level of significance as shown by the p-value of F statistic and the R-square is 0.6596 indicating 66% of the variation in economy growth in short run is explained by the regressors in the model.

Error Correction Representation for the Selected ARDL Model
ARDL(1,1,0) selected based on Akaike Information Criterion

Dependent variable is dEG_B			
40 observations used for estimation from 1978 to 2017			
Regressor	Coefficient	Standard Error	T-Ratio[Prob]
$dFDI_B$	1.2775	.98453	1.2975[.203]
$dREMIT_B$	-.11814	.15465	-.76392[.450]
ecm(-1)	-1.2797	.15763	-8.1187[.000]

R-Squared	.65951	R-Bar-Squared	.62060
S.E. of Regression	.011866	F-Stat. F(3,36)	22.5978[.000]
Mean of Dependent Variable	.0011528	S.D. of Dependent Variable	.019265
Residual Sum of Squares	.0049285	Equation Log-likelihood	123.2746
Akaike Info. Criterion	118.2746	Schwarz Bayesian Criterion	114.0524
DW-statistic	1.9044		

Table 8: Short run coefficients from ECM based on AIC for Bangladesh
Source: Author calculations by Microfit (5.0)

4.5 Diagnostic test results

Since we have established that there exists a cointegrating relationship, we have to see the diagnostics table to see if there are any apparent issues regarding autocorrelation and heteroskedasticity with the models used.

4.5.1 Diagnostic test results for Nepal

As seen in Table 9, serial correlation is insignificant as per both F version and LM version. Since the null hypothesis is that the residuals are serially uncorrelated, F-statistic p-value of 0.485 indicates that we will fail to reject this null. We therefore conclude that the residuals are serially uncorrelated. Similarly normality and functional form are insignificant. Heteroscedasticity is insignificant too since the null hypothesis is that the residuals are homoskedastic, the F-statistic p-value of 0.726 indicates that we will fail to reject this null. We therefore conclude that the residuals are homoskedastic. Hence there is no apparent issue which with this model.

Diagnostic Tests

* Test Statistics	* LM Version	* F Version	*
* A:Serial Correlation	*CHSQ(1) = .70903[.400]	*F(1,14) = .51456[.485]	*
* B:Functional Form	*CHSQ(1) = .99531[.318]	*F(1,14) = .73321[.406]	*
* C:Normality	*CHSQ(2) = .043891[.978]	* Not applicable	*
* D:Heteroscedasticity	*CHSQ(1) = .14023[.708]	*F(1,18) = .12710[.726]	*

Table 9: Diagnostic Tests for ARDL model of Nepal
Source: Author calculations by Microfit (5.0)

4.5.1 Diagnostic test results for Bangladesh

Diagnostic Tests

* Test Statistics	* LM Version	* F Version	*
* A:Serial Correlation	*CHSQ(1) = .040317[.841]	* F(1,34) = .034304[.854]	*
* B:Functional Form	*CHSQ(1) = 7.9922[.005]	* F(1,34) = 8.4897[.006]	*
* C:Normality	*CHSQ(2) = 2.6921[.260]	* Not applicable	*
* D:Heteroscedasticity	*CHSQ(1) = .23516[.628]	*F(1,38) = .22472[.638]	*

Table 10: Table 9: Diagnostic Tests for ARDL model of Bangladesh
Source: Author calculations by Microfit (5.0)

Just as in the Nepal case, from the diagnostic tests of Bangladesh we see that the model is free from any issues of serial correlation and heteroskedasticity.

V. Conclusion and Recommendation

The purpose of this study was to examine the nexus between economic growth, foreign direct investment and remittance of Nepal and Bangladesh. We found that long run relationship does exist between these factors in an economy for both Nepal as well as Bangladesh.

In terms of Nepal, cointegrating relationship was found when economic growth was the dependent variable. Based on this, we found the long run and short run dynamics amongst the variables. Although cointegrating relationship was found, the effect of FDI and remittance was not found to be individually statistically significant in the long run. In terms of short run dynamics, we found that any error will be adjusted by more than 100% i.e. 196% in short run, indicating that disequilibrium will be adjusted fast and within less than a year.

Very similar results followed for Bangladesh as well but there were some differences. For Bangladesh, cointegrating relationship was found in two instances: when economic growth and FDI was the dependent variable separately. Because of the very F statistic when economic growth was dependent, and because most literature suggested this relationship, we went ahead with this model. Unlike in Nepal's case, in the long run, FDI had a significant effect on economic growth. In the short run, we found that any disequilibrium in the system is corrected within less than a year as the error correction coefficient was -1.28.

From this analysis, it is found that foreign direct invest and remittance affect economic growth in long run and short run, though further analysis needs to be done including more variables such as the role of inflation, role of financial sectors, exports, imports, etc. It is also recommended that the high levels of adjustments in disequilibrium be further probed in further analysis for both countries and look into biannual or quarterly data to find the true rate of adjustments.

Acknowledgement

A research work or project require assistance and guidance from many people. We are thanking to all people who were engaged with this project. We would like to express our sincere gratitude to our Professor Dr. Sunil Kumar, associate professor, South Asian University, New Delhi, India. We have completed this project work under his direct supervision. A part of this we extend our thanks to our friends who have help us as well. Finally, we are grateful to our parents and family members for their moral support and care. We thank each other also.

The guidance and support received from all was vital for the completion of this project and we are grateful for their constant support and help.

IpsuKhadka
Umme Salma

References

[1]. Belloumi, M. (2014). The relationship between Trade, FDI and Economic growth in Tunisia: An application of autoregressive distributed lag model. *Economic Systems*, 269-287
[2]. Chamlagai, D. (2015). *The Impact of Remittance, Foreign aid and FDI on growth: Evidence from the Nepal Economy* . North Cyprus : Eastern Mediterranean University .
[3]. Hasanuzzaman, A. K. (2013). Remittances and investment nexus in Bangladesh:. *Springer-Verlag Berlin Heidelberg*, 387-407.
[4]. K.R.Dhungel. (2012). *The Link between Remittance and Economic Growth: An ARDL Bound Testing Approach* . NRB Economic Review .
[5]. M.Rahman. (2009). ' Contributions of exports, FDI and expatriates' remittances to real GDP of Bangladesh, India Pakistan and Sri Lanka'. *Southwestern Economic review*, 141-154.
[6]. Pesaran, M.H., and B. Pesaran. 1997. "Working with Microfit 4.0: Interactive Econometric Analysis", Oxford: Oxford University Press.
[7]. Pesaran, M. H., Y.Shin& R.J. Smith. 2001. "Bounds Testing Approaches to The Analysis of Level Relationships", Journal of Applied Econometrics, 16, 289– 326.
[8]. R.R.Kumar. (2011). Nexus between financial and technology inclusion, remittances and trade openness vis-avis growth: A study of Nepal. *The economic journal of Nepal*, Vol.34,(1),issue no. 133.
[9]. Raza, S. T. (2012). *Workers' Remittances and Economic.* Korachi, Pakistan: MRPA paper no.39001.
[10]. Singh, S. (2017). "The Relationship between FDI outflows, Exports and GDP in India: An Application of the Autoregressive Distributed Lag Model." Economic Affairs. Vol. 62, No. 3: 471-481
[11]. S.akter. (2016). Remittance Inflows and Its Contribution to the Economic Growth of Bangladesh. *Researchgate publication, no. 62*, 215-245.www.worldbank open dataset.

Khadka and Salma. "Nexus between Remittances, FDI and Economic Growth of Nepal and Bangladesh: An ARDL Bound Test Approach." IOSR Journal of Economics and Finance (IOSR-JEF), vol. 10, no. 4, 2019, pp. 07-16.