Econometric Analysis of Remittance Inflow and Economic Growth of Nepal

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Abstract- The significance of Remittances has been considerable in economic growth via changed in consumption and investment pattern. In such scenario of growing role of Remittance in Nepalese economy the objective of this study is to identify the long run relationship as well as cause and effect relationship between Remittance and GDP in Nepal. Johansen Cointegration test and Granger Causality test have been used to study annual time series data from 1974/75 to 2015/16. The Johansen Cointegration suggests that there is no long run equilibrium relationship between GDP and Remittance. Engle Granger causality test finds that there is uni-directional causality running from Remittance to GDP.

Index Terms— Economic Growth, GDP Nepal, Remittance, Unit Root, Co-integration, Error-correction, Causality

1 INTRODUCTION

Remittance have significant impact on poverty reduction and finance the economic growth in receiving economics. The contribution of Remittance in Nepalese economy has significant since last two decades. After the fiscal year 2003/04, the average annual outlay of the Remittance has mounted more than 10 percent of the national GDP with 8% of the annual average growth rate. The figures are getting higher after fiscal year 2011/12 and recent outlook from World Bank shows that the total volume of the Remittances that received reached to 29.70% of the GDP which is second in world after Kyrgyz Republic. (World Bank, 2017).

Remittance represents household income from foreign economics arising mainly from the temporary or permanent movement of people to those economics. IMF Balance of payment manual defines that total Remittance is sum of compensation of employees and personal transfers (IMF, 2009). Remittances have played a significant role not only in balancing BOP and maintaining foreign reserves but also in minimizing the problem of unemployment and poverty in LDCs including Nepal (Karna, 2017). International migrant Remittance have become an important source of external finance in developing countries.

Foreign employment earnings with regards to developing and underdeveloped countries has been considered noteworthy for economic phenomenon; however there is a major question of capable of being sustain of those economy (Dhungana, 2014) explained that there are some critical issues regarding Remittance and economic growth in Nepalese scenario that poor utilization of Remittance, excessive investment in unproductive sectors, low economic growth, limited job opportunities and the trend of brain drain that need to be answered.

There are several dimensions for measuring economic growth. Changes in Gross Domestic Product (GDP) is the strong tool for accessing the economy size and growth. IMF defines GDP as measurement of monetary value of final goods and services- that is, those that are brought by the final user- produced in the country in a given period of a time. (IMF, 2018).

Scholars are separated into two sides for the impact of Remittance upon national economy. (Srivastava & Chaudhary, 2007) drawn the impact of Remittance has been seen most remarkable in the GDP and GNP both in nominal and real terms. (Dahal, 2014) further explains increasing inflows of Remittances in Nepal have a positive association with financial development and human capital accumulation, but a negative association with international trade. On another side (Sharma, 2006) argued that most of the Remittances have been used for consumption purpose in Nepal, it has negative impact on growth of GDP in Nepal.

This study examines the casual relationship between Remittance inflow and economic growth of Nepal. Remittance is used either for investment or consumption purpose so Remittance have indirect calculation on GDP. Based on previous research literature Gross Domestic Product (GDP) is termed as proxy variable of economic growth. This study is organized as follows: First part deal with introduction, second explains about the literature for the relevant theoretical and empirical work on Remittance and GDP are viewed. After that, the econometric model are developed and analyzed. Finally the conclusion and recommendations are presented.

2 Review of Literature and Statement of Problem

The relationship between Remittance and economic growth has been various researchers concluded that Remittances have a positive as well negative outcome on country's national economic growth.

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Marwan, et al., (2013) on their empirical study using Cointegration test, revealed that there is long run positive relationship between growth and Remittance in Sudan. Hossain, (2012) examines the dynamic causal relationship between economic growth, electricity consumption, export values and Remittance for the panel of three SAARC countries Bangladesh, India and Pakistan and revealed higher Remittance give rise to economic growth. Tahir, Khan, & Shah, (2015) measures the relationship between external determinants such as foreign Remittances, foreign direct investment and foreign imports using ARDL approach found that foreign Remittances have a significant positive role in the growth process of Pakistan economy. Carlos, Shikha, & Guntur, (2009) observed that a 10 per cent increase in Remittances with respact to total national GDP may leads to a 0.9-1.2 per cent increase in GDP growth in 20 Asian countries. Paul & Das, (2011) concluded a long run positive relationship between Remittance and GDP but there is no evidence on Remittance-led growth in the short run.

On the other hand Gapen et al. (2009) assessed the role of Remittance taking account of whether Remittance serve to promote long run economic growth and argued that workers Remittances have no impact on economic growth. Datta & Sarkar, (2014) adopted ARDL and ECM model to evaluate the relationship of export, import and Remittances with GDP and claimed that there is weak long run relationship between Remittances and economic growth and also they had mentioned that there is no predictable causal relationship in the short-run or long run among the variables. Jouini, (2015) investigate the casual links between economic growth and Remittances for Tunisia over the period 1970-2010 based on ARDL approach to Cointegration, and result reveal no impact on economic growth in the long run and shows bidirectional casulity between Remittances and growth in the short run.

Cooray, (2012) based on panel data over the 1970-2008 period, study investigate the impact of migrant Remittances on economic growth and find the significant positive interactive effect of Remittances on economic growth is detected through education and financial sector development. Matuzeviciute & Butkus, (2016) in their empirical research using an unbalanced panel data covering a sample of 116 countries studied the interaction between Remittances and level of economic development as well as its impact on long-run economic growth and result shows that in general Remittances have a positive impact on long-run economic growth, but the impact differs based on the country's economic development level and the abundances of Remittances in the economy.

There are few research conducted in Nepal regarding the Remittance and economic impact. Dahal,(2014) in his empirical study about the impact of Remittances on economic growth of Nepal by assessing the effects of Remittances on financial development, productivity, international trade and human capital accumulation found that increasing inflow of Remittance in Nepal have a positive association with financial development, but a negative association with international trade. Sharma, (2006) argued that Remittance does not support the economic growth of Nepalese economy as most of the funds received as a remittances used for consumption purpose. Dhungana, (2012) in his study explained that simply increasing Remittance does not support for the economic growth and the development of the nation unless it is extensively used into the productive sectors. The impact of Remittances on a country's economic growth is analyzed at various levels: individuals or households (micro) and country (macroeconomic). In this paper analysis is focused for the macro level impact specified on economic growth.

3 Data and Econometric Methodology

Annual data on Remittance inflow and GDP from fiscal year 1974/75 to 2015/16 are used for this paper. Data on GDP at current prices are collected from Nepal Rastra Bank website and data on Remittance inflow are collected from Ministry of Finance Nepal website.

3.1 Test of unit root problem

Empirical work based on time series data assumes that the underlying time series is stationary. Gujrati, Porter, & Gunasekar (2009) argued that any inconsistencies in coefficient estimation, series are required to be stationary. Since most of the variables or series are non-stationary, unit root tests are useful to determine the order of integration of the variables. If a time series is nonstationary we can study its behavior only for the time period under consideration as a consequences it is not possible to generalize it to other time periods. Therefore, it is critical to check the stationery properties. Under this study Augmented Dickey-Fuller (ADF) unit-root test is used for potential non-stationery concerns. The typical Augmented Dickey Fuller test is given below, equation (1).

$$\Delta Yt = \beta o+\beta 1t+\delta Yt\text{-}1+ \Delta Yt\text{-}1+\sum_{i=1}^{m} \alpha i\ \Delta Yt\text{-}1+\varepsilon t \text{……..} (1)$$

However, the government of Nepal took a series of reform in the macroeconomic sector during the study periods. In addition, Nepalese economy has witness liberalization from mid-80s. The Structural Adjustment Program advocated by World Bank and IMF in Nepalese financial sector likely to have an impact on the overall macro economy of Nepal. Thus, only use of ADF test for checking the stationary properties of the data set given the presence of structural break arising from these reforms might lead to misleading results. Perron (1989,1990) has shown that the structural change in the mean of a stationary variable tends to bias the standard ADF test towards non rejection of hypothesis of unit root. There for in

this paper Phillips Perron unit root test is also checked to confirm stationary of variables.

3.2 Tests of Cointegration

Cointegration analysis can be used to evaluate the co-movement of a time series variables for long time within an equilibrium model. Firstly, Cointegration analysis establishes a long term relationship by calculating long-run equilibrium asset prices. Next, correlations within an error correction model are estimated. Therefore, stochastic trends common to the respective time series are found prior to the cointegration analysis.

Granger (1986) pointed out that a linear combination of two or more non-stationary series may be stationary. If such a stationary linear combination exists, the non-stationary time series are said to be cointegrated. The stationary linear combination is called the cointegrating equation and may be interpreted as a long-run equilibrium relationship among the variables. Granger argues that a test for Cointegration can be thought of as a pre-test to avoid spurious regressions situations.

Polleit & Belke (2009) states the purpose of the co-integration test is to determine whether the groups of non-stationary series are co-integrated. There are number of methods for testing the Cointegration. As explained below, the presence of a co-integrating relation forms the basis of the Vector Error Correction Model (VECM) specification.

The mathematical form of a VAR model is

$$Yt = A1Yt{-}1 + \cdots + Ap\ Yt{-}p + BXt + \epsilon t \quad (2)$$

where Yt is a k-vector of non-stationary I (1) variables, Xt is a d-vector of deterministic variables, and ϵt is a vector of innovations. We can rewrite the VAR model as:

$$\Delta Yt = \Pi Yt\text{-}1 + \sum_{i=1}^{p-1} \Gamma i\, \Delta Yt\text{-}1 + Bxt\text{-}1 + \varepsilon t \quad (3)$$

Where,

$$\Pi = \sum_{i=1}^{p} A^{t-i} \text{ and } \Gamma i = -\sum_{j=i+1}^{p} Aj \quad (4)$$

Granger's representation theorem asserts that if the coefficient matrix Π has reduced rank (such that r < k), then there exist k x r matrices α and β each with rank r such that Π = αβ and β yt is I(0). r is the number of cointegrating relations (the rank) and each column of β is the cointegrating vector.

Hjalmarsson & Österholm (2007) explains Johansen proposes two different likelihood ratio tests of the significance of these canonical correlations and thereby the reduced rank of the Π matrix: the trace test and maximum Eigen value test, shown in the equations below respectively.

$$Jtrace = -T \sum_{i=r+1}^{n} ln(1-\lambda) \quad (5)$$

$$Jmax = -T \ln(1-\lambda i) \quad (6)$$

The null hypothesis for the test is as follows;

Ho: β1 = β2 =0

Rejection of null hypothesis happen when trace statistics is greater than the critical values at 1 % or 5 % and it means that at least one of the coefficient is statistically significant (not equal to zero. Once a co-integrating vector is estimated, there is a long-run relationship among the variables. In order to find the number of co-integrating vectors, Johansen applies maximal eigenvalue method.

3.3 Granger Causality Model

This test is performed in order to identify the direction of the causal relationship between remittance and GDP. The casual relationships can be either unidirectional or bi-directional. This test estimates the following equations assuming there is no correlation between ε1t and ε2t.

$$\Delta LGDPt = \alpha o + \sum_{i=1}^{k} \beta^{i}\, \Delta LGDPt\text{-}i + \sum_{i=1}^{l} \alpha^{j} \Delta LREMITt\text{-}i + \varepsilon 1t \quad (7)$$

$$\Delta LREMITt = \alpha o + \sum_{i=1}^{r} M^{i}\, \Delta LREMITt\text{-}i + \sum_{i=1}^{s} N^{i}\, \Delta LGDPt\text{-}i + \varepsilon 2t \quad (8)$$

4 Results and Discussion

4.1 Testing for Unit Root

The first stage involves establishing the order of intregation using ADF for testing the presence of unit root. Table 1 accounts the results of ADF test for two variables Gross Domestic Product (GDP) and remittance. Likewise Table 2 reports Philips Perron Test statistics.

Table 1: Unit Root Test
ADF Test

Variables	ADF (Constant)		ADF (Constant & Trend)	
	Level	1st Diff .	Level	1st Diff .
LGDP	-0.07922	-6.4524 ***	-1.7969	-6.3766***
LRMT	0.3143	-7.4622***	-2.5465	-7.4613***

*Superscripts ***, **, and * indicates rejection of null hypothesis at 1%, 5% and 10% level of significance.*

Table 2: Unit Root Test
Phillips Perron (PP) Test

Variables	ADF (Constant)		ADF (Constant & Trend)	
	Level	1st Diff .	Level	1st Diff .
LGDP	-0.07467	-6.4511***	-2.0508	-6.3764***
LRMT	0.5544	-7.4749***	-2.5019	-7.5290***

Superscripts ***, **, and * indicates rejection of null hypothesis at 1%, 5% and 10% level of significance.

The results indicates that variables GDP and remittance are not stationary at their levels in both ADF and PP tests. On the

other hand, all series are stationary (both constant and trend) at first difference and therefore indicating that all variables are I(1).

4.2 Cointegration Test

Having all the variables stationary at their first difference I(1), there is a possibility that GDP and remittance have a long run relationship. For this purpose this paper examines Johansen Cointegration test . The optimal lag length of the level VAR system is determine using Akaike's Information Criterian (AIC). Table 3 below reports the number of cointegrating relationship among the variables under consideration.

Table 3: Johansen Cointegration Test

Hypothesized No of CEs	Eigen Value	Trace Statistics	0.05 Critical Value	p-value	Max-Eigen Value Statistics	0.05 Critical Value	P-Value
None	0.11577	5.14340	15.4947	0.7934	5.04465	14.2646	0.73618
At most 1	0.0024	0.09875	3.8414	0.7533	0.09875	3.8414	0.7533

Results of both Trace and Maximum Eigenvalue test suggests that there is no existence of cointegrating relationship among the variables in the series at 5 % level of significance. Thus we can conclude that remittance and GDP are not cointegrated. Thus there is a no long-run relationship between remittance and GDP for Nepal.

4.3 Results of Granger Causality Test

Here in this study all the variables were I (1) but not cointegrated, we can transform the variables by taking their difference to induce stationary and test for standard Granger causality without adding an error correction term. Table 4 shows that there is statistical uni-directional Granger causality runs from GDP to remittance but there is no feedback on causality from remittance to GDP.

Table 4: Granger Causality Test

Dependent Variables	Independent Variables	Order of Lag	F-Statistics	P-values
ΔLGDP	ΔLRMT	1	0.86412	0.3585
ΔLRMT	ΔLGDP	1	10.8234*	0.0022

Notes: Δ denotes a first difference. * denotes statistically significant at the 5% level.

5 Conclusion

This paper examined the interaction between GDP and remittance of Nepal. Annual data are employed and applied econometric model for cointegration using Johansen approach, application of standard Granger Casulity tests to study the GDP and REMITTANCE interaction. Using Johansen approach, our results show no long-run association between GDP and remittance. This mean that GDP and remittance do not move together in the long run which is in line with previous research of Gapen et al. (2009), Sharma, (2006), Dhungana, (2012). However, using standard Granger causality test, this reports evidence of uni-directional link from GDP to Remittance.

This report provides evidence to the policymakers of Nepalese economy to think about the dependability over Remittance. Most economist argues that money came from foregin countries in Nepal, haven't utlized properly, so that it couldn't support the expansion of Nepalese economy. Inflowed money worryingly consumed on short term purpose so that it might affect the economy once it start to falling down. Thus for achieving sustainable economic growth, Nepal must have to reduce its dependency over Remittance as a main source of foreign income.

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