

The Empirical Linkage Between Remittances And Economic Growth An ARDL Co-Integration Approach For India

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ABSTRACT: The purpose of this paper is to investigate the empirical relationship between remittances and economic growth by highlighting short run and long-run dynamics for Indian economy. The paper uses secondary time series data over the period 1977-2016. Augmented Dickey-Fuller and Phillips Perron unit root tests are applied to figure out the order of integration. The study employed Autoregressive Distributive Lag (ARDL) approach generally known as Bound testing technique. ARDL technique is more efficient for small and finite sample studies. Error Correction Model (ECM) has also been utilized to provide us information about the impact of a causal factor on the variable under study. Further, in order to check the model stability, CUSUM and CUSUMQ tests are also used. Sensitivity analysis is conducted to check the robustness of the results. The research paper establishes an empirical relationship between remittances and economic growth for the Indian economy. The findings reveal the existence of a significant positive relationship between economic growth and remittances in the long run while the results are insignificant in case of a short run. However, the model is found to be stable. The paper proves empirically the linkage between remittances and economic growth in the long run by bridging the gap between theory and practice. Indian policymakers can consider the model to formulate pertinent policies by transforming the potential of these efficient financial resources into real economic growth.

KEYWORDS: India, Remittance, Economic growth, ARDL approach

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I. INTRODUCTION

Economic globalization in the nineties led to the increase in economic activities with the greater international demand for manpower. This has opened up opportunities for skilled and unskilled labor in a labor surplus economy like India. That showed the way for many people to migrate to an international destination (Castles and Davidson, 2000) that can fetch them better livelihood abroad. Migration adds to inclusive and sustainable economic growth and development in both home and host countries. India is the second highly populated country with a total migrant stock of 16.4 million which constitute the largest diaspora in the world with 1.36% of India's total population (Migration and Development Brief Report 2018, World Bank). Indian migrants mainly reside in, Saudi Arabia, UAE, and the UK. Migration can be seen as the blend of benefits and costs for the individual and economy at large. The cost comprises of reduction in labor in which considerable amount of human capital has been employed, distortion of age structure and the depopulation of rural areas. The advantages include the reduction of social tensions such as unemployment, acquisition of skills in foreign countries by the returning migrants to their host countries and money transfers from migrants to the families back home which constitutes remittances. Remittance inflows in India have become larger with the increasing demand for its labor resources. However, India is the highest recipient of remittances with its diaspora remitting about US\$ 69 billion back home in 2017 exceeding remittances of US\$ 62.7 billion in 2016 US\$ 9.3 million in 1977. Remittances constitute a major source of household income that benefits the livelihood of families and society at large through investment in education, health, infrastructure, housing, and sanitation. Remittance inflows illustrate solution for the inadequate foreign exchange reserves required for the payment of import bills in a labor remitting economy like India. India as the sixth largest economy in the world with the Gross domestic product (GDP) of US\$ 2.6 trillion in 2017 with a growth rate of 6.6%, US\$ 2.26 trillion in 2016 with a growth rate of 7.1%, remittances forms 2.8% of GDP.

Worldwide, remittances have reached US\$ 613 billion in 2017 from US\$ 537 billion in 2016 which grew up to 7%. Further, it is expected to rise 4.6% which accounts for the US \$ 642 billion in 2018. However, remittances are relatively steady as compared to cyclical private debt and equity flows. Remittances are more than the three times the size of official development assistance and significantly larger than foreign direct investment, portfolio investment and grant in aid. The two major factors responsible for the rapid increase in

remittances in developing economies are the drastic increase of immigrants between developing and developed economies in the past 20 years and technological advancements which have reduced the transaction costs for the international transfer of payments between individuals (Guiliano & Ruiz-Arranz, 2006). It is assumed that a major portion of remittances seems to be unrecorded which is around 20 to 200% of officially recorded remittances due to high transfer costs (Aggarwal et al., 2006, World Bank, 2006). However, the 2030 Agenda for Sustainable development acknowledges that international migrants are of major importance for the growth of origin, transit and destination countries. The agenda also attempts to reduce remittance transfer costs and to provide a safe, regular and orderly mobility of people with the well-planned implementation of migration policies.

Large remittance inflows have micro and macroeconomic effect in the country and have emerged as an effective source of foreign exchange earnings. This paper is an attempt to investigate empirically whether remittances have any effect on economic growth by evaluating long run and short-run dynamics in the context of India. Therefore this paper might be helpful for policymakers to formulate pertinent policies for transforming the economic potential of these efficient financial resources into real economic growth.

The paper is outlined as follows: after the introduction, Section 2 provides relevant existing literature on remittances and economic growth. Section 3 outlines the methodology. Section 4 reports the estimation process and empirical results, following the conclusion in Section 5.

II. REVIEW OF LITERATURE

Remittances have captivated extensive debate among researcher, economists and policy makers as there is a diverse opinion on the remittance-growth nexus in developing economies. Myriads of studies have focused on determinants of growth including utilization of surplus labor in development, foreign aid, foreign investment,

latest technological adoption and return on investment (Lewis, 1954; Solow, 1956; Denison, 1967; Romer, 1986; Barro, 1991). Makun (2017) examined the effect of external factors on economic growth in the Republic of Fiji Island for 35 years. The study explored that external factors namely imports, remittances and Foreign direct investment (FDI) have a significant impact on economic growth where imports have an adverse outcome on the economy, FDI have a positive effect on the economy in long run as well as in short run. Lianos (1997) studied the determinants for streaming of migrant remittances from Germany, Belgium, and Sweden towards Greece. The paper suggested that the level of income of migrants, inflation rate, unemployment rate, exchange rate, interest rate and the number of migrants are the major determinants. Docquier and Rapoport (2006) documented migration as a doctrine of brain drain which describes deficiency of manpower in the country where it is already scarce. A recent research by Chantha and Pheara (2017) assessed the macroeconomic and non-economic factors influencing the flows of migrant workers' remittances to Cambodia, Laos, Myanmar, and Vietnam (CLMV) countries for the period 2000-2015. The study utilized fixed effect and random effect model and found that GDP per capita of the host, as well as home country, migrant stock, official exchange rate, political instability index of the home country, are the major determinants.

Nicholas (2005) developed a Keynesian type econometric model and estimated short and long-run multipliers of remittances for the five Mediterranean countries. The findings pointed out the fluctuation and plunge in remittances have a catastrophic effect when compared to remittance contribution towards growth. Jawaid & Raza (2012) investigated the relationship between workers' remittances and economic growth in China and Korea from the period 1980-2009. The study employed Johansen and Juselius Co-integration technique, Error Correction Model and Sensitivity analysis. The results showed the existence of positive long run and short run linkage between remittances and economic growth in Korea and a negative relationship between remittances and economic growth in China. Unidirectional causality from workers' remittances towards economic growth has also been witnessed. Siddique et al. examined the causal nexus between remittances and economic growth in South Asian countries such as Bangladesh, Srilanka, and India by using time series data of 25 years. The study employed Granger causality test under Vector Autoregression framework (VAR). The findings explored the causal relationship between remittances and economic growth in Bangladesh. In case of India, remittances do not lead to economic growth while in Srilanka, bidirectional causality is found between the variables under study. Pradhan (2016) investigated the dynamic relationship among remittances, exchange rate, export and economic growth in Brazil, Russia, India, China, South Africa (BRICS) economies from the period 1994-2013. Panel cointegration technique was employed which demonstrated the existence of long-run equilibrium relationship between the variables. The study used fully modified OLS and found that remittances have a significant negative impact on economic growth in four economies except for China which has a positive outcome. Rao and Hassan (2010) assessed the direct and indirect growth effect of remittances in 40 remittance recipient countries. The paper applied a system GMM panel data analysis and found that by increasing M2 to GDP ratio, remittances might foster rapid economic growth. Gupta et al. (2007) found an optimistic effect of remittances on poverty alleviation through increased income level and better standard of living by migrants family members. Aggarwal et al. (2011) explored a positive and significant impact of remittances on bank

deposits to GDP and a net positive effect on the growth of the economy. Remittances exert a positive response on the business cycle in the migrants' destination countries and a negative influence on recipient economy as observed by Frankel (2011). Ratha(2003)concluded that remittances have encouraged the consumption level of rural households. This, in turn, might have a multiplier effect as they are assumed to consume more of domestically produced goods.

However, Lipton (1980), Ahlburg (1991) and Brown and Ahlburg (1999) reported that remittances can weaken productivity and growth in low-income countries as their consumption pattern is mainly based on foreign goods rather than on productive investment. Barajas et al.,(2009) also found no direct effect of remittances on poverty and economic growth. With the large cross-country studies of 113 countries, Chami et al.,(2003) indicated that remittances have a negative effect on economic growth as it minimizes the motivation to work by migrant family members. Ahortor and Adenutsi (2009) opined that workers' remittances may bring voluntary unemployment in recipient countries due to over-dependence on external income such as workers' remittances. Sofranko and Idris (2009) documented that remittances are generally for consumption purposes so the efficiency savings are not sufficient for fostering economic growth.

Giuliano and Ruiz-Arranz (2009) gathered panel data for 100 developing economies for the period 1975-2002 and examined the impact of remittances on economic growth. The study witnessed those economies with the less developed financial system, their remittance acts as a substitute for financial system by minimizing credit constraints and increasing the allocation of capital thereby promoting economic growth. Mundaca (2009) stated that deeper financial sector possibly leads to proper utilization of remittance thus promoting economic growth. Frometin (2017) analyzed the dynamic impact of remittances for developing economies for the time spanning from 1974-2014. The study employed Pooled Mean Group approach and supports the evidence that remittance promotes financial development in developing economies in the long run. Bettin and Zazzaro(2012) found the presence of complementary hypothesis that countries with the advanced level of financial development support migrants to remit more money back home ultimately leading to financial democracy. In a survey of Tongan migrants in New Zealand, remittances sent would increase by 0.22 percent if transaction costs reduce by 1 percent was reported by Gibson et al. (2007).

Singer(2010) addressed that the amount of remittances inflows increase the possibility to follow fixed exchange rate regime. However, the presence of multiple exchange rates certainly decreases the volume of recorded remittances was found by Freud and Spatafora(2008). Waheed and Aleem (2008) contend that effort should be taken to increase foreign exchange earnings through export rather than on remittances. Numerous empirical evidence revealed that remittances may indirectly influence real exchange rate giving rise to "Dutch disease", where remittance inflows lead to a real appreciation of exchange rate. Appreciation of exchange rates takesplace in countries with larger remittances which may downturn economic growth.

III. METHODOLOGY

Data description and variables

The economic analysis uses secondary data of time series nature obtained from World Development Indicators for the period of 1977-2016. The process of estimation consists two variables i.e. Economic growth (Econ) and Remittances (Remit). According to World Bank, remittances include personal transfer and compensation of employees. Personal transfer comprises of all current transfer in cash or kind made or received by resident households to and from non-resident households. Economic growth is the dependent variable and remittance is the independent variable. Economic growth is proxied by real GDP growth and remittance as a percentage of GDP is the proxy for remittances.

Model specification

The model has been designed relating remittances to economic growth for India:

$$\mathbf{Econ} = \mathbf{f(Remit)} \quad (1)$$

The absolute form of this model is presented as follows:

$$\mathbf{Econ}_t = \beta_0 + \beta_1 \mathbf{Remit}_t + \epsilon_t \quad (2)$$

IV. ESTIMATION PROCESS AND EMPIRICAL RESULTS

In econometric research of empirical nature, the basic requirement is to check the stationarity of a series. Augmented Dickey-Fuller (ADF) and Phillips Perron(PP) tests are employed to check stationary and to determine the order of integration for the variables included in the study. Non-stationarity or the presence of unit root leads to the inappropriate application of conventional tools like Ordinary least square (OLS) and two-stage least square(2LS). In order to address this issue, cointegration technique has been suggested by Engle and Granger(1987) and Johansen and Juselius(1990). The cointegration analysis can be applicable in such cases where all the variables are non-stationary at level and stationary of the same order. Variables may be integrated at different orders which restrict the usage of cointegration analysis. To address this problem, Autoregressive

Distributive Lag (ARDL) generally known as bound testing approach suggested by Pesaran et.al.(2001) can be applied. ARDL can be employed to tests the presence of long-run relationship despite their order of integration. In case there is any presence of a long-run relationship between the variables, one can determine long-run coefficients and error correction term to analyze the long run impact of the variable and the speed of adjustment. In order to employ ARDL approach equation (2) can be represented as a conditional ARDL as follows:

$$\Delta \text{Econ}_t = \alpha_0 + \sum_{i=1}^m \beta_i \Delta \text{Econ}_{t-i} + \sum_{j=0}^m \gamma_j \Delta \text{Remit}_{t-j} + \lambda_1 \text{Econ}_{t-1} + \lambda_2 \text{Remit}_{t-1} + \varepsilon \quad (3)$$

Pesaran and Shin designed a two-step procedure to estimate Equation (3). At first, the null hypothesis (H_0) of the absence of a long-run relationship between remittances and economic growth is defined by $H_0: \lambda_1 = \lambda_2 = \lambda_3 = 0$. Non-acceptance of null hypothesis suggests the existence of long-run relationship between remittance and economic growth. In order to check null hypothesis, the computed F-statistics are compared with the critical values calculated by Narayan (2005) which is suitable for the small size of the sample. There are two sets of critical values under the band where $I(1)$ denotes the upper bound and $I(0)$ denotes the lower bound. If the computed F-statistics is greater than the upper bound, there is the existence of cointegration with the rejection of the null hypothesis. If the computed F-statistics is lesser than the lower bound, there is the absence of cointegration with the acceptance of the null hypothesis. However, if it lies within the upper bound and lower bound, the outcome is inconclusive.

Descriptive statistics

	Remit	Econ
Mean	2.16	6.06
Median	2.27	6.28
Maximum	4.21	10.25
Minimum	0.75	-5.23
SD	1.08	2.75
Observations	40	40

Table I.
Descriptive statistics

Table I presents the basic descriptive statistics of the variables under study. The average REMIT is 2.16 % with a standard deviation of 1.08, maximum remittances as a share of Gdp of 4.21 and a minimum of 0.75%. The average GDP growth is 6.06% with a standard deviation of 2.75%..., minimum and maximum of -5.23% and 10.25% respectively.

Unit root test

The study reports ADF and PP test statistics for each variable in Table II. The table shows GDP is stationary at level while REMIT is stationary at first difference showcasing different order of integration, $I(0)$ and $I(1)$ respectively. This outcome restricts the researcher to apply standard cointegration techniques suggested by Engle and Granger (1987) and Johansen and Juselius (1990). In such case, it is appropriate to use ARDL bound testing approach suggested by Pesaran et al. (1999, 2001) to check long-run causal nexus between the variables.

Variables	Augmented Dickey-Fuller (ADF)		Phillips-Perron (PP)	
	Level	1st difference	Level	1st difference
Econ	-5.59***	-9.78***	-5.61***	-33.84***
Remit	-1.34	-6.87***	-1.31	-6.91***

Table II.
Unit root test result Note: ***Significant at 1 per cent level

Co-integration

The bound testing to cointegration approach provides the comparison of computed F-statistics with that of the critical values. The critical values are obtained from Narayan (2005) as the sample size is less than 80. When economic growth is the dependent variable for India, the calculated F-statistics $F_{\text{ECON}}(\text{Econ}/\text{Remit})=10.92$ is greater than the upper bound of critical values of 6.33 at 1 % level, 4.52 at 5% level and 3.73 at 10% level of significance. Anyhow, when remittances are used as the dependent variable, it is found that the computed F-statistics is 1.75 much lower than the lower bound critical values of 5.59, 3.93, 3.21 at 1%,

5% and 10% level of significance respectively. This propounds that the null hypothesis representing the absence of cointegration relationship can be rejected. Hence, economic growth and remittances are cointegrated only when economic growth is the dependent variable.

		Critical values of the F-statistics: with unrestricted intercept and unrestricted trend					
		90% level		95% level		99% level	
		I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
Table III.	K	3.21	3.73	3.94	4.52	5.59	6.33
F-statistics for	Notes: Critical values are extracted from Narayan (2005); k is the number of regressors calculated						
co-integration	F-statistics: F _{Econ(Econ Remit)} =10.92; F _{Remit(Econ Remit)} = 1.75						

Long run and short elasticity

With the realization of long-run relationship between remittances and economic growth when economic growth is the dependent variable, long run coefficients are determined depending on the following (m,n) equation:

$$\Delta Econ_t = \beta_0 + \sum_{i=1}^m \beta_1 \Delta Econ_{t-i} + \sum_{i=0}^n \beta_2 \Delta Remit_{t-i} + \mu_t \tag{4}$$

The long-run estimates are presented in Table IV. The result reports the expected sign for the regressor under study. The model implies that the explanatory variable, remittance have a significant positive impact on economic growth. The outcome exhibits that 1% increase in remittances encourages an increase of 1.11% of economic growth. This confirms the existence of positive long-run equilibrium relationship between remittances and economic growth in India.

		Dependent variable Econ		
		Regressors	Coefficient	t-Statistics
Table IV.	Constant		5.41	4.19***
	Remit		1.11	2.61**
Long-run estimates	Note: ** ,*** Significant at 5 per cent and at 1 per cent level, respectively			

To seize the speed of adjustment, the study assumes the following error correction model:

$$\Delta Econ_t = \beta_0 + \sum_{i=1}^p \beta_1 \Delta Econ_{t-i} + \sum_{i=0}^p \beta_2 \Delta Remit_{t-i} + \beta_3 ECT_{t-1} + \mu_t \tag{5}$$

The results of short-run dynamics by applying Error correction model of ARDL are presented in Table V. The model contains an error correction term (ECT₁). The coefficient of error correction term captures the speed of adjustment where the disequilibrium in economic growth is rectified in the next interval. ECT₁ should be negative and significant, ensuring that the long run equilibrium is achievable. ECT₁ generally lies between 0 and -2 (Loayza and Ranciere, 2005). In the estimated model, ECT₁ is -1.06 which reflects an oscillatory convergence and the model is dynamically stable. However, the coefficient of Δ sign presents short-run elasticity. Δ REMIT is an insignificant factor for economic growth.

		Dependent variable Econ		
		Regressors	Coefficient	t-Statistics
Table V.	Constant		-0.06	-0.01
	Δ Remit		0.32	0.32
	Ect-1		-1.06	-4.88
	Short-run estimates	Note: R² .57, Durbin-Watson statistic 1.99; F-statistic 11.90.		
	** ,*** Significant at 5 per cent and at 1 per cent level, respectively			

The value of R² is .52 which indicates that 52% variations of the dependent variable are explained by the independent variable. The value of F-statistics is significant as its probability value less than 0.05 and the value of Durbin Watson statistics is 1.99.

Stability tests

Brown et al (1975) proposed stability techniques such as the Cumulative sum of recursive residuals (CUSUM) and Cumulative Sum of Squares residuals (CUSUMQ). These tests are dependent upon recursive residuals and indicate the stability and non-stability of the model for decision making. In case of CUSUM test, 5% critical lines and cumulative sum are plotted. If the cumulative sum passes 5% critical lines, the parameters are not consistent. CUSUMQ test checks the parameter stability on the basis of the Cumulative sum of squared recursive residuals. Alike CUSUM test, the significance of variation from the mean value line is checked with the help of parallel critical lines surrounding the mean value.

Figure 1 and 2 present the CUSUM and CUSUMQ tests. The plots of each did not cross the critical value line determining the stability of the parameters and this model provides a reliable picture which can be used by India in decision making and formulating policies.

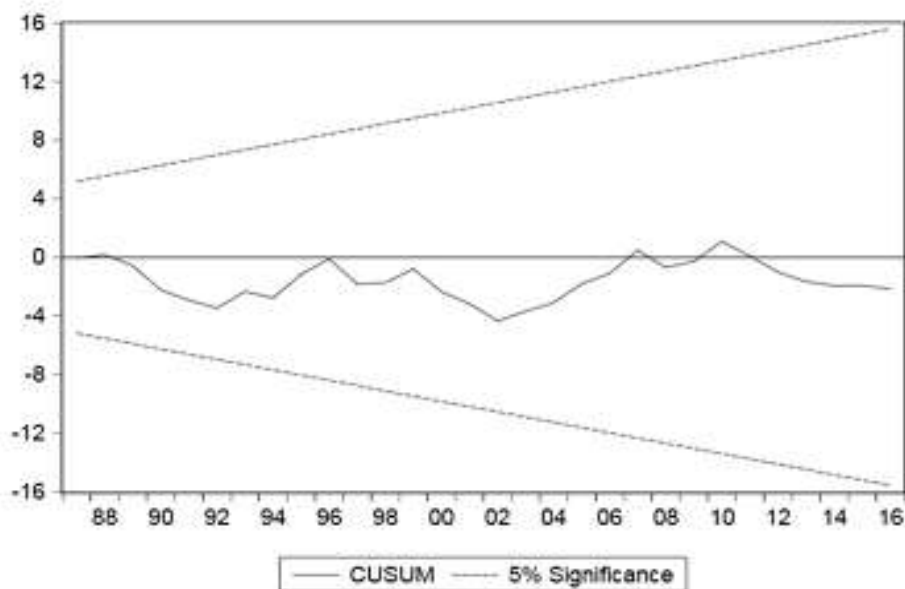


Figure 1. CUSUM and CUSUM square test of stability

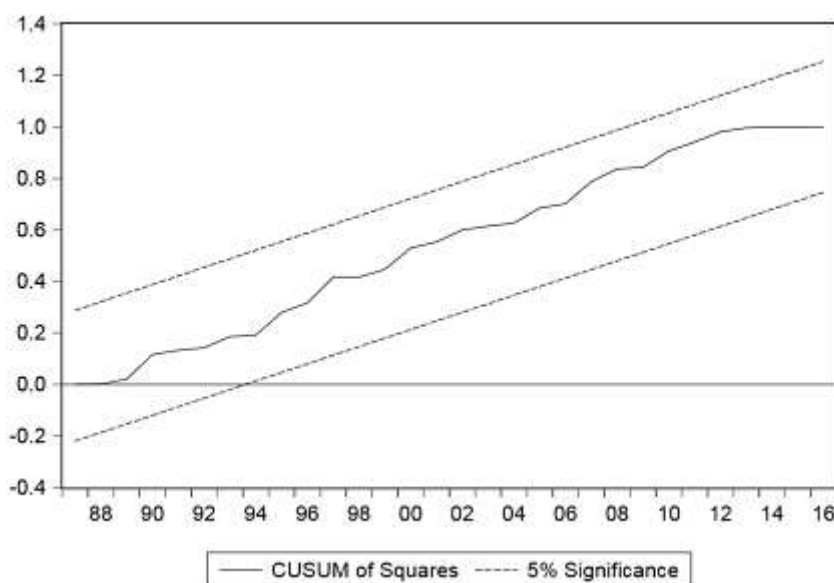


Figure 2. CUSUM and CUSUM square plots

V. CONCLUSION

The current paper is an endeavor to examine the relationship between remittances and economic growth by highlighting long- run and short-run dynamics for the Indian economy. The study includes time series data for the period spanning from 1977 to 2016. Bound testing approach confirms that there exists a significant

positive long-run equilibrium relationship between remittances and economic growth when economic growth is the dependent variable while the results were found to be insignificant in short run. However, an error correction model (ECM), error correction term was found to be negative and significant which confirms the existence of the relationship. It also indicates that there is an oscillatory convergence. The model is also found to be stable and robust. The outcome of the paper adds to the existing literature on the macroeconomic effects of remittances which are in support of the domestic level studies which presents that remittance promotes the welfare of the economy. It is suggested that India should formulate pertinent policies to assure continuous inflows of remittances and their effective usage in order to encourage economic growth. Moreover, India still needs to improve remittance delivery infrastructure so that migrants can prevent informal channels for sending remittances back home. This can help to reduce unrecorded remittances inflows thereby minimizing the possibility of superficial inflation in the areas that have most migrants outside India.

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Further reading

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