

**Remittances and Consumption Expenditure in India: An ARDL Investigation**

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*Received; 02/11/2020, Revised; 27/12/2020, Accepted: 28/12/2020*

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**Abstract**

This study investigates the empirical relationship between remittances and consumption expenditure in India over the period of 1975-2018 using the annual time series data. In this study, the Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) unit root tests, the Autoregressive Distributed Lag (ARDL) bounds cointegration technique, the Granger Causality test, and the Impulse Response Function analysis are employed as the analytical tools. The ADF and PP unit root test results indicate that the variables are stationary at 1<sup>st</sup> difference. The ARDL Bounds cointegration test result shows that remittances in India have a long-run reciprocal relationship with consumption expenditure. The error correction term shows that 15percent of disequilibrium error is corrected every year and the response variable of consumption expenditure moves to the long-run equilibrium path. The Granger Causality test results indicate that remittances Granger Cause the consumption expenditure. The impulse response analysis shows that a positive shock to remittances has an immediate significant positive impact on consumption expenditure.

**Keywords:** Remittances; Consumption; ARDL Method; India

## 1. Introduction

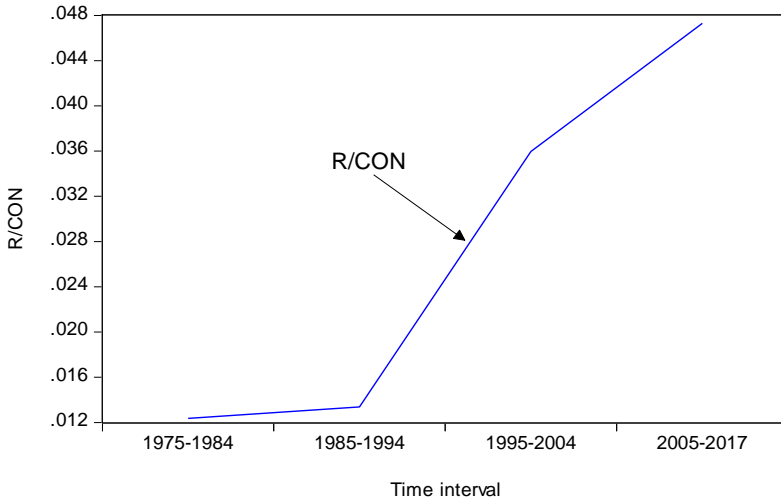
Migration becomes an important idea in emerging countries after the globalization process which creates the needing socio-economic and financial benefits for migrants, for their families, for the cities, and countries of origin and destination (Ramanayake & Wijetunga, 2018). Every year thousands of workers move overseas to look for better employment (Ang, et al., 2009; Tumble 2012; Vakulabharanam & Thakurata, 2014; Samaratunge, et al., 2020). The result of migration is inflows of remittances from their working countries (Jena & Sethi, 2019). Remittances are the sum of money sent by a migrant worker to an individual or family in their home country, which nowadays play an important role in contemporary economies (Tumble, 2012). At present, the inflow of remittances is more than double the official aid received by developing countries (Mahapatro, et al., 2017; Aslam & Sivarajasingham, 2020b). Increasing remittances in developing countries are a blessing for their economies at both macro and micro levels. At the macro level, remittances help to maintain the foreign exchange reserves stable. Further, remittances help Indian Rupee hold its value against the US dollar and form a significant part of the GDP (Choithani, 2017). On the other hand, at the micro-level, remittances have shown a mutual impact on healthcare, entrepreneurship, education, and the overall economic development of the recipient families (Mahapatro, et al., 2017). Remittances are the second-largest inflow of capital in developing countries (De & Ratha, 2012; Randazzo & Piracha, 2014; Phillip & Selvamalai, 2018).

India is one of the developing countries which engage with two types of remittances namely inward and outward remittances (Parida, et al., 2015). Inward remittances mean that the money sent by Indian expatriates working abroad to those near and dear to them in India (Mahapatro, et al., 2017). The World Bank's reports indicate that the Indian diaspora sent an enormous \$79 billion back home in 2018 which was \$62.7 billion in 2016 and \$65.3 billion in 2017. At the growth rate of 14 percent in inward remittances, India has registered significant growth in the flow of remittances over the last 3 years. On the other hand, outward remittances refer to money sent overseas by residents of India for specific purposes, which is made in many ways (Hatzipanayotou, 1991).

Consumption expenditure determines the welfare of society (Kirwan & Holden, 1986; Rivera-Batiz, 1986; Aronsson & Lofgren, 2007; Syrovatka, 2007; Ghosh, et al., 2009; Moss, 1973). Moreover, the consumption of durable and non-durable goods

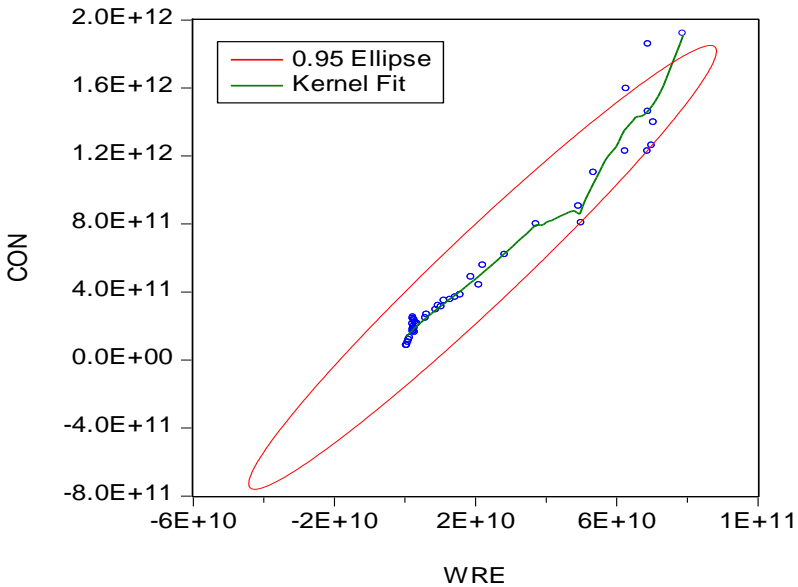
determines human satisfaction (Hirsch, 2005). Therefore, it can be decided that there is a relationship between consumption expenditure and societies' welfare (Tukker, et al., 2010; Attanasio, et al., 2013; Witt, 2016). In the meantime, the consumption expenditure of society in a country is decided by income (Diacon & Maha, 2015). According to Keynes (1936), the consumption expenditure of the individual depends on his/her income. Thus, it may be emphasized that the income of all individuals in a country is the key determinant of the consumption expenditure of such a country (Witt, 2016). Further, the income of all individuals can be referred to as the Gross National Income at the macro-level. (Diacon & Maha, 2015).

On the other hand, the Gross National Income of a country determines the consumption expenditure (Singh, 2004). The Gross National Income of a country can be divided into remittances and Gross Domestic Product (Glytsos, 2002). It can be stated that remittances are an important factor in determining the consumption expenditure of a country (Glytsos, 2005, Karpestam, 2012; Nisar, et al., 2013). However, the impact of remittances on consumption expenditure is not so far studied in South Asian countries, India in particular. However, India is being the largest remittance-receiving country in South Asia. , In the literature on the relationship between remittances and consumption expenditure, the present study will be useful for identifying the consumption behavior of migrants' households in India. Further, remittances in India contributed 1.2% to consumption expenditure at an average over the period 1975-1984 which increased by 4.7% for the period 2005-2018. Figure 1 shows the contribution of remittances to consumption expenditure in India over the study period. Based on Figure 1, it is clear the contribution of remittances shows an upward trend in India.



**Figure 1.** Contribution of remittances to consumption in India (1975-2018)  
Source(s): Authors' derivation

The relationship between remittances and consumption expenditure in India is shown in Figure 2, which indicates that there is a positive relationship between remittances and consumption expenditure at a confidence level of 95% in India.



**Figure 2.** Association between remittances and consumption expenditure in India  
Source(s): Authors' calculation

Based on the above discussion, even though it is confirmed that remittances have a significant relationship with consumption expenditure in India, this relationship has not so far been empirically examined using statistical tools. Thus, it is a researchable issue in the Indian context. The main motivation of this study is to answer the research question whether remittances in India induce consumption expenditure. The objective of this study is to examine the empirical relationship between remittances of workers and consumption expenditure in India. The remainder of this study is organised as follows. Section 2 presents the review of the literature. Section 3 provides research methods. Section 4 presents the empirical results and discussion. The final section concludes this study.

## 2. Literature review

A wide range of empirical literature studying the consequences of remittances concludes that remittances have mainly been used for consumption expenditure. Tabuga

(2007) uses the cross-sectional data in 2003 to study the impact of remittances on consumption expenditure in the Philippines. This study finds a positive effect of remittances on consumption expenditure. This finding is confirmed by Semyonov & Gorodzeisky (2008) in the same county using cross-sectional data collected from 2346 households over the period of 1999 to 2000. Further, Ang, et al., (2009) also confirm that remittances have an equal relationship with consumption expenditure in the Philippines which is confirmed by the cross-sectional data for the period of 2003 to 2006. Medina and Cardona (2010) find that remittances have a reciprocal relationship with consumption expenditure in Colombia; the findings of this study are based on households' survey. Incařtarau & Maha (2012) used the households' survey data for examining the impact of remittances on consumption expenditure in Romania. This study is based on the household survey data collected from 5467 houses over the period of 1999 to 2000, finding a reciprocal effect of remittances on consumption expenditure.

De & Ratha (2012) examine the relationship between remittances and consumer spending in Sri Lanka based on household survey data collected from 7,500 households in nine provinces between 1999 and 2000. This study concludes that a positive relationship exists in Sri Lanka between remittances and consumption expenses. Bouoiyour & Miftah (2015) investigate the impact of workers' remittances on consumption expenditure in Morocco using household survey data collected from 7062 households for the period 2006 to 2007. This study also suggests that remittances have a beneficial impact on consumption expenses for households. Additionally, Karki Nepal (2016) investigates the relationship between workers' remittances and consumer spending in Nepal based on household survey data from 5988 households collected in 2010. This research concludes that remittances from migrant employees have a mutual impact on consumer spending.

On the other hand, Castaldo & Reilly (2007) in Albania, Medina, and Cardona (2010) in Colombia find that there is no connection between workers' remittances and consumer spending. Senegal, et al., (2014) find that workers' remittances have a negative relationship with consumer spending. In addition to the above works which utilize cross-sectional data, Yasmeen, et al., (2011) explore the nexus between workers' remittances and consumption expenditure in Pakistan using the time series data from the period 1984 to 2009. In their study, they conclude that there is an equal relationship between workers' remittances and expenditure on consumption. Ogunwole (2016) uses the annual time series data for the period 1981 to 2012 to analyse the character of workers'

remittances on consumption expenditure in Nigeria. In this study, the technique of Johansen and Juselius cointegration is used to check the long-run relationship between workers' remittances and consumption expenditure and this study shows that remittances from migrant labor have a reciprocal relationship with consumption expenditure. Ahmed (2012) uses the Johansen and Juselius cointegration technique to examine the impact of workers' remittances on consumer spending in Pakistan over the period 1973-2010 and this study finds that there is a reciprocal relationship between workers' remittances and consumer spending.

A substantial part of the study has examined the relationship between workers' remittances and consumption expenditure based on panel data. Accordingly, Bilal, et al. (2015) explore the connection between remittances and consumption expenditure using the annual time series data collected from five South Asian countries, namely India, Pakistan, Bangladesh, Nepal, and Sri Lanka for the period 1975 to 2010. This research uses the Panel Generalized Moments Method (GMM) and finds that remittances from migrant laborers increase consumption expenditure. Shah & Soomro (2012) examine the impact of workers' remittances on consumption expenditure over the period 1995 to 2013, based on time-series data from Pakistan, India, China, and Bangladesh. The classical regression method is used to check such a relationship in this study which summarises that remittances from migrants' laborers have a positive effect on consumption expenditure.

In sum, the findings, indicated in the above literature, indicate controversies and ambiguities because the above-mentioned literature use different methodologies, different sample periods, and different empirical models. Further, none of the researchers have so far considered the relationship between workers' remittances and consumption in the Indian context. Therefore, it is believed that this study is a potential study for India in particular.

### **3. Methodology**

#### **3.1 Model Specification**

Having closely reviewed the literature, the following empirical model is formulated by using the Keynesian consumption theory. Based on Keynes (1936), it is emphasised that the consumption expenditure is the function of the absolute income of the current period. Therefore, the functional form of this statement can be written as:

$$C_t = f(Yd_t) \tag{1}$$

where: the notation of  $C_t$  represents the consumption expenditure,  $Yd_t$  refers to the disposable income which consists of the gross national income ( $Y_t$ ) and direct tax ( $T_t$ ). Further ( $Yd_t = Y_t - T_t$ )

Therefore, the function (1) can now be changed as:

$$C_t = f(Y_t, T_t) \tag{2}$$

Glytsos (2002) states that the gross national income ( $Y_t$ ) can be divided into gross domestic product and remittances. It can be written as follows:

$$Y_t = GDP_t + R_t \tag{3}$$

Where:  $GDP_t$  is the gross domestic product, and  $R_t$  is remittances.

Now Equation (1) can be written as:

$$C_t = f([GDP_t + R_t] - T_t) \tag{4}$$

Thus, from the consumption function (4), the empirical model for this study is established as:

$$C_t = \beta_0 + \beta_1 GDP_t + \beta_2 R_t + \beta_3 T_t + \varepsilon_t \tag{5}$$

where  $\beta_0$  is constant,  $\beta_1$ ,  $\beta_2$ , and  $\beta_3$  are coefficients of the gross domestic product, remittances and the direct tax, respectively,  $\varepsilon_t$  is the white noise error term. Further,  $\beta_1$  and  $\beta_2$  are expected to be positive whereas  $\beta_3$  is expected to be negative.

### **3.2 Data and Variables**

This study considers yearly time series data from 1975 to 2018 for the variables of consumption expenditure (C), the gross domestic product (GDP), Remittances (R), and direct tax (TAX), which were gathered from the World Bank database.



**3.3 Unit root test**

In order to confirm the order of integration of the variables, the Augmented Dickey-Fuller (ADF) and Philips Perron (PP) unit root tests were used in this study. Once the order of integration of the variable is determined, this study would decide which cointegration technique is suitable for testing the long-run relationship between remittances and consumption expenditure in India. The results of ADF and PP tests are reported in Table 1 which indicates that the variables are non-stationary at their level,  $I(1)$ . Although the variables are stationary at 1<sup>st</sup> difference, the sample observations of this study are below fifty. Therefore, this study recommends the autoregressive distributed lag (ARDL) Bounds cointegration technique to examine the empirical relationship between remittances and consumption expenditure.

**Table 1.** Unit root test results

Variable	ADF test		Decision	PP test		Decision
	(Intercept)			(Intercept)		
	At level	1 <sup>st</sup> Difference		At level	1 <sup>st</sup> Difference	
<b>CON<sub>t</sub></b>	-4.8100	-6.5526	$I(1)$	-3.5924	-4.1272	$I(1)$
<b>GDP<sub>t</sub></b>	-4.4436	-6.9629	$I(1)$	-2.9314	-4.4385	$I(1)$
<b>RE<sub>t</sub></b>	-2.6459	-4.7387	$I(1)$	-2.6039	-3.8735	$I(1)$
<b>T<sub>t</sub></b>	-4.1936	-6.0109	$I(1)$	-3.5966	-3.7930	$I(1)$

Source(s): Authors' calculation

\*P<0.05

**3.4 Estimation technique**

Finding the novel relationship between the variables is one of the primary tasks in well-structured research. Thus, in order to understand the novel relationship between remittances and consumption expenditure, this study has used the exploratory data analysis tools such as scatter plot, a confidential ellipse with kernel fit. Further, this study has also employed the inferential data analysis techniques such as the autoregressive distributed lag ARDL Bounds test, Ganger's causality test, and Impulse response function analysis.

A question may arise among the readers as to why this study uses the ARDL technique. The answer to such a question is that even though the variables used in this

study are stationary at the first difference (see Table 1), the sample observations are below fifty. That is why this study uses the ARDL technique. Further, this technique has some more advantages than conventional cointegration techniques (Pesaran *et al.* 2001). The conventional cointegration techniques request that all the variables used in a research should be of the same order. However the ARDL technique accepts mixed order variables, but does not allow  $I(2)$  or higher order variables (Ozturk & Acaravci, 2010); the ARDL technique admits small finite sample whereas the traditional cointegration technique strictly states that the sample observation should be over fifty. As the ARDL technique provides unbiased estimates in the long-run model, it takes care of omitted variables (Harris & Sollis, 2003).

Based on the seminal work of Pesaran *et al.* (2001), this study derives the following ARDL model as:

$$\Delta CON_t = \beta_0 + \sum_{i=1}^p \beta_{1i} \Delta CON_{t-i} + \sum_{i=0}^{p_1} \beta_{2i} \Delta GDP_{t-i} + \sum_{i=0}^{p_2} \beta_{3i} \Delta RE_{t-i} + \sum_{i=0}^{p_3} \beta_{4i} \Delta T_{t-i} + \delta_5 CON_{t-1} + \delta_6 GDP_{t-1} + \delta_7 RE_{t-1} + \delta_8 T_{t-1} + \varepsilon_t \tag{6}$$

where  $\Delta$  is 1<sup>st</sup> difference operator,  $p, p_1, p_2$  and  $p_3$  are the optimal lag length.  $\varepsilon_t$  is the random error term;  $\beta_0$  is constant;  $\beta_{1i} - \beta_{4i}$  are the short –run coefficients; and  $\delta_5 - \delta_8$  are the long – run coefficient.

Once the ARDL model specification is determined, the presence of a long-run relationship between the variables used in this study were tested by employing the ordinary least squares regression techniques. In order to test the long-run relationship, the null hypothesis that there is no long-run relationship between the variables used in this study ( $H_0: \delta_5 = \delta_6 = \delta_7 = \delta_8 = 0$ ) was tested against the alternative hypothesis with the long-run relationship ( $H_1: \delta_5 \neq \delta_6 \neq \delta_7 \neq \delta_8 \neq 0$ ). The conclusion of the long-run relationship between the variables had been taken by using the estimated  $F$ -statistic compared with the critical values introduced by Pesaran, et al., (2001). If the estimated  $F$ -statistic is greater than the upper bound critical value, the null hypothesis will be rejected; thus, the decision that the variables used in this study have a long-run relationship between them can be taken. . On the other hand, if the estimated  $F$ -statistic falls below the lower bound critical value, the null hypothesis cannot be rejected. However, if the estimated  $F$ -statistic is situated between the upper and lower bounds of

critical value, the decision on the long-run relationship between the variable is inconclusive (Hossain & Hasanuzzaman, 2013).

If the long-run relationship between the variables is confirmed by equation (6), the next step of the ARDL technique is the estimation of the short-run parameters. In order to estimate the short-run dynamics parameters of the variables used in this study, the following short-run error correction conditional model was employed.

The short-run error correction model of this study is as follows:

$$\Delta CON_t = \beta_0 + \sum_{i=1}^p \beta_{1i} \Delta CON_{t-i} + \sum_{i=0}^{p_1} \beta_{2i} \Delta GDP_{t-i} + \sum_{i=0}^{p_2} \beta_{3i} \Delta RE_{t-i} + \sum_{i=0}^{p_2} \beta_{4i} \Delta T_{t-i} + \lambda ECT_{t-1} + \varepsilon_t \tag{7}$$

Where  $\lambda$  is the speed of adjustment which should be negative, less than one and statistically significant.

### 3.5 Diagnostic test

In this study, in order to ascertain the robustness of the estimated ARDL model, both validity and stability tests were conducted. The validity test consists of the serial correlation, Heteroskedasticity, and normality tests. The stability test used the test of the cumulative sum of the recursive residuals (CUSUM) plot.

### 3.6 Granger's causality test

Granger's causality from one variable to another means that the conditional forecast for the latter can be significantly improved by adding lagged variables of the former to the information set.

In order to test the short-run causality between the variables, the pairwise Granger causality test was employed. Causality is defined as  $X_t$  is said not to Granger cause  $Y_t$  if  $E(Y_{t+h}|J_t, X_t) = E(Y_{t+h}|J_t)$  (8)

where  $J_t$  denotes the information sets considering the past observation of  $X_t$  and  $Y_t$  up to and including time ( $t$ ).

Granger (1988) postulates that the coefficient of error correction term used in the cointegration analysis can be utilized to test the long-run causality between the variables. This study, therefore, employs the coefficient of error correction term to confirm the presence and direction of the long-run Granger causality between the variables.

### **3.7 Impulse Response Function**

To understand the dynamic simulations of the effects of shocks known size and duration in remittances on consumption expenditure in India, this study used the impulse response function (IRF) analysis. In fact, an IRF suggests the response of contemporary and forthcoming values of the endogenous variables to the one standard deviation shock through the dynamic structure of the vector auto- regression (VAR). Plots of the IRF over time deliver a graphical illustration of the period-by-period simulation, describing both the adjustment path and the long-run effect on consumption expenditure in response to the shock in remittances. The IRF analysis assumes that all the series are stationary and they can be expressed in a vector moving average (VMA) representation as follows:

$$Y_{t+s} = \sum_{i=0}^{\infty} \psi_{t+n-i} \tag{9}$$

Then, the IRF is defined as:

$$\{\psi_n\}_{i,j} = \frac{\partial Y_{i,t+n}}{\partial \varepsilon_{i,j}} \tag{10}$$

The matrix can be interpreted as that its  $(i,j)$  element measures the consequences of one unit increase in the  $j$ th variable's innovation at date  $t$ ,  $(\varepsilon_t)$  for the value of the  $i$ th variable at time  $t+n$  holding all other innovations at all dates being constant. The IRF is

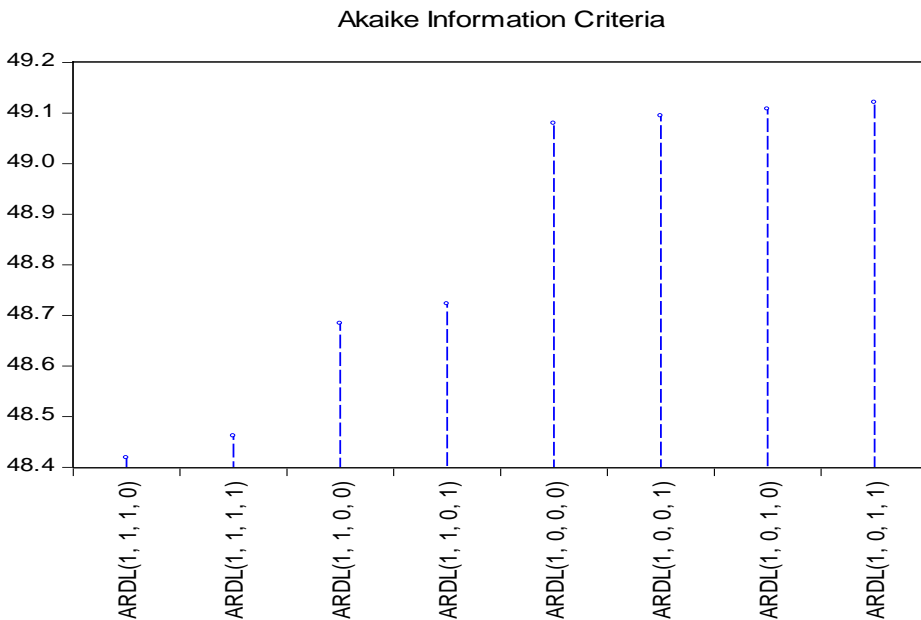
derived by plotting these elements as a function of  $s$ . The advantage of examining impulse response functions is that they show the size of the impact of the shock plus the rate at which the shock dissipates, allowing for interdependencies.

#### 4. Results and Discussion

##### 4.1 Determination of optimal lag selection

To select the optimal lag length ARDL model, there are a number of lag selection criteria used in empirical studies. However, this study considers the Akaike Information Criterion (AIC) to select the optimal lag ARDL model. The AIC lag selection criteria produces top 8 appropriate  $ARDL(p, q_1, q_2, q_3)$  models (see Figure 3). In these models, the  $ARDL(1,1,1,0)$  model has the lowest value than the other ARDL models. Therefore, this study uses the  $ARDL(1,1,1,0)$  model to investigate the long-run relationship between remittances and consumption expenditure in India.

Figure 3. Graph of AIC model selection criterion



Source(s): Authors' derivation

4.2 ARDL Bounds test

The test results of Bounds test are shown in Table 2 which indicates that the calculated *F*-statistic is 7.33 which is greater than the upper-bound critical value of 3.63 at 5 percent significance level. Therefore, the null hypothesis that there is no long-run relationship between the variables is rejected. Thus, remittances in India have a long-run relationship with consumption expenditure during the study period.

**Table 2:** Cointegration test results

Test statistic	Value
<i>F</i> -Statistic	<b>7.33</b>
K	3

Significance	I(0) Bound	I(1) Bound
10%	2.01	3.1
5%	2.45	<b>3.63</b>
2.5%	2.87	4.16
1%	3.42	4.84

Source(s): Authors' estimation

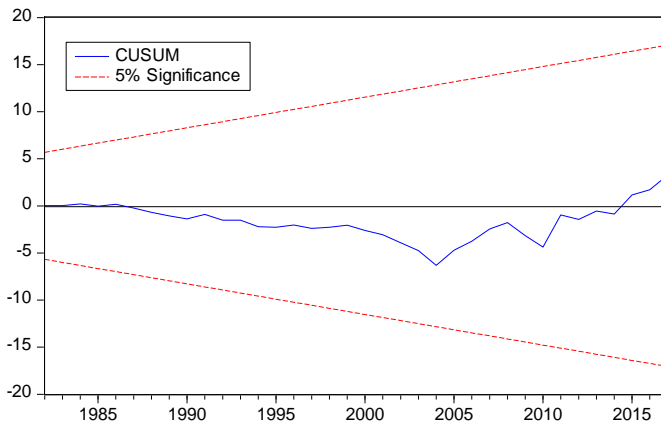
4.3 Diagnostic test result

In order to check the validity and stability of the estimated ARDL model of this study, the Breusch-Godfrey serial correlation LM test, Heteroskedasticity ARCH test, Jarque-Bera normality test, and CUSUM plot are used (see Table 3 below).

Model	Test statistic			
	Breusch-Godfrey Serial Correlation LM Test		Heteroskedasticity ARCH Test:	
	F-Statistic	Prob.F(1, 35)	F-statistic	Prob.F(1, 39)
<b>NARDL (1, 1, 1, 0)</b>	0.0599	0.8081	0.0459	0.8314
<b>J-B test statistic</b>		$\chi^2$ 0.5052		<i>p</i> -value 0.7767

Table 3 shows the test results of the Breusch-Godfrey serial correlation LM test, Heteroskedasticity ARCH test, and Jarque-Bera normality test. As the corresponding  $p$ -value of the Breusch-Godfrey serial correlation LM test is greater than at 5 percent significance level, the estimated ARDL model of this study does not suffer from serial correlation issue. Furthermore, as the corresponding  $p$ -value of the Heteroskedasticity ARCH test given in Table 3 is greater than at 5 percent significance level, the estimated ARDL model therefore is homoscedasticity. In addition, as the Jarque-Bera normality test given in Table 3 is greater than at 5 percent significant level, the null hypothesis – that the residual of estimated ARDL model is normally distributed – is not rejected. Therefore, the residuals of estimated ARDL model are normally distributed.

Figure 4 illustrates the plot of the Cumulative Sum of Recursive Residuals (CUSUM) for the estimated ARDL model of this study which implies that the recursive residuals behaviours are within the critical bounds at 5 percent significance level. Thus, the CUSUM plot indicates that the null hypothesis that the parameter of coefficient constancy is not rejected. Therefore, the diagnostic findings of this study show that the estimated ARDL model is stable over the study period.



**Figure 4.** The CUSUM plot for the estimated ARDL model  
Source(s): Authors’ derivation

4.4 Long-run coefficient

Table 4 below presents the long-run test results of variables used in this study. The variable of remittances is statistically different from zero at 1 percent significance level. The coefficient of remittances indicates that 1 unit increase in remittances in India upsurges the consumption expenditure by 5.93 units. Therefore, this finding is consistent with the findings of Chioma (2009); Diacon & Maha (2015); and Yasmeen *et al.* (2011); Aslam & Sivarajasingham (2020a). The gross domestic product given in Table 4 is also statistically different from zero at 1 percent significance level. The estimated coefficient of the gross domestic product explains that 1 unit changes in the gross domestic product escalate the consumption expenditure by 0.72 unit. This finding validates the findings of Andersson (2014); Combes & Ebeke (2011); Haider, *et al.*, (2016); Incalçarau & Maha, (2012); Nisar, *et al.*, (2013); Ogunwole, (2016); Semyonov & Gorodzeisky, (2008). However, the direct tax in India negatively impactsthe consumption expenditure. The estimated coefficient of direct tax is -2.1 which is statistically significant at 1 percent level. The estimated coefficient of direct tax indicates that 1 unit increases in direct tax decreases the consumption expenditure by 2.1 unit. This finding confirms the findings of Pestel & Sommer (2013), Kaya & Sen (2015).

Table 4. Long – run relationship between the variables

Dependent Variables: $CON_t$				
Variable	Coefficient	<i>t</i> - statistic	<i>P</i> value	
$GDP_{t-1}$	0.726	3.431	0.001*	
$RE_{t-1}$	5.934	3.346	0.001*	
$TAX_{t-1}$	-2.107	3.810	0.001	

Source(s): Authors’ estimation

\*p<0.01

4.5 short-run coefficient

Table 5 demonstrates the short-run dynamics of the variables used in this study. The estimated coefficient of remittances positively affect the consumption expenditure at 10 percent significance level. As well, the GDP also positively influences on the consumption expenditure at 1 percent significance level. On the other hand, the direct tax negatively affects the consumption expenditure at 5 percent significance level. The estimated coefficient of remittances in the short-run indicates that 1 unit increases in



remittances induces the consumption expenditure by 0.93 unit. This finding confirms the finding of Diacon & Maha (2015); and Yasmeen, *et al.*, (2011). The coefficient of GDP illustrates that 1 unit upsurges in GDP increase the consumption expenditure by 0.72 unit. This finding is consistent with findings of Combes & Ebeke (2011); Haider, *et al.*, (2016); Incalțarau & Maha (2012). However, the coefficient of direct tax demonstrates that 1 unit increases in direct tax revenue decreases the consumption expenditure by 0.49 unit. This finding confirms the empirical findings of Kaya & Şen (2015); Pestel & Sommer (2013); Steindel (2001).

The estimated coefficient of error correction term ( $ECT_{t-1}$ ) given in Table 5 shows a negative sign and is statistically significant at 5 percent level. The negative sign of the  $ECT_{t-1}$  indicates that the response variable of the consumption expenditure moves towards the long-run equilibrium path. In addition, the estimated error correction term given in Table 5 is 0.15 which implies that 15 percent of disequilibrium error is adjusted every year.

**Table 5.** Short-run dynamics of the variables

<b>Dependent Variables: <math>\Delta LCON_t</math></b>			
<b>Variable</b>	<b>Coefficient</b>	<b>t- statistic</b>	<b>P value</b>
$\Delta GDP_t$	0.674	20.597	0.000*
$\Delta RE_t$	0.938	1.974	0.056***
$\Delta TAX_t$	-0.494	-2.109	0.041**
$ECT_{t-1}$	-0.158	-1.594	0.011**

Source(s): Authors' Calculation

\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.1$

#### **4.6 Granger causality analysis**

Table 6 presents the test results of Pairwise Granger causality from the single equation. The null hypothesis is that remittances does not Granger Cause consumption expenditure is rejected at 5 percent significance level as the corresponding  $p$ -value is less than at 0.05. Thus, it is established that there exists unidirectional causality from remittances to consumption expenditure.

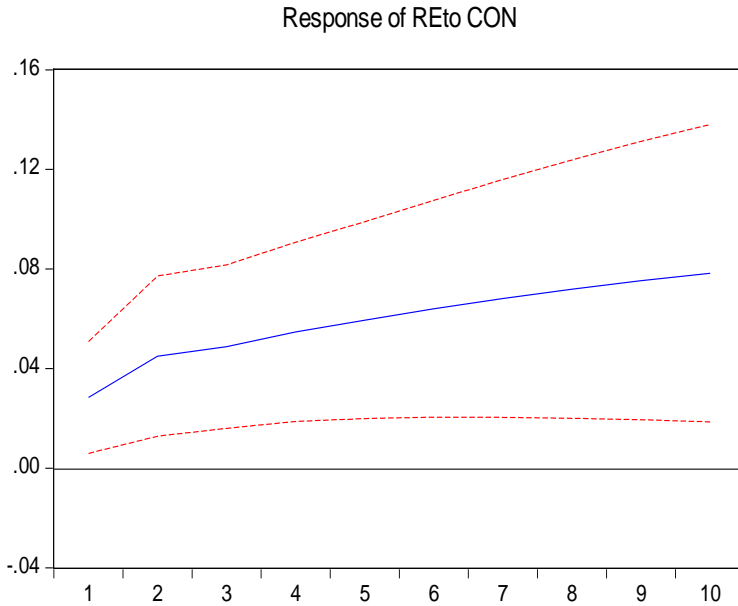
**Table 6.** Pairwise Granger Causality test result

Null Hypothesis	Obs	F-statistic	P-value
$\Delta CON$ does not Ganger Cause $\Delta RE$	43	2.5E-05	0.996
$\Delta RE$ does not Ganger Cause $\Delta CON$	43	4.20125	0.047*
Source(s): Authors' Calculation			<i>*p&lt;0.05</i>

Further, the estimated coefficient of error correction term given in Table 5 endorses that there is a long-run causality between the variables used in this study. The estimated coefficient of the error correction term is significant at 5 percent level as the corresponding p-value of the error correction term is less than 0.05. Thus, this study confirms that there is a long-run causality between remittances and consumption expenditure in India.

**4.7 Impulse Response Analysis**

Figure 5 illustrates the output of impulse response analysis. In Figure 5, the vertical line shows the time limit in year over which the IRF is performed. The solid line represents the point estimates of the IRF with 5 percent standard error bands on either side of the IRF to judge the statistical significance of the IRF. Figure 5 expresses that a positive shock to remittances has the immediate significant positive impact on consumption expenditure increases up to at 10 year. Further, the IRF indicates that the magnitude of the consumption expenditure is positive for long-turn.



**Figure 5.** Impulse response of remittances to consumption expenditure  
Source(s): Authors' derivation

## 5. Conclusion

This study has examined the empirical relationship between remittances and consumption expenditure in India over the period of 1975 to 2018 using the annual time series data. The unit root test results indicate that the variables used in this study are non-stationary, I(1). The ARDL cointegration Bounds test results show that remittances in India have a mutual relationship with consumption expenditure in the long-run. The coefficient of the error correction term indicates that 15 percent of disequilibrium error is corrected every year, and the response variable of consumption expenditure has moved towards the long-run equilibrium path. The diagnostic test results confirm that the estimated model in this study is robust. The Granger Causality test results explain that there is unidirectional causality from remittances to consumption expenditure. The IRF test results show that a positive shock to remittances has an immediate significant positive impact on consumption expenditure in India. As per the findings of this study, it can safely be concluded that the variable of remittances in India has been an important

element in determining the consumption over study periods. Thus, this study shows/suggests/recommends that advises it is absolutely necessary for the policymakers to consider the finding of this study when they formulate the development policies in India.

Further, to the authors' knowledge, this is the first study that examines the empirical relationship between remittances and consumption expenditure in India. Therefore, we hope that this study will help future research on this topic.

**Funding:** The authors received no financial support for this research, authorship, and/or publication of this research article.

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