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Do Migrant Remittances Spur Financial Development in Pakistan? Evidence From Linear and Nonlinear ARDL Approach

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ABSTRACT

The study asseses the influence of migrant remittances on financial development over the period of 1976-2018 in Pakistan. This study has applied the linear autoregressive distributive lag (ARDL) model and nonlinear autoregressie distributed lag (NARDL) model to check the symmetric and asymmetric effect of remittances. Results of the ARDL and NARDL bound test confirm remittances, FDI, real GDP and inflation significantly contributing to financial development. The outcomes of ARDL and NARDL have also confirmed the significant positive effect of migrant remittances on financial development in long-run. The asymmetric ARDL results show the existence of remittances nonlinear effect on financial development. Specifically, the study found remittances decrease have a significant impact while remittances increase have no any significant effect on financial development. Based on findings, this study recommends the plan for the policymakers of recipient countries, especially Pakistan, could harvest the potential gain of migrant remittances though positive asymmetric association with financial sector development.

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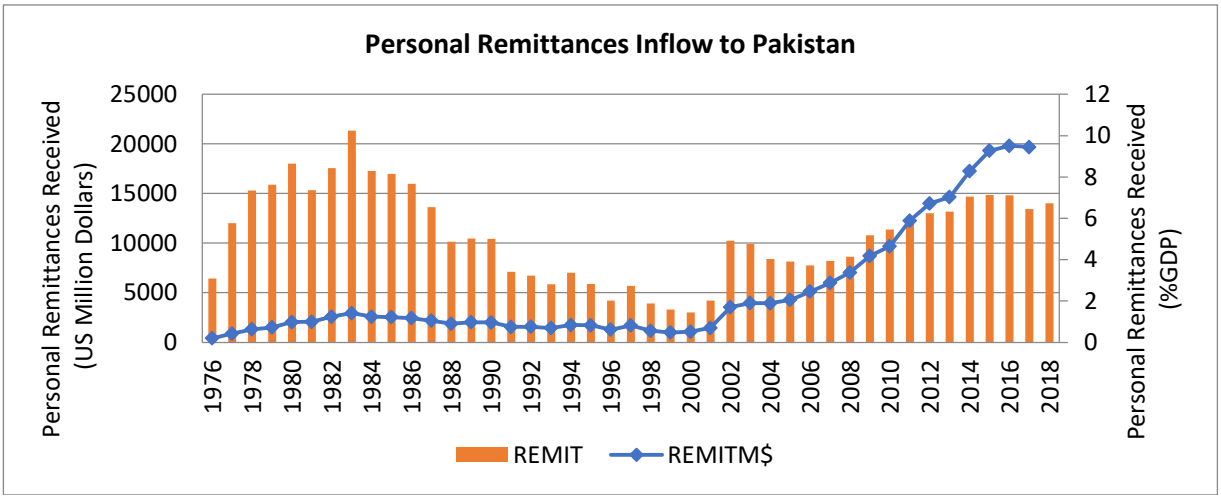
1. Introduction

Migrant remittances are considered more stable than any other international financial flows and become a significant input in Asia, Africa, Latin America and Pacific region's economic development during the last three decades (Ratha, 2004; Bhattacharya et al., 2018). However, still, it relies on informal transfer channel1 inspite of bank transfer (Adams and Page, 2005). However, the bank estimates show the flow of remittances reached $529 billion to low- and middle-income economies in 2018 (World Bank, 2018).

1 Informal remittances transfer channel is medium of unrecorded capital export through unofficial international financial transaction (Brown, 1992).

Economic development of a country depends on finance and it is supposed to be core of modern economy (Aibai et al., 2019). Since the 2000s, the integration of developing countries with the capital inflows and the global financial system is due to the third phase of globalisation because financial globalisation improves the functioning of financial system (Bhattacharya et al., 2018). The role of financial institutes and markets is significant in economic growth and development, especially in productive activities through their role in finance allocation (Levine, 2005; Nazar et al. 2018). Sound research has been done in empirical studies to check their role in different economies by using various econometric techniques. A lot of literature highlights the efficiency of financial institutions and financial markets to enhance economic growth (Pagano 1993; Levine 2003; Goodhart, 2004).

Pakistan economy is in the list of the fastest-growing economies of Asia, which remains its position in the world's remittance recipient countries (World Bank, 2018). Traditionally, in Pakistan, migrant remittances have remained the source of foreign exchange earnings (Luqman and Haq, 2016). Following graph shows the trend of personal remittances from 1976 to 2018. The increase in personal remittances shows upward trends with time.



Source: Authors' computation with data from WDI

Many studies have been explained the impact of remittances while a few of them considering financial development. The previous literature discussed the linkage of remittances with different areas of interest i.e., remittances and Dutch disease effect (Hassan and Holmes, 2013; Chowdhury and Rabbi, 2014; Roy and Dixon, 2016; Urama et al., 2019), remittances impact on growth (Cooray, 2012; Meyer and Shera, 2017), remittances influence on education and sustainable development (Calero et al., 2009; Adams and Page 2005); remittances and environmental effect (Li and Zhou, 2015), remittances and political institutions (Williams, 2017); remittances and foreign exchange earnings (Keely and Tran, 1989), remittances and health expenditures (Valero-Gil, 2009; Terrelonge, 2014); household expenditure pattern (Taylor ,1992; Ogunwole, 2016); on investment (Glytsos, 2005; Kapur and McHale, 2003; Balde, 2011), poverty and income inequality (Bang et al., 2016; Docquier and Rapoport, 2003), unemployment (Ratha, 2005), and remittances and productivity of the labour (Al Mamun et al., 2015; Al Mamun et al., 2016).

However, a single question arises that if the developed financial market is responsible for the country's economic growth then why many countries are still financially underdeveloped in the world and remittances inflows have any influence on financial development? This study tries to answer by analyzing the symmetric and asymmetric relation of migrant remittances with financial development by employing ARDL and nonlinear ARDL (NARDL) in Pakistan.

The rest of our paper is structured as follows. Literature review provides in section 2. Section 3 presents methodology. Section 4 repots the empirical results and discussion. In the last, concluding remarks and some policy recommendations are given in section 5.

2. Literature Review

Although there is an ambiguous and unclear association of migrant remittances with financial development (Aggarwal et al., 2011), however, literature explains several reasons behind the linkage of remittances with banking sector development is positive. The first and most important reason is as remittances being lumpy as sending the cost of migrant remittances is fixed that increase households demand for banking products. Secondly, banks act as paying agents because the most unofficial source is used by household rather than the formal financial sector and offer banking products to unbanked households. Thirdly, the processing fee of the bank against remittances transactions could be a source of income. Fourthly, banks are provided with information related to the household income of recipient by processing remittance flows that could be used to extend credit (Demirgüç- Kunt et al., 2011; Opperman and Adjasi, 2019).

The literature displays the empirical linkage of international remittances with the financial sector development that is still evolving. Remittances encourage financial sector growth through the formal channel (Nyamongo and Misati, 2011). On the other side, remittances relax the household financial constraints that reduced the demand for credit (Giuliano and Ruiz-Arranz 2009). The literature is divided into two main categories; an indirect association which states that remittances and growth relationship is affected by a given level of financial development, and by checking the link between remittances and financial intermediation by considering the impact on financial deepening and widening. The study of Opperman and Adjasi (2019) uses two-step GMM estimator to evaluate the migrant remittances effect, migrant remittances volatility on financial development and concluded that remittances and volatility in remittances affect efficiency and banking sector depth in Africian countries. The results of the study of Williams (2016) also in support of the above study by showing the positive linkage of remittances with financial development in 45 Africian economies by employing dynamic panel estimator for the period 1970-2013.

Similarly, the study of Aggarwal et al. (2011) proved the positive influence of remittances on financial development in 109 under-developed countries. The study of Chowdhury (2011) contributed in literature through finding the same result in case of Bangladesh. In contrast, Brown et al. (2013) showed the negative influence of migrant remittances on financial development by using the sample of 138 countries. Additionally, Motelle (2011) concluded in favour of no causal effect of remittances with financial development in Lesotho. However, nonlinear effect of one variable with other variable is common in current studies. For example, the study of Akthar and Masih (2019) found the asymmetric effect of remittances on exchange rate by employing ARDL and nonlinear ARDL estimation over the period of 1976 to 2017 in Bangladesh. Similarly, Al mamun et al., (2016) employed ARDL and NARDL method and results concludes remittances affect labor productivity positively in Bangladesh over 1982-2013.

Furthermore, other factors also affect financial sector. Otchere et al. (2015) found bidirectional causal relation of FDI with financial sector development in African economies. Similarly, the study of Azman-Saini et al. (2010) concluded that the affect of FDI remained positive on economics growth after a threshold level of financial development. Similarly, extensive studies are existing that shows the positive association of FDI on macroeconomic indicators including financial development (Anwar et al., 2016; Chaudhry et al., 2017; Makiela and Quattara, 2018; Sultanuzzaman et al., 2018; Aibai et al., 2019). The strong institutional quality is needed for the efficient operation of financial markets, and successful financial liberalization and overall reforms are necessary for the financial sector to improve remittances policies (Hansen 2012).

3. Methodology

The data source is World Development Indicators (WDI) and study covers the period from 1976 to 2018 for Pakistan. This study used financial development as dependent variable and Broad money (BM) is used to measure financial development The study uses other variables as control variables like, Inflation rate, FDI and gross domestic product.

The literature shows different cointegration techniques are applied to test the relationship of migrant remittances with financial development. The study uses linear ARDL and nonlinear ARDL method to achieve the study objective. This methodology have additional advantages over traditional cointegration techniques such as; Firstly, it is independent of the same compulsion order of integration as it can be applied if variable are I(1) or mixture I(0) and I(1) order; no variable should be on I(2). Secondly, this methodology expresses simultaneously short term and long term components that eliminate endogeneity of variables and serial correlation (Pesaran and Shin 1999). Thirdly, this methodology is appropriate even with a small sample size (Narayan and Narayan 2005).

The following specification is adopted to achieve our objective:

$$FD_t = \alpha_0 + \alpha_1 REMIT_t + \alpha_2 FDI_t + \alpha_3 INFL_t + \alpha_4 GDP_t + \mu_t \quad (1)$$

Where FD, REMIT, FDI, INFL and GDP shows financial development, migrant remittances, foreign direct investment, inflation rate and gross domestic product, respectively. Moreover, α = (α0, α1, α2, α3, α4) shows long-run parameters estimates.

We can write equation (1) in an ARDL framework that is shown in Shin et al. (2011).

$$\Delta FD_t = \alpha_0 + \sum_{i=1}^{n1} a_{1i} \Delta FD_{t-i} + \sum_{i=0}^{n2} \alpha_{2i} \Delta REMIT_{t-i} + \sum_{i=0}^{n3} \alpha_{3i} \Delta FDI_{t-i} + \sum_{i=0}^{n4} \alpha_{4i} INFL_{t-i} + \sum_{i=0}^{n5} \alpha_{5i} GDP_{t-i}$$
$$+ \beta_1 FD_{t-1} + \beta_2 REMIT_{t-1} + \beta_3 FDI_{t-1} + \beta_4 INFL_{t-1} + \beta_5 GDP_{1=1} + \mu_t \quad (2)$$

For the asymmetric relationship, non-linear ARDL model is applied that decompose partial sum of remittances positive and negative changes to shows the asymmetric effect (Shin, Yu, and Greenwood-Nimmo (2014). So, following equation presents the asymmetric co-integration:

$$FD_t = \beta^+ REMIT_t^+ + \beta^- REMIT_t^- + u_t \quad (3)$$

Where FD is financial development is the dependent variable, $REMIT_t^-$ and $REMIT_t^+$ are the partial sum process of remittances changes (negative and positive) and ut shows the error term. And β^- and β^+ represents the long-run parameters of $REMIT_t^-$ and $REMIT_t^+$.
Further, the following equation shows the partial sum of changes in remittances (positive and negative):

$$REMIT_t^+ = \sum_{j=1}^{t} \Delta REMIT_j^+ = \sum_{j=1}^{t} \max(\Delta REMIT_j, 0) \quad (4)$$

$$REMIT_t^- = \sum_{j=1}^{t} \Delta REMIT_j^- = \sum_{j=1}^{t} \max(\Delta REMIT_j, 0) \quad (5)$$

The formulation of nonlinear ARDL will completed after supplanting REMIT+ and REMIT- in place of REMIT in equation (2):

$$\Delta FD_t = \alpha_0 + \sum_{i=1}^{n1} a_{1i} \Delta FD_{t-i} + \sum_{i=0}^{n2} \alpha_{2i} \Delta REMIT^+_{t-i} + \sum_{i=0}^{n3} \alpha_{3i} \Delta REMIT^-_{t-i} + \sum_{i=0}^{n4} \alpha_{4i} \Delta FDI_{t-i} + \sum_{i=0}^{n5} \alpha_{5i} INFL_{t-i} + \sum_{i=0}^{n6} \alpha_{6i} GDP_{t-i}$$
$$+ \beta_1 FD_{t-1} + \beta_2 REMIT^+_{t-1} + \beta_3 REMIT^-_{t-1} + \beta_4 FDI_{t-1} + \beta_5 INFL_{t-1} + \beta_6 GDP_{1=1} + \mu_t \quad (6)$$

4. Results and Discussion

For checking the unit root, the Augmented Dickey Fuller (ADF) and Phillips Perron (PP) tests are used. The findings are shown in Table 4.1. The result of the ADF and Phillips Perron test confirms that the financial development, remittances, FDI, GDP and INFL are non-stationary at the level and all variables become stationary at first difference.

Table 4.1: Results of Unit Root Tests

Level			First Difference	
Variable	ADF	PP	ADF	PP
FD	-1.14	-1.02	-5.55***	-6.78***
REMIT	-1.56	-1.87	-6.14***	-6.19***

FDI	-2.91	-1.96	-4.33***	-4.29***
INFL	-4.59	-3.07	-7.95***	-7.95***
GDP	-2.36	-2.78	-4.95***	-4.59***

Note: *** denote significant at 1%.

A cointegration test is performed for linear specifications, and the results are shown in Table 4.2. The computed value of F-statistic is 4.967 which is clearly higher than higher bounds that show the long-run linear association of financial development with others variables like, migrant remittances, inflation, GDP and foreign direct investment.

Table 4.2: Linear ARDL Bound Test Result

	10%	5%	1%
Lowe bound I(0)	2.45	2.86	3.74
Upper bound I(1)	3.52	4.01	5.06
F-Statistics 4.967			

Before going to estimate the long-run model and making inferences, there is need to pass some diagnostic tests. The value of R2 is about 0.93 which explained the variation in the financial development concerning the regressor. To check the autocorrelation in the residual LM test is conducted, and the result shows the absence of autocorrelation. Moreover, Jarque-Bera and Ramsey RESET tests show the normality and well specification of the model. CUSUM and CUSUM of squares tests used for model stability. Moreover, descriptive statistics show the overall picture of the data and the correlation matrix of variables presented in the appendices.

The primary focus of this empirical study is to check the remittances influence on financial development , so let us start with cointegration and long run forms equations that is based on table 4.3. The results explains migrant remittances show significant effect on financial sector development with positive sign. In simple, findings explains that a 1% increase in remittances inflow increase financial development by 0.60%, 0.50% in long run and short run, respectively. The findings also concludes FDI and GDP show positive linkage with financial sector development both in long run and short run. However, these control variables are essential to include in the study for better analysis of dynamics and garner valid inference of the above variable relationship. The findings are in agreement with the studies that showed positive linkage of remittances with financial development (Chowdhury, 2011; William, 2016; Opperman and Adjasi, 2019).

Table 4.3: Linear ARDL Long run/Shor-run Estimation and Diagnostic Checks

Regressors	Coefficients	Standard error	t-ratio (Prob.)
Long -Run Coefficients			
REMIT	0.600	0.170	3.522***(0.001)
FDI	3.317	0.652	5.087***(0.000)
GDP	0.071	0.006	11.172***(0.000)
INFL	0.082	0.119	0.696(0.492)
Intercept	31.119	1.549	20.082***(0.000)
Short -Run Coefficients			
D(FD(-1))	0.378	0.125	3.009***(0.005)
D(REMIT)	0.5000	0.144	3.475***(0.001)
D(FDI)	2.762	0.510	5.412***(0.000)
D(GDP)	0.059	0.012	5.097***(0.000)

D(INFL)	-0.219	0.112	-1.959*(0.059)
D(INFL(-1))	-0.226	0.097	-2.337**(0.025)
ECT	-0.833	0.133	-6.265***(0.000)
Diagnostic Tests			
R Square	0.934	Serial Correlation	0.330(0.721)
F-Statistic	56.972(0.000)	Functional Form	1.788(0.192)
J.B Test	1.753 (0.416)	Hetero Test	0.408(0.907)

Note: ***, **, * shows significance level at 1%, 5% and 10% ; the values in ( ) are p-values.

Now turning to results of nonlinear autoregressive distributed lag model, a cointegration test is performed for nonlinear specifications, and the results are shown in following table. The computed value of F-statistic is 4.26 which is higher than upper bounds that show financial development and others variables like, migrant remittances, inflation, GDP and foreign direct investment cointegrated in long run.

Table 4.4: NARDL Bound Test for Cointegration

	10%	5%	1%
Lowe bound I(0)	2.26	2.62	3.41
Upper bound I(1)	3.35	3.79	4.68
F-Statistics 4.26			

The estimated results of NARDL model presented in the following table 4.5. The long run and short run results revealed that the effect of negative changes in remittances on financial development is positive and significant at 1%, while positive changes in remittances show insignificant effect. In simple words, a 1% decrease in remittances will lead to 62%, 54% decrease in financial development. In addition, the coefficients FDI and GDP are significant with positive sign in long run and short run. The value of R2 is about 0.94 which explained the variation in the financial development concerning the regressors. To check the autocorrelation in the residual LM test is conducted, and the result shows the absence of autocorrelation. Moreover, Jarque-Bera and Ramsey RESET tests show the error tends to follow the normal distribution and correct specification of the model. The results also support the long run and short run asymmetry.

Table 4.5: Nonlinear ARDL Long run/Shor-run Estimation and Diagnostic Checks

Regressors	Coefficients	Standard error	t-ratio (Prob.)
Long -Run Coefficients			
REMIT_POS	0.246	0.357	0.690(0.495)
REMIT_NEG	0.623	0.166	3.756***(0.001)
FDI	3.308	0.625	5.288***(0.000)
GDP	0.093	0.021	4.392***(0.000)
INFL	0.082	0.114	0.713(0.482)
Intercept	34.359	1.788	19.207***(0.000)
Shor -Run Coefficients			
D(FD(-1))	0.390	0.126	3.104***(0.004)
D(REMIT_POS)	0.213	0.304	0.699(0.489)
D(REMIT_NEG)	0.539	0.148	3.638***(0.001)

D(FDI)	2.863	0.518	5.527***(0.000)
D(GDP)	0.081	0.023	3.449***(0.002)
D(INFL)	-0.220	0.112	-1.964*(0.05)
D(INFL(-1))	-0.229	0.097	-2.371**(0.024)
ECT	-0.865	0.136	-6.358***(0.000)
Diagnostic Tests			
R Square	0.937	Serial Correlation	0.664(0.523)
F-Statistic	50.986(0.000)	Functional Form	2.641(0.069)
Normality	1.502 (0.472)	Heteroscedasticity	0.546(0.829)
WLR	0.011 (0.000)	WSR	0.236 (0.023)

Note: ***, **, * shows significance level at 1%, 5% and 10% ; the values in ( ) are p-values.

To assess the stability of the parameters ARDL model is insufficient, so study applied the CUSUM and the CUSUM of squares in figure 1 and figure 2 respectively that shows the stability of the parameters.

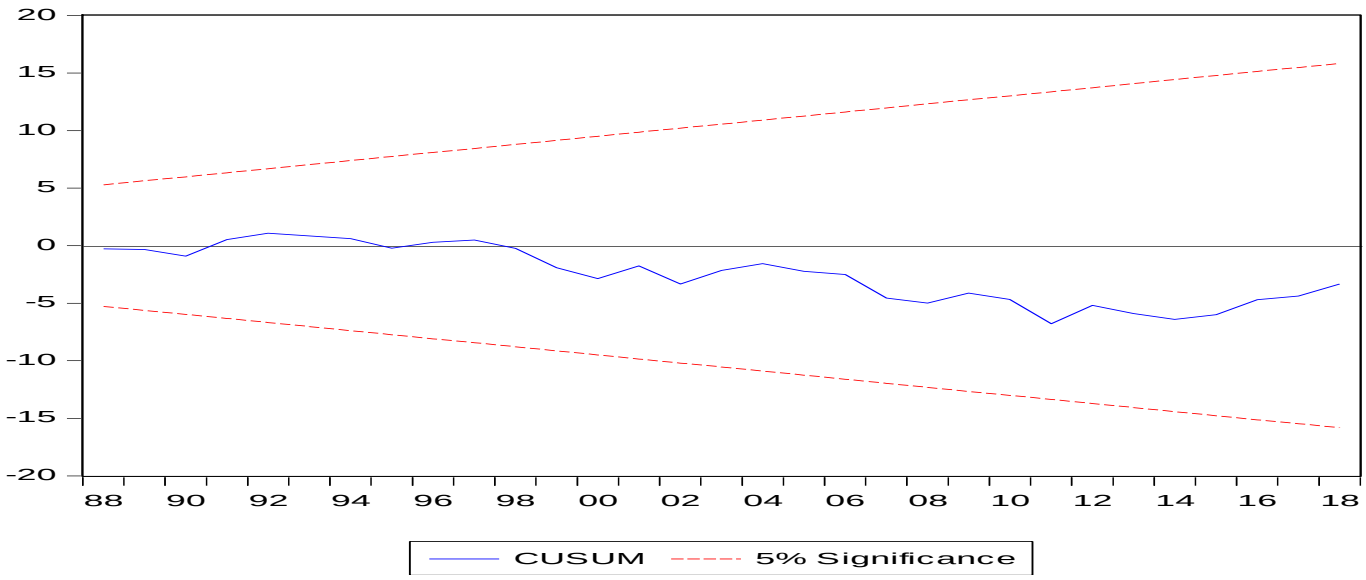


Figure. 1 CUSUM Test.

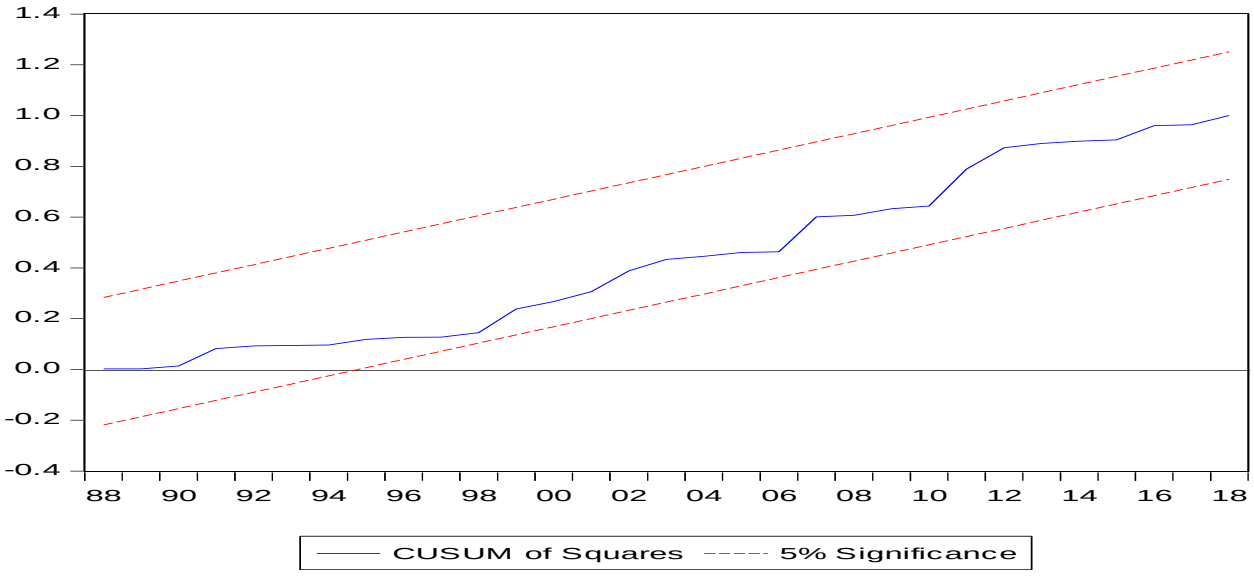


Figure. 2 CUSUM of Square Test.

4. Concluding Remarks and Policy Implications

This paper rigorously explores remittances link with financial development. The study employed the linear ARDL and NARDL model for the period of 1976-2018 to achieve this objective in Pakistan. The linear ARDL result shows that migrant remittances significantly influence financial development. Specifically, the financial development leads to increase 0.50, 0.60 per cent as one per cent increase in the inflows of remittances increases in the short- run and the long- run, respectively. The other variables like FDI and GDP positively linked with financial development and while inflation have negative sign. The long run results of NARDL, the financial development effect of negative changes in remittances shows to be positive and significant at 1%, while positive changes in remittances appears to be insignificant. In simple words, a 1% decrease in remittances will lead to 62% decrease in financial development. This recommends the plan for the policymakers of recipient countries especially Pakistan, could harvest the potential gain of migrant remittances though it has positive association with financial development.

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APPENDICES

Descriptive Statistics

	FD	REMIT	GDP	INFL	FDI
Mean	46.31332	5.214781	117.4894	8.070025	0.856340
Median	45.31106	5.021795	106.0658	7.692156	0.620823
Maximum	58.86769	10.24763	253.9353	20.28612	3.668323
Minimum	37.83940	1.453638	33.81353	2.529328	0.061630
Std. Dev.	6.206424	2.212975	61.95885	3.705305	0.799127
Skewness	0.482692	0.105764	0.493772	0.777461	2.128949
Kurtosis	2.079921	2.126129	2.188268	3.960552	7.336815
Jarque-Bera	3.186502	1.448375	2.927857	5.984961	66.17997
Probability	0.203264	0.484718	0.231326	0.050163	0.000000
Sum	1991.473	224.2356	5052.046	347.0111	36.82263
Sum Sq. Dev.	1617.827	205.6849	161233.8	576.6299	26.82136
Observations	43	43	43	43	43

Correlation Matrix

	FD	REMIT	GDP	INFL	FDI
FD	1				
REMIT	0.0155	1			
GDP	0.878	-0.079	1		
INFL	0.034	-0.164	-0.055	1	
FDI	0.639	-0.366	0.442	0.336	1