Quest Journal of Management and Social Sciences
Volume 3 Issue 1: 126-140
ISSN Print: 2705-4527
ISSN Online: 2705-4535
Web: https://www.quest.edu.np

Determinants of Workers' Remittances in Nepal: An Empirical Study

Naw Raj Bhatt[1*], *Melina Kharel*[1]

[1] Central Department of Economics, Tribhuvan University, Nepal
[*] Corresponding Author (bhattanr92@gmail.com)

Received: 27 February, 2020
Revised: 14 April, 2021
Accepted: 6 May, 2021
Published: 10 June, 2021

How to cite this paper:
Bhatt, N.R., & Kharel, M. (2021). Determinants of workers' remittances in Nepal: An empirical study. *Quest Journal of Management and Social Sciences, 3(1)*, 126-140.

Abstract

Background: Remittance has a crucial role in external sector stability, poverty eradication, and social as well as the human development of developing countries like Nepal. The determinants of remittance are widely discussed in the existing works of literature from altruism and portfolio approaches. Since the share of remittance in the current account, current transfer income, and forex reserve is significantly high, the study of major determinants of increasing remittance inflow is necessary. In this regard, this paper examines the relationship between remittance inflow, exchange rate, and workers outflow in Nepal.

Objective: The main objective of this study is to examine the effect of the exchange rate and workers outflow on the remittance inflow of Nepal.

Method: This study employs the ARDL approach to co-integration to examine the relationship between remittance inflow as an endogenous variable and exchange rate and workers outflow as exogenous variables.

Result: The coefficients of the exchange rate and workers outflow are significant and positive in long run as well as in the short-run whereas coefficients of the first lag value of workers outflow and remittance inflow itself are significant but negative.

Conclusion: The significant and positive coefficient of exchange rate indicates that depreciation of Nepalese currency with US dollar (or rise in the exchange rate) rises the remittance inflow. Further, the remittance inflow also increases with an increase in workers outflow. The effect of the exchange rate on remittance is greater than that of workers outflow in both the long-run and short-run.

Keywords: Remittance, Exchange rate, Workers' outflow, ARDL, ECM

Originality: This paper is original, and this has not been published in other publications and, no financial support has been received while preparing this paper.

Paper Type: Research paper

JEL Classification: G2, J21, J24

Introduction

The term "remittance" generally refers to the transfers, in cash or other forms, from a migrant to household residents in the country of origin. In comparison to foreign direct investment, official development assistance, and other private flows, remittance is a more constant source of income to developing countries (Pant, 2008).

The determinants of remittance can be grouped into three main categories. The first one is the 'altruism approach', which says that level of remittance depends on the degree of altruism, "attachment" to the home country of migrant workers (Bouhga-Hagbe, 2004). The second is the 'portfolio approach' which views remittance as similar to capital. In this approach, variables that are macroeconomic in nature such as Gross Domestic Product (GDP) of home and host countries, interest rate differential, exchange rate, and inflation rate are considered as determining factors of remittances (Barua, Majumder, & Akhtaruzzaman, 2007). And the third one is the 'mixed approach' which includes a mix of altruism and portfolio approach in the analysis.

The wave of globalization and economic liberalization began in the 1980s and the economic integration thereafter led international trade, immigration, and foreign capital inflows to grow significantly. Over the past two decades, the number of people going to third countries (especially Malaysia and Gulf countries) for employment and the inflow of remittance from foreign employment significantly increased. However, there seems a decreasing trend of workers outflow from Nepal since FY.2071/72 (NRB, 2020).

Remittance has become a prime element to determine the balance of payment position and contribute to the external sector sustainability of Nepal mainly through the financing of imports and payment of the external debt. In Nepal, the remittance to GDP ratio is about 25 percent in the past decade (NRB, 2020). The remittance inflow was higher than seven times the official development assistance and about seventy-five percent of the total foreign exchange reserve in 2015 (Pant & Budha, 2016). In the past six years, the share of remittance inflow to the current account is on an average 62.6 percent and the share of remittance inflow to current transfer income is around 85.78 percent (MoF, 2020). Besides, there is a significant role of remittance in poverty eradication, financial resource mobilization, national capital formation, and the human development index of Nepal.

Since our entire economy highly depends on remittance inflow, there could arise several side effects like Dutch disease, brain drain, and productivity loss of the country. However, there is a big challenge for Nepal to shift its dependency to export earnings from remittance inflow to maintain adequate forex reserves and external sector balance and stability unless we prepare for sufficient and competitive products at home. Hence, for now, remittance is crucial to our economy. In this regard, this paper addresses the most raised research question that how the exchange rate and workers outflow indeed determine the remittance.

Despite its role and growing significance, the literature that examines the macroeconomic determinants of remittance inflow is insufficient. Though there exist several studies examining the determinants of remittances in developing countries, most of the literature considered the determinants regarding the altruism approach to remittance. The empirical studies examining the role of the exchange rate and foreign migrants to remittance inflows are very rare. On this note, this paper fills the gap in the literature by addressing frequently raised issues in the discourse: impact of the foreign exchange rate and migrant workers on remittance inflow in Nepal.

In this paper, we consider the nominal exchange rate as exogenous to remittance inflows due to pegged exchange rate system between Nepal and India. Here, the level of remittance can be influenced by exchange rate through substitution as well as wealth effects (Bouhga-Hagbe, 2004). When the currency of the home country depreciates, the goods in the home country become less expensive since the migrant feels increased purchasing power and needs to send a smaller amount of money as before to

meet the previous level of consumption by the migrant's family. This enables migrants to substitute some goods in their home country for more expensive goods in the host country and this is called the substitution effect. On the other side, when the exchange rate of the home country devaluates or depreciates, a migrant worker can accumulate more wealth that enables him/her to send more money for making excess expenditure and investing in residential buildings, real estate, etc. in the home country. This can be termed as the wealth effect of exchange rate devaluation or depreciation. Also, exchange rate depreciation can provide an incentive to migrant workers to send more money to their home country by taking loans and advances so that they can take advantage of the favorable exchange rate (Chamon, Semblat, & Morant, 2005). Here, the examination of the effect of these channels on remittance inflow with more systematic methods of analysis covering wider and updated observations and using updated methodologies can be the scope for further research works.

This study is organized into five sections. Section II includes a brief review of literature consisting of both the theoretical as well as empirical literature. Section III discusses the research methodology which includes model specification, variable description, data sources, and required econometric tools and techniques. Section IV is the result and discussion related to the research issue. Section V concludes the entire study with a brief discussion of policy implications.

Literature Review

Theoretical Concepts on Remittance

Pure Altruism

In the altruistic model, the migrants send remittances due to their altruistic behavior. The altruistic behavior of migrants is influenced by emotional and social attachment to the household members in the country of origin. The desire to care for and improve the living standard of their families provides them an incentive to send money to their home country. In this model, the amount of remittance and migrant's income are positively correlated whereas remittance is negatively correlated to the income of the household in the country of origin (Lucas & Stark, 1985). Moreover, with the familial distance and number of migrants in the same household, altruism decreases gradually.

Pure Self-Interest

In this case, where the migrant's behavior is led by a pure self-interest motivation, there could be three reasons behind sending the remittance. First, remitting behavior could be driven by the aspiration of inheritance. Here, the migrant sends remittances for strengthening his/her reputation and to assure an important role within the family hierarchy (Fokkema, Cela, & Ambrosetti, 2013). Hence, the amount of remittance sent has a positive correlation with assets to inherit and migrant's income (Hoddinott, 1994). The second self-interest of the migrant in remitting money could be for exchange motivation which is to invest in the assets at home country or to provide for their maintenance with the relatives left behind acting as agents or to pay for the services provided by the family at home like caring for children left behind. Moreover, the third pure self-interest of the migrant in remitting money could be the strategic behavior of high-skilled workers, who want to protect their wage from becoming depressed due to the presence of low-skilled migrants (Fokkema, Cela, & Ambrosetti, 2013). This model explains that the average productivity of the pool of migrants where they belong determines the wages of the migrants since employers do not acquire adequate information about individual skill level and their productivity. Hence, skilled migrants send remittances to keep unskilled from migrating. Here remittance is expected to increase with migrants' income and education and decrease with household income.

Tempered Altruism or Enlightened Self-Interest

Both pure altruism and pure self-interest may not fully explain the remittance behavior of migrants (Fokkema, Cela, & Ambrosetti, 2013). Hence, to better explain the motivation to remit Lucas and Stark (1985) elaborated an intermediate model: enlightened self-interest (or tempered altruism) represents an intertemporal, contractual arrangement between migrants and their households in the home country. The model explains that remittance could satisfy the interest of both migrants and their families left behind.

Empirical Studies on Remittance

Yoshino, Farhad, and Otsuka (2020) observed the determinants of international remittance inflow using the generalized method of moments (GMM) method with panel data from 22 Asia-Pacific middle-income countries. A study found that the gap in the per capita GDP growth rate between origin and destination countries, gross enrollment ratio of secondary education, and trade openness are positively associated with remittance inflow whereas net foreign direct investment (FDI) inflows are negatively correlated. Kapri and Ghimire (2020) examined the impact of remittances on household-level agricultural productivity in Nepal using Nepal Living Standard Survey (NLSS) 2010/11 datasets. Based on the three-stage least square method, the study found that the households receiving remittance are found to be more productive. Further, the paper showed that the impact of remittances on agricultural productivity is higher in the Terai region compared to the Hill/Mountain region in Nepal.

Simpson and Sparber (2019) examined the determinants of remittances originating from the USA using cross-sectional data from the Current Population Survey (2008) of the USA. The study used the gravity model to examine the role of various push, pull, and distance factors on remittance outflow and found that household earnings played a major role in determining remittance outflows. Further, remittances were found more responsive to earnings in households with more adult women relative to men. Kumar, Hossain, and Osmani (2018) explored the significant factors of international remittance in Bangladesh using primary data from 84 migrant households. Using the multiple regression model estimated by the OLS method, the study found that household size, training, skill, years abroad, and earnings significantly affects the international remittance in Bangladesh that indicates that migrant remit home motivated by mixed views like altruistic, loan repayment, and exchange view.

Pant and Budha (2016) examined the impacts of the nominal exchange rate, economic activities in the host countries, and workers' outflow in determining remittance inflows to Nepal using OLS, Engle-Granger co-integration test, and FM-OLS based on monthly data from 2006 to 2015. The empirical result revealed the positive impact of Nepalese currency depreciation on remittance inflows to Nepal. Tahir, Khan, and Shah (2015) empirically examined the relationship between external determinants and economic growth of Pakistan's economy using the ARDL approach to co-integration analysis with times series data from 1977 to 2013. The paper found that external sector determinants such as foreign remittances and foreign direct investment have a significant positive role in the economic growth of Pakistan.

Lin (2011) analyzed the determinants of remittance in Tonga using the generalized method of moments (GMM) in dynamic panel data and found that appreciation in Tongan currency leads to a fall in remittance growth.

Parida and Madheswaran (2011) examined the determinants of migration and remittance using National Sample Survey data from 2007-2008 and suggested that individual characteristics like size of the household, caste, and land possession have an immense influence on both decisions to migrate and sending remittance. Barua, Majumder, and Akhtaruzzaman (2007) identified macroeconomic determinants of inflow of worker's remittance from major ten host countries to Bangladesh using pooled EGLS and found a positive correlation between devaluation of domestic currency (or increase

in the exchange rate) and flow of worker's remittances in Bangladesh. Lopez, Molina, and Bussolo (2007) explored the empirical evidence regarding the impact of remittance on the real exchange rate and found that remittance appeared to lead the exchange rate appreciation significantly. Similarly, Holzner (2006) found that remittance inflows lead to an appreciation of the real exchange rate. Bourdet and Falck (2003) also found the association between the remittance inflows in Cape Verde and the real exchange rate from 1980 to 2000.

Most of the existing literature seems to examine the determinants of remittance from the altruism approach which is related to the attachment of workers to their home countries. The study of the effect of exchange rate and workers outflow on remittance inflows is rarely addressed in existing literature more particularly in the Nepalese case. Pant and Budha (2016) examined the effect of exchange rate and workers outflow on remittance inflows in Nepal using the Engle-Granger co-integration test. However, we have studied the effect of exchange rate and workers outflow on remittance inflow using the ARDL approach to co-integration.

Research Method

Model Specification, Variable Description, and Data Sources

This study uses annual time series data from 1994 to 2020 due to the unavailability of time series data regarding workers outflow from Nepal previous to 1994. Based on these datasets, we examined the relationship between inflow of remittances and nominal exchange rate with US dollar. For this, we assume that remittance inflows depend on the nominal exchange rate and workers outflow following Pant and Budha (2016). The functional specification can be stated as;

$$RMT = f(ER, WO) \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where, RMT stands for migrant remittance inflows, ER for the nominal exchange rate between Nepalese rupee and US dollar, and WO stands for annual workers outflow. The linear form of the equation (1) using log can be written as equation (2);

$$LnRMT = \beta_0 + \beta_1 LnER + \beta_2 LnWO + Ut \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Here, Ln refers to the natural logarithm; β0 is the intercept; β1 and β2 are respective coefficients and U is the error term and t stands for time. The respective coefficients of the LnRMT and LnWO are expected to have a positive sign as an increase in the exchange rate and workers outflow lead to an increase in remittance inflows. Data sources and the description of the variables used in this study are presented in Table 1:

Table 1: Description of the Variables

Variable	Description	Source
RMT (Remittance)	Migrant workers' remittance on the current account, measured in Rs. Million	Current Macroeconomic and Financial Situation, Nepal Rastra Bank
ER (Exchange Rate)	Nominal exchange rate of Nepalese Rupee to US dollar	Current Macroeconomic and Financial Situation, Nepal Rastra Bank
WO (Workers Outflow)	The annual outflow of migrant workers	Department of Foreign Employment, Government of Nepal and Nepal Rastra Bank

ARDL Approach to Co-integration

The ARDL approach to co-integration developed by Pesaran and Shin (1999) and Pesaran, Shin, and Smith (2001) is widely used and the most suitable measure to check the co-integration relationship between the underlying variables irrespective of whether the variables are integrated to an order of zero, one or mutually integrated.

This approach overcomes the criticism of exclusion of multivariate analysis under Engle-Granger co-integration test and difficulty in interpretation when more than one co-integrating vectors exist in the model and sensitivity with the number of lag selection with Johansen techniques (Adhikari, 2018). The co-integration relationship is estimated using OLS estimation after choosing the appropriate lag order for the model and this test is valid for small and finite sample size (Bhatta, 2013).

The ARDL version of equation (2) is presented in equation (3);

$$\Delta \mathrm{LnRMT_t} = \alpha_0 + \sum_{j=1}^{p} b_j \, \Delta \mathrm{LnRMT_{t-j}} + \sum_{j=0}^{q} c_j \, \Delta \mathrm{LnER_{t-j}} + \sum_{j=0}^{r} d_j \, \Delta \mathrm{LnWO_{t-j}} + \gamma_1 \mathrm{LnRMT_{t-1}} + \gamma_2 LnER_{t-1} + \gamma_3 \mathrm{LnWO_{t-1}} + U_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where 'Δ' stands for the first difference operator. bj, cj, and dj are the respective short-run parameters whereas, γ_1,γ_2 and γ_3 represent the long-run parameters. Similarly, Ut is the error term in the model.

The bound test for co-integration proposed by Pesaran and Shin (1999) is carried out to test whether the co-integration exists between selected variables. The hypotheses to test the long-run relationship are;

Null Hypothesis (H_0): $\gamma_1 = \gamma_2 = \gamma_3 = 0$; No co-integration exists.
Alternative Hypothesis (H_1): $\gamma_1 \neq \gamma_2 \neq \gamma_3 \neq 0$; Co-integration exists.

If the result obtained from the bound test shows the co-integration then there exists a long-term relationship among the variables. For this, F-statistics is compared with the critical values provided by Pesaran Shin and Smith (2001). If the computed F-statistics is higher than the appropriate upper bound of the critical values, the null hypothesis of no co-integration is rejected, if it is below the appropriate lower bound, the null hypothesis cannot be rejected, and if it lies within the lower and upper bounds, the results are inconclusive. Once, the cointegration among the variables is ensured with the F-bound test, the next step is to estimate the long-run and short-run relationship based on the appropriate lag selection criteria.

For the diagnostic tests of the model, various formal tests such as Lagrange Multiplier (LM) test for serial correlation, Ramsey Reset test (RESET) for functional form misspecification, Jarque-Bera test for normality, and KB test for Heteroscedasticity are carried out. Similarly, for the stability test of the model, CUSUM and CUSUMSQ tests are carried out.

Results and Discussion

Unit Root Test Result

Table 2 presents the results of the ADF, PP, and KPSS tests to check the stationarity of data.

The underlying variables are non-stationary at level but stationary after first differencing as observed from Table 2, that is, all the variables are integrated of order one. Here, no variables are integrated of order more than one, hence we can proceed with the ARDL model in the study. The test of the stationarity of the variables is further reconfirmed with the graphical analysis presented in appendix-II.

Table 2: Results of the Unit Root Test

ADF Test				
Variable	**At Level**		**At First Difference**	
	Intercept	Intercept and Trend	Intercept	Intercept and Trend
LnRMT	-5.541105*	-1.319384	-5.607304*	-5.843604*
LnER	-0.799560	-1.762830	-5.053701*	-4.954888*
LnWO	-4.946268*	-0.884945	-1.465160	-4.205815**
PP Test				
Variable	**At Level**		**At First Difference**	
	Intercept	Intercept and Trend	Intercept	Intercept and Trend
LnRMT	-1.624795	-1.215159	-5.594252*	-5.837422*
LnER	-0.799560	-1.790263	-5.053701*	-4.954888*
LnWO	-2.006491	-0.160542	-2.873136**	-9.396771*
KPSS Test				
Variable	**At Level**		**At First Difference**	
	Intercept	Intercept and Trend	Intercept	Intercept and Trend
LnRMT	0.756631	0.171964**	0.220528*	0.059614*
LnER	0.703061	0.097116*	0.110541*	0.111143*
LnWO	0.633510**	0.188462**	0.404416*	0.099515*

Source: Authors' computation

*Note: * and ** indicate that the coefficients are significant at 1 and 5 percent level of significance respectively.*

Lag Length Selection

The selection of an appropriate order of lag for the ARDL model is crucial to identify the co-integrating relationship among the variables. The optimal lags selected by different criteria based on the VAR lag selection approach are presented in Table 3.

Table 3: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SBIC	HQ
0	-46.28398	NA	0.010350	3.942718	4.088983	3.983286
1	40.30008	145.4612	2.10e-05	-2.264006	-1.678946*	-2.101735
2	52.17468	17.09943*	1.74e-05*	-2.493974*	-1.470119	-2.210001*

Source: Authors' computation

*Note: * indicates lag order selected by the criterion; LR: sequentially modified LR test statistic (each test at 5% level); FPE: Final Prediction Error; AIC: Akaike Information Criterion; SBIC: Schwarz Bayesian Information Criterion; HQ: Hannan-Quinn Information Criterion.*

Co-integration (Bound Test) Results

Table 4 presents the bound test result regarding the co-integration relationship between the remittance inflow and exchange rate and workers outflow. Based on the AIC criterion, the lag length of 2 is selected for the analysis of the cointegrating relationship between underlying variables.

Table 4: Results of the Bound Test

Variables	F-Statistic	Critical Values			Lag Option
		Significance	I(0)	I(1)	
F(LnRMT/ LnER, LnWO)	6.122198	10%	3.437	4.471	(2, 1, 2)
		5%	4.267	5.473	
		1%	6.183	7.783	

Source: Authors' computation

The bound test result displayed in Table 4 shows that the calculated F-statistics 6.122 is greater than the upper bound critical value 5.473 at the standard 5 percent level of significance. This shows the rejection of the null hypothesis of no co-integration among the underlying variables. In other words, there exists a long-run cointegrating relationship between remittance, exchange rate, and workers outflow.

ARDL Regression Result and Interpretation

Given the existence of co-integration between remittance inflow and explanatory variables, the long-run and short-run coefficients from equation (3) are estimated using the ARDL model and the results are presented in the upcoming section. Based on the VAR lag length selection criteria, we have chosen the maximum lag length of 2 with the AIC criterion, and the optimal number of lags for each of the variables is shown as ARDL (2, 1, 2).

Table 5: Long-Run Coefficients from ARDL (2, 1, 2) Model

Dependent Variable: LnRMT			
Variable	**Coefficient**	**Standard Error**	**t-Stat [Prob.]**
LnER	2.1025*	0.63035	3.3354 [0.004]
LnWO	0.7909*	0.08463	9.3461 [0.000]
C	-6.4354**	2.2049	-2.9187 [0.010]
R-Squared: 0.9907;	Adjusted R-Squared: 0.9869; F-Statistic: 259.7271 [0.000]		D-W Statistic: 1.5056;

Source: Authors' computation

*Note: * and ** indicate that the coefficients are significant at 1 and 5 percent level of significance respectively.*

Table 5 presents the long-run coefficients from the selected ARDL model. As expected, the coefficients of both explanatory variables are positive and statistically significant. The coefficients of LnER and LnWO state that an increase of one percent in respective variables will lead to an increase in remittance inflow on an average by 2.1025 and 0.7909 percent respectively. The effect of exchange rate on remittance inflow is found greater than that of workers outflow. This result supports the findings of Pant and Budha (2016), Lin (2011), and Barua et al. (2007).

Table 6 shows the short-run coefficients of the selected model where all the coefficients are statistically significant. The coefficient of ΔLnER and ΔLnWO have a positive and significant effect on ΔLnRMT whereas ΔLnRMT(-1) and ΔLnWO(-1) have a significant but negative effect.

The value of the error correction term [ECM(-1)] is -0.5250 which is significant at a 1 percent level of significance and shows the speed of adjustment towards the previous year's disequilibrium to the current years. The result claims the adjustment speed to be 52.50 percent per annum, that is, the deviation in the short-run converges to the equilibrium at the speed of 52.50 percent per annum.

Here, the value of R-squared is 0.6351 and it shows the overall goodness of fit of the model, which means 63.51 percent of the total variation in the remittance is explained by the exchange rate and workers outflow in the short-run, and the remaining 66.49 percent is due to error. Further, the probability of the F-statistic having 0.002 confirms that the short-run model is significant.

Table 6: Short-Run Coefficients from ARDL (2, 1, 2) Model

Dependent Variable: ΔLnRMT			
Variable	**Coefficient**	**Standard Error**	**t-Stat [Prob.]**
ΔLnRMT(-1)	-0.3467**	0.1583	-2.1902 [0.041]
ΔLnER	2.5754*	0.7613	3.3825 [0.003]
ΔLnWO	0.3862**	0.1764	2.1893 [0.041]
ΔLnWO(-1)	-0.3940**	0.1788	-2.2033 [0.040]
ECM(-1)	-0.5250*	0.1299	-4.0415 [0.001]
R-Squared: 0.6351;	Adjusted R-Squared: 0.4849;		F-Statistic: 5.9195 [0.002]
ECM = LnRMT - 2.1025*LnER - 0.7909*LnWO + 6.4354*C			

Source: Authors' computation

*Note: * and ** indicate that the coefficients are significant 1 and 5 percent level of significance respectively.*

Table7: Results of the Diagnostic Test of the Selected Model

Test Statistics	LM Version	F Version
A: Serial Correlation	CHSQ(1)=3.3934 [0.065]	F(1,16)=2.5128 [0.132]
B: Functional Form	CHSQ(1)=0.0587 [0.808]	F(1,16)=0.3768 [0.849]
C: Normality	CHSQ(2)=1.9912 [0.370]	Not applicable
D: Heteroscedasticity	CHSQ(1)=1.1490 [0.284]	F(1,23)=1.1080 [0.303]

Source: Authors' computation

Note: A: Lagrange multiplier test of residual serial correlation; B: Ramsey's RESET test using the square of the fitted values; C: Based on a test of skewness and kurtosis of residuals; D: Based on the regression of squared residuals on squared fitted values.

Table 7 presents the result of the diagnostic test which signifies that the model passes all the tests. The null hypothesis of the normality of residuals, no first-order serial correlation, no heteroscedasticity, and no misspecification of functional form are accepted as both LM and F version reveals the p-values more than 5 percent level. This means the model is free from serial correlation, heteroscedasticity, functional form misspecification, and the issue of normality.

Figure 1: CUSUM Statistics

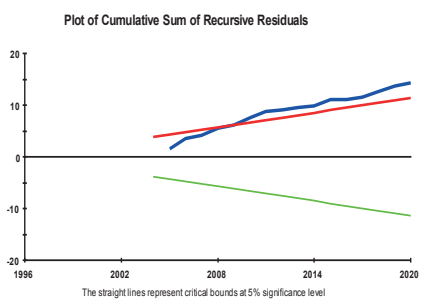
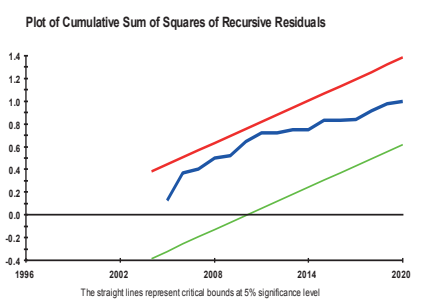


Figure 2: CUSUMSQ Statistics



Source: Authors' computation

Figures 2 and 3 present the plot of the cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ) respectively. If both statistics stay within the critical bounds of a five percent significance level represented by a pair of straight lines, the null hypothesis that coefficients are consistent cannot be rejected. If either of the lines is crossed, the null hypothesis can be rejected at the 5 percent level of significance. The result of CUSUM statistics indicates instability in the model as the plot lies outside the 5 percent critical bounds. On the other hand, the plot of the CUSUMSQ statistics shows an absence of any instability of coefficients during the study period since the plot lies within the 5 percent critical bounds. From the CUSUMSQ result, it is confirmed that the model is structurally stable.

Causality Test Results

If the two series are cointegrated, then there will be at least a unidirectional causality relationship between them. This study found the cointegrating relationship between remittance inflow, exchange rate, and workers outflow. Pairwise Granger Causality test is applied using lag length up to 2 periods and the results are presented in Table 6.

Table 6: Results of Pairwise Granger Causality Test

Null Hypothesis	F-Statistics [Prob.]	
	Lags=1	Lags=2
LnER does not Granger Cause LnRMT	0.06265 [0.8046]	0.25451 [0.7778]
LnRMT does not Granger cause LnER	0.69132 [0.4143]	0.50209 [0.6127]
LnWO does not Granger cause LnRMT	5.63978 [0.0263]*	2.90555 [0.0780]*
LnRMT does not Granger cause LnWO	1.88754 [0.1827]	0.66107 [0.5272]
LnWO does not Granger cause LnER	0.02002 [0.8887]	0.03801 [0.9628]
LnER does not Granger cause LnWO	0.15631 [0.6962]	1.10282 [0.3513]

Source: Authors' computation

*Note: * indicates that the causality runs from LnWO to LnRMT.*

The outcome of the Granger-causality test reveals the hypothesis that workers outflow does not Granger-Cause the remittance inflow is rejected at 5 percent level of significance taking lag 1. Whereas at lag 2, the null hypothesis is rejected at a 10 percent level of significance. It reconfirms the positive relationship between workers outflow and remittance inflow as an increase in workers outflow increases the inflow of remittances. At the same time, the result does not support the rejection of the null hypothesis in the rest of the cases.

Conclusion

This paper examines how remittance inflow is affected by the change in the exchange rate and the worker's outflow in the case of Nepal employing the ARDL approach to co-integration from 1994 to 2020. From the empirical result, it can be generalized that both exchange rate and workers outflow significantly and positively influence the remittance inflow of Nepal in the long run. It was expected because of similar arguments in the existing literature. This result suggests that when our currency is depreciated we can be benefited from increased remittance inflow. Here, the coefficient of the exchange rate is greater than that of workers outflow in the long run.

Similarly, in the short run exchange rate and workers outflow significantly and positively affect the remittance inflow whereas the preceding year's workers outflow and remittance itself has a significant but negative effect on the remittance inflow of the current year. Deviation in the short-run converges to the long-run equilibrium at the speed of 52.50 percent per annum indicating a quick adjustment process.

Crucial policy concern is necessary since remittances are very large and distinct sources of income providing direct benefit to households and help the economy to withstand the economic shocks. Further, considering the increasing trend of remittance inflow in Nepal, there is an urgent need to mobilize the growing influx of remittances into the productive sector. Also, the monetary authority needs to stay prepared to manage the liquidity in the economy through money market operation when there are fluctuations in remittance inflow with the change in the exchange rate and workers outflow. Lastly, despite its high significance, remittance can never be a substitute for a sustained economy that guarantee domestically engineered development efforts, and the remittance inflow at the cost of brain drain is never a solution.

However, this study could not examine the relationship among the specified variables preceding 1994 due to the unavailability of data of workers outflow before that period. Moreover, the study could be better if we could include the more exogenous variables like economic activities of host countries and the unemployment rate of the home country.

Conflict of Interest

Author declares no conflict of interest while preparing this paper.

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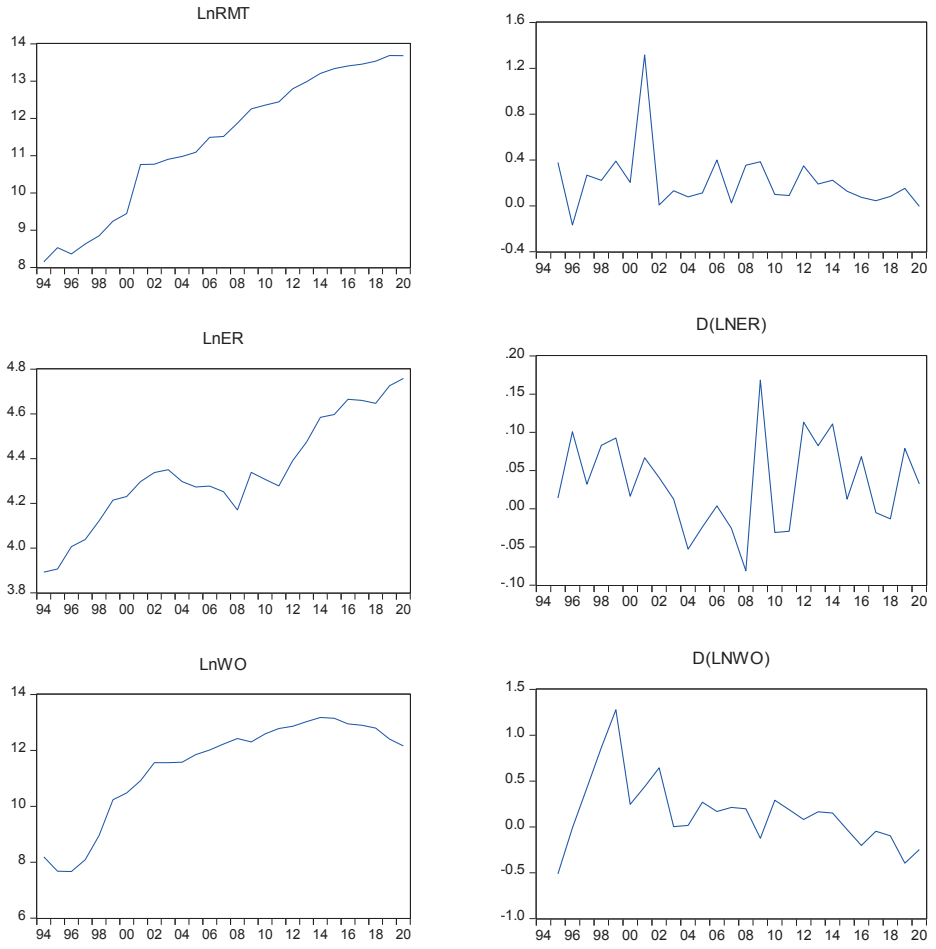
Appendices

Appendix I: Data Sets Used in the Study

Fiscal Year	Remittance (In Rs. Million)	Exchange Rate with US $ (Annual Average)	Workers Outflow
1993/94	3469.10	49.01	3605
1994/95	5063.60	49.70	2159
1995/96	4283.60	54.96	2134
1996/97	5595.00	56.75	3259
1997/98	6987.80	61.66	7745
1998/99	10314.60	67.63	27796
1999/00	12662.30	68.74	35543
2000/01	47216.10	73.48	55025
2001/02	47536.30	76.53	104736
2002/03	54203.30	77.49	105043
2003/04	58587.60	73.49	106660
2004/05	65541.20	71.76	139718
2005/06	97688.50	72.03	165252
2006/07	100144.80	70.20	204533
2007/08	142682.70	64.72	249051
2008/09	209698.50	76.58	219965
2009/10	231725.30	74.24	294094
2010/11	253551.60	72.08	354716
2011/12	359554.40	80.72	384665
2012/13	434581.70	87.66	453543
2013/14	543294.10	97.95	527814
2014/15	617278.80	99.19	512887
2015/16	665064.35	106.19	418713
2016/17	695452.40	105.65	398978
2017/18	755058.58	104.26	362023
2018/19	879271.40	112.81	243868
2019/20	875026.96	116.53	190453

Source: Nepal Rastra Bank, Department of Foreign Employment, GoN

Appendix-II: Graphical Test of Stationarity of the Variables



Source: Authors' computation based on Appendix-I

Appendix-III: Overall ARDL Estimate Results

Dependent Variable: LNRMT
Method: ARDL
Sample (adjusted): 1996 2020
Included observations: 25 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): LNER LNWO
Fixed regressors: C
Number of models evaluated: 18
Selected Model: ARDL(2, 1, 2)

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
LNRMT(-1)	0.128242	0.203685	0.629606	0.5373
LNRMT(-2)	0.346706	0.158297	2.190220	0.0427
LNER	2.575355	0.761377	3.382494	0.0035
LNER(-1)	-1.471445	0.724458	-2.031097	0.0582
LNWO	0.386258	0.176432	2.189270	0.0428
LNWO(-1)	-0.364983	0.258484	-1.412015	0.1760
LNWO(-2)	0.394038	0.178838	2.203319	0.0417
C	-3.378899	1.538272	-2.196555	0.0422

R-squared	0.990736	Mean dependent var	11.64127
Adjusted R-squared	0.986922	S.D. dependent var	1.700290
S.E. of regression	0.194446	Akaike info criterion	-0.182983
Sum squared resid	0.642760	Schwarz criterion	0.207057
Log-likelihood	10.28729	Hannan-Quinn criter.	-0.074802
F-statistic	259.7271	Durbin-Watson stat	1.505597
Prob(F-statistic)	0.000000		