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An Analysis of Remittance and Private Consumption in Nepal

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Abstract

In recent decades, the increasing inflow of remittances and their benefits to originating countries have become an emerging issue in migration and development in the world economy. The government and household members of the country of origin have been taking the maximum possible advantages of remittances in various fields, and it is becoming a more stable source of external finance. However, around 80 percent of remittance received by households is used only for consumption purposes in Nepal. Despite the increasing importance of remittance in the Nepalese economy, the relationship between remittance and private consumption has not yet been adequately studied. Hence, the prime objective of this paper is to analyze the effects of remittance on private consumption expenditure in Nepal. The ARDL bounds testing model is employed in the study to identify the effects of remittance on private consumption in Nepal. The time series data for 20 years, 2001-2020, are collected from various government sources, such as the Ministry of Finance, Nepal Rastra Bank (NRB), and the National Statistics Office. This study finds a positive and significant relationship between remittances and private consumption in Nepal. The impact of other control variables like GDP is positive and significant for consumption. However, the consumer price index has a negative effect on consumption. The Nepal government and other concerned agencies should encourage sending remittances only from formal banking channels that could help with capital formation and thereby investment and job creation in Nepal. It also solves the liquidity crisis and foreign exchange constraints in the nation.

Keywords: *Remittance, Private consumption, Time series, ARDL bound test, Long-run*

JEL Classification: F24, D12, C22, C32, C32.

Introduction

Economic liberalization and globalization have increased the movement of workers around the world market especially after the 1970s. This has

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encouraged workers to migrate from low-income and underdeveloped countries to developed, industrialized, and emerging economies in search of employment and other opportunities. This policy also influenced the movement of Nepalese workers abroad after the 1990s. Nepalese migrate abroad every year in search of employment opportunities for economic and non-economic reasons. Mostly, the income received from remittances is used for consumption purposes, which has very little impact on long-term economic growth (Lamsal, 2023).

The history of the migration of Nepalese people for foreign employment dates back more than two centuries. It started before the early 19th century when the first Nepalese person, Ranjit Singh traveled to join the army in Lahore, then India but now, Lahore is a part of Pakistan. Labor migration started after the 'Anglo-Nepal Treaty of Peace and Friendship – 1816', which recruited 3000 Nepalese soldiers in the British Gurkha Regiment (Lamsal, 2015). Similarly, the signing of a peace and friendship treaty between India and Nepal in July 1950 was a turning point in the movement of Nepalese migrants to India (Kanel et al., 2023). Being impressed with the sincerity and hard work of the Nepalese workers/people, the Indian Government still recruits the Nepalese to the Indian army, police force, civil service, and private sectors. However, the movement of Nepalese people beyond India started with the enactment of the Foreign Employment Act in 1985. Likewise, the oil boom of the 1970s created many employment opportunities for unskilled and semi-skilled workers in the Middle East Gulf countries (Shrestha, 2004).

Nepal has implemented an economic liberalization policy since the 1990s. The total volume of trade is increasing every year in which the volume of imports is increasing rapidly, and there is a slow change in exports. The total trade deficit was NRs. 9,076.8 million in 2004, and now, in 2020, it has reached NRs. 86, 321.0 million (MoF, 2021). Thus, the increasing deficit in foreign trade has limited foreign exchange earnings. There has been slow growth in the tourism sector in recent years especially due to the COVID-19 pandemic. Consequently, the country has lost significant foreign exchange earnings from tourism. Nepal was a food surplus country till the 1990s and now has suffered from food shortage. Nepal has been importing huge quantities of food items from India and other countries in recent years. In such a situation, the provision of foreign employment and inflow of remittances has not only helped to minimize unemployment but has injected a significant amount of foreign currency into Nepal (Lamsal, 2023).

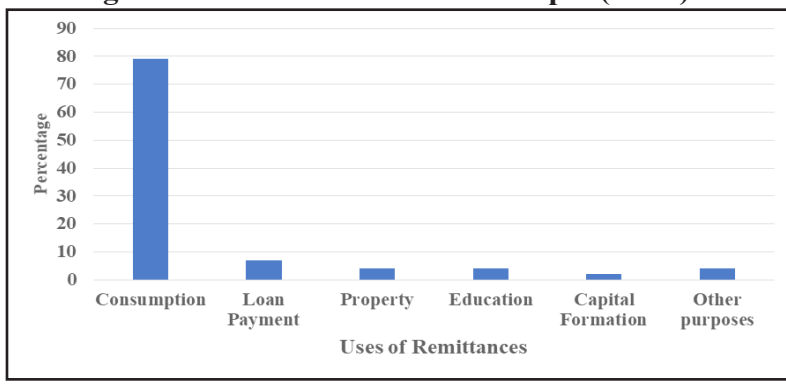
The population growth of Nepal, according to the 'Population Census – 2001', was 2.25 percent and 1.35 percent in 2011, and the recent growth rate as per the 2021 census result is 0.92 percent per annum (NSO, 2022). It shows there is relatively higher population growth in Nepal than in the 2021 Census. According to the Ministry of Labour, Employment and Social Security, around 500,000 people enter the job market in search of employment opportunities every year

in Nepal (MoLESS, 2020). However, very few of them can get employment in Nepal. So, searching for jobs in foreign countries became the ultimate option for a large number of Nepalese people. Even though there is a lot of potentiality in Nepal due to the failure of the Nepalese economy to transform from subsistence agriculture to industry, service, and tourism sectors, widening the scope of export trade, highly unstable politics, etc. are majors reasons for the slow growth of employment opportunities in the domestic economy (Sigdel, 2010). As a result, on average, 2000 Nepalese youth go abroad every day for jobs (MoLESS, 2020).

It was found that almost half of all households in Nepal had at least one migrant abroad, either for work or for educational purposes. The unstable government and its failed policies, the lack of quality education in the domestic economy for mass students, and the lack of sufficient job opportunities in Nepal are crucial problems. Remittances received by foreign countries contributed a quarter of the income of all households and almost two-thirds of the income for those receiving money from abroad (World Bank, 2011).

Due to attractive and favorable policies targeted by the Indian Government to inflow remittances, India stood at rank one in terms of remittance-receiving countries in the world. In 2019, India received US$ 83.10 billion in remittances, which is around 2.8 percent of Indian GDP. China and Mexico are in second and third positions in receiving remittances with U.S.$ 59.5 billion and 42.9 million, respectively, in the world (World Bank, 2021). In the SAARC region, India, Pakistan, and Bangladesh are receiving U.S.$ 26.10 and U.S.$ 21.80 billion, respectively, which are 7.9 percent and 5.8 percent of their GDP. Nepal stood at 4th position in terms of receiving remittances, which is the U.S.$ 8.10 billion and 27.3 percent as compared with the GDP of Nepal. Sri Lanka, Afghanistan, Bhutan, and Maldives are at 5th, 6th, 7th, and 8th rank in terms of receiving remittances from host countries (World Bank, 2021). Nepal received the highest amount of remittance from Qatar (NRs. 53.93 billion), followed by UAE (NRs. 40.87 billion), Saudi Arabia (NRs. 38.15 billion), and Malaysia (NRs. 29.66 billion) in 2019 (Kafle, 2020).

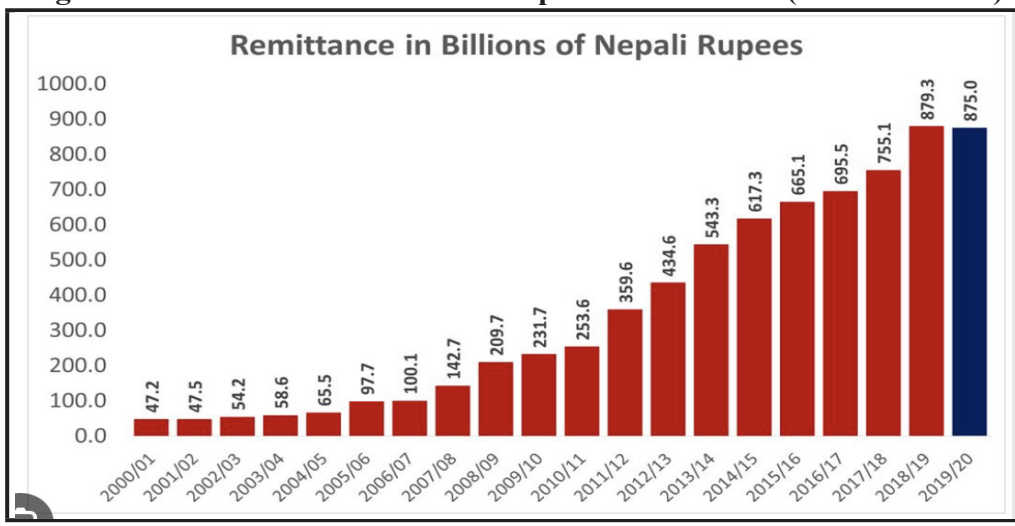
Figure 1: Uses of Remittance in Nepal (In %)



Source: CBS, 2011.

Figure 1 shows the use of remittances for multiple purposes in Nepal. However, the highest percent (around 80 %) is used only for consumption. Figure 2 depicts the year-wise inflow of remittances in Nepal from 2000 to 2020.

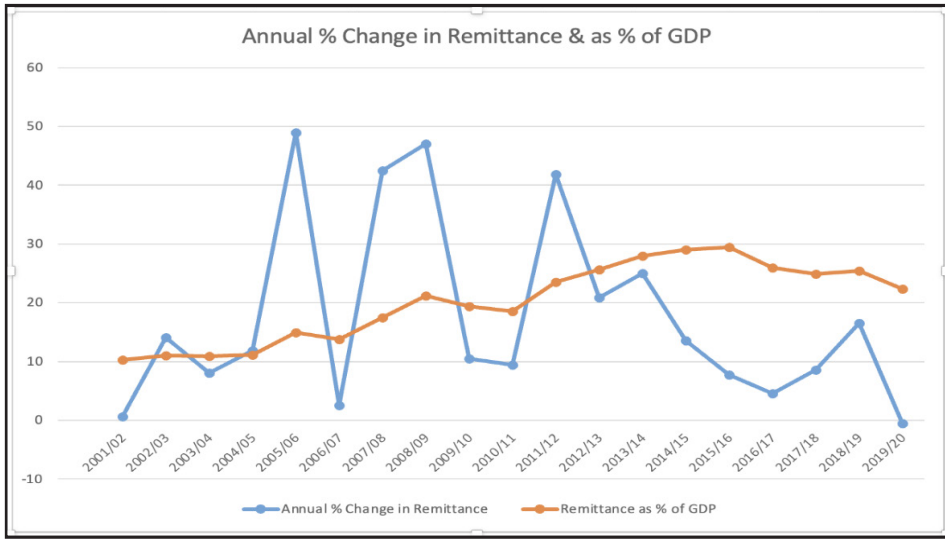
Figure 2: Inflow of Remittances in Nepal - 2001 to 2020 (NRs. in billion)



Source: NRB, 2021.

Figure 2 shows the year-wise increasing inflow of remittances in Nepal. Remittances' contribution to the increase in consumption, their role in alleviating poverty, and maintenance of BoP surplus are some positive aspects.

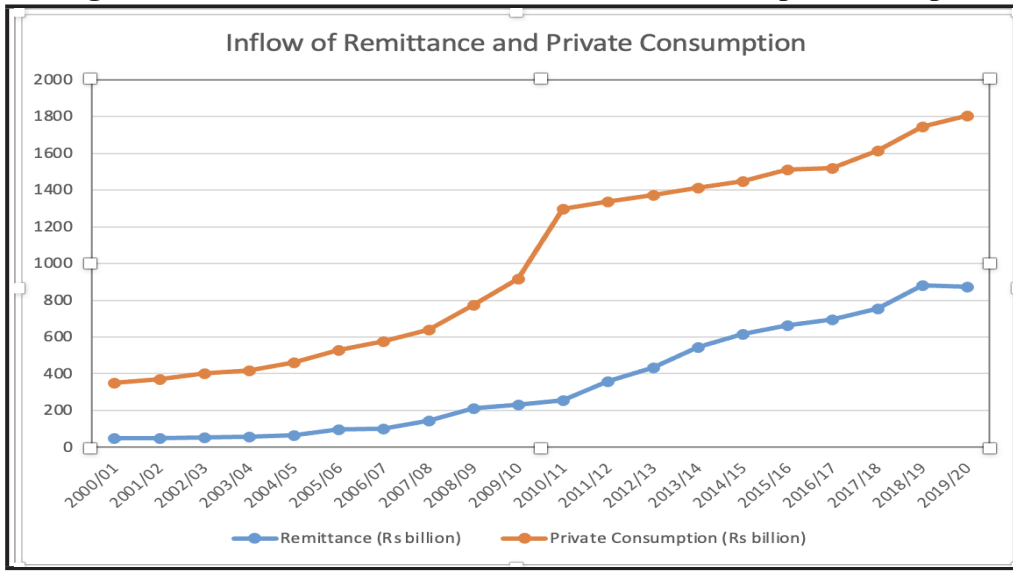
Figure 3: Annual Percent Change in Remittance Inflow as % of GDP



Source: NRB, 2021.

Figure 3 represents the annual percent change in remittance inflow in Nepal, which peaked in 2005/06 and became negative in 2019/20 due to the COVID-19 pandemic. Likewise, Figure 4 shows the year-wise inflow of remittances and private consumption expenditure.

Figure 4: Inflow of Remittances and Private Consumption in Nepal



Source: NRB, 2021.

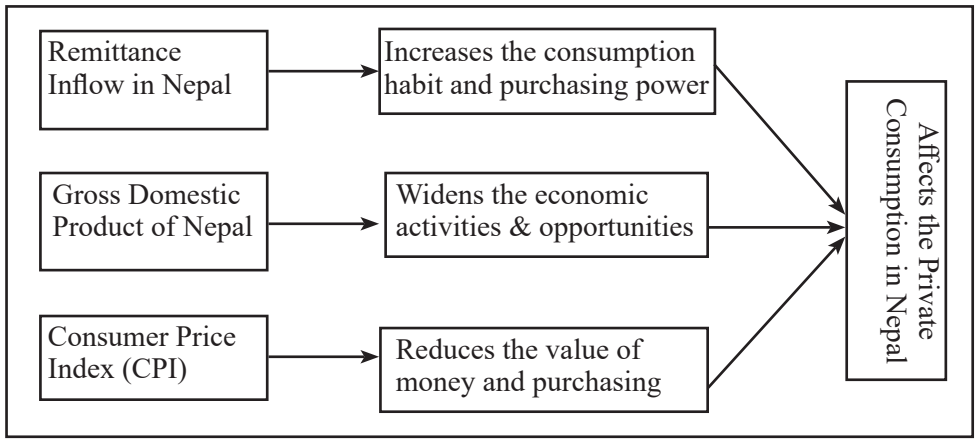
The research question of this study is: Do remittances sent by Nepalese workers from host countries affect private consumption in Nepal? As the main variable of interest of the study is remittance, it is expected that remittance inflow boosts household consumption. So, the basic objective of this study is to explore the effects of remittances (REMI) as a core variable on private consumption expenditure (PVTC) in Nepal along with the gross domestic product (GDP) and consumer price index (CPI) as control variables.

The rest of the paper is organized into different sections as follows: The second section reviews the literature including the conceptual framework designed for this study; the third section shows the research methodology including data and methods; the fourth section presents the results from empirical findings; and the last section is about summary, conclusion, and policy recommendations, followed by the limitations of the study and areas of further research.

Conceptual Framework

The conceptual framework of this study is presented in Figure 5.

Figure 5: Conceptual Framework



Source: Author's creation, 2022.

Figure 5 presents the conceptual framework of the study. Here, private consumption is the dependent variable. The main variable of interest is remittances, and other control variables selected for the study are gross domestic product (GDP) and consumer price index (CPI). The inflow of remittances increases the consumption habits of the recipient family; an increase in GDP increases the multiple opportunities in the economy, and a rise in CPI reduces the value of money.

Review of Literature

Qamruzzaman and Jianguo (2020) argue that there are around 250 million migrant workers around the world, and they remit more than U.S.$. 500 billion to their home country each year. To explore the relationship between remittance and household consumption in 105 countries from 1993 to 2017, the authors employed the ARDL model and the Granger-Causality test. The result reveals that remittance supports household consumption both in the short run and long run. The study found that the magnitude of the coefficient is relatively higher in lower-income countries as compared with higher-income countries. Similarly, Adhikari (2020) found that the inflow of remittance in Nepal supports consumption expenditure.

Ramcharran (2019) claims that the increasing inflow of remittances in developing countries stimulates researchers to find whether remittances support consumption. Based on the 'Permanent Income Hypothesis' and using panel data from 11 Latin American and Caribbean countries from 2003 to 2013, the

study empirically found that remittance income positively supports household consumption.

Aslam and Sivarajasingham (2020) have examined the intertemporal relationship between remittances and consumption expenditures in Sri Lanka. They employed time series data from 1975 – 2017 and used econometric tools like ADF and Phillips and Perron unit root tests for empirical findings. They found that remittances have a positive long-run relationship with consumption expenditures in Sri Lanka.

Makina (2022) investigated the long-run relationship between remittances and household consumption in Lesotho using the cointegration model. The study employed the Johansen co-integration technique and Engle-Granger approach for empirical analysis. By using the time series data for 30 years from 1991-2019, this study found a positive relation between remittance and household consumption in Lesotho. Yousafzai (2015) also found that remittance supports household consumption in Pakistan.

Remittance received from host countries also plays a crucial role in enhancing consumption and promoting saving behavior in rural areas. In this context, Siddiqui et al. (2016) have identified the impact of remittance on the consumption and saving behavior of rural households in Bangladesh. By applying the Path model, the study found that remittance has a statistically significant and positive impact on the consumption of Bangladeshi people along with savings compared to remittance non-receivers. Moreover, they said that one of the primary reasons for international migration is the search for employment opportunities, a better lifestyle in the host country, and a better lifestyle for family members in the home country.

Jougwanich (2007) has highlighted the role of remittance on economic growth and poverty reduction in developing Asia and Pacific countries. The study used panel data from 1993 to 2003 applying the regression model. The study found that foreign employment and remittance are equally important in economic growth and poverty reduction in developing countries like Nepal. The study concludes that remittances significantly impact poverty reduction by increasing income, smoothing consumption, and easing the capital constraints of poor people. It further claimed that remittances have less impact on the home country's economic growth operating through investment and human capital development.

How does the remittance sent by migrants from abroad contribute to asset accumulation, boost consumption, and solve the problem of credit constraints in the home country? In order to address these issues, Quisumbing and McNiven (2007) analyzed the impact of migration and remittance on asset accumulation, consumption, and credit constraints in the rural Philippines. They used the longitudinal data set from the Philippines, which included 448 families in rural

Mindanao. This study found that remittances impact non-land assets most, i.e., consumer durables and educational expenditures.

Relating the remittances to rural households in China, Synder and Chern (2009) found a significant role of remittance in rural households in China. Using the data from 9840 agricultural households in three Chinese provinces (i.e., Heilongjiang, Henan, and Jiangsu), they use the Logit, Tobit, and OLS models to explore the relationship between remittances with household consumption and production. This study concluded that remittances increase the consumption of non-durable goods.

Various researchers and institutions have conducted to identify the impact of remittance on both micro and macro levels. In this context, Anjum et al. (2011) analyzed the impact of remittances on private consumption and investment in Pakistan. They used the time series data for 25 years collected from the 'Economic Survey' from 1984 – 2009. They used the regression model (OLS) and found that remittance positively enhances private consumption and investment in Pakistan. This study concluded that foreign exchange, monetary, and fiscal policy could put great pressure on the nation in the absence of remitances.

The effects of remittances on household consumption, educational attendance, and living standards in Colombia were analyzed by Medina and Cardona (2010). They found positive effects of remittances on education, household consumption, and living standards in the 1990s. Javid (2017) examined the impacts of remittances on consumption and investment in four main villages of Tehsil Sargodha (Punjab), Pakistan. This study used the primary data collected from the field for one year (2011) and was analyzed by using a regression model. It concluded that remittance is positively related to consumption and investment.

Neupane (2010) used the simultaneous equation model to examine the relationship between the inflow of remittance in Nepal with private consumption, private investment, economic growth, and imports by using the time series data from 1990 to 2008. The study used remittances as the main variable of interest. The study found that the inflow of remittance contributes to boost private consumption in Nepal. This study concluded a positive relationship between remittance and private consumption in Nepal. Likewise, Ghimire (2016) and Adhikari (2020) said that remittance is important for promoting consumption in the nation.

The given literature review shows that most studies have found positive and significant effects of remittance on consumption expenditures of private sector. The remittance income sent by Nepalese migrants has multiple effects on various sectors of the Nepalese economy. However, very few studies were conducted to identify the impact of remittance on private consumption. Moreover, previous studies have not covered all these variables together. Thus, to the best of my knowledge, there is a research gap in the macroeconomic effects of remittances

on private consumption in Nepal. To fill up this gap, an empirical research is important to explore how remittance promotes private consumption. Hence, the paper is expected to add value to formulating relevant macro policies.

Research Methodology

Data Sources and Variables

The study is based on secondary data. It uses the time series data set of 20 years from the year 2001 to 2020 (Appendix – I) published by the Ministry of Finance (MoF) in the 'Economic Survey' of various issues, data published in the Quarterly Economic Bulletin by Nepal Rastra Bank (NRB), and various publications of National Statistics Office (NSO). As the main variable of interest of the study is remittance, other control variables used are gross domestic product (GDP) and consumer price index (CPI). GDP is collected at a constant price for real GDP, and remittances are converted into real terms using CPI values. Among the methods used for analyzing the time series data, ARDL is suitable for small and large samples. Thus, the ARDL Bounds testing model is selected for the empirical analysis. The unit root for the stationarity test is checked using the ADF Unit Root test. Empirical results are obtained based on the data of the natural log (Appendix – II) using EViews 10 software.

Model Specification

Although remittance is the main variable of interest in the study, a few important control variables were added to explore its effects on private consumption in Nepal, i.e., gross domestic product (GDP) and consumer price index (CPI). So, the functional relation between dependent and explanatory variables is shown by the given functional equation as follows:

$$PVTC_t = f(REMI_t, GDP_t, CPI_t) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Converting the functional equation into linear form, it becomes as following:

$$PVTC_t = \beta_0 + \beta_1 REMI_t + \beta_2 GDP_t + \beta_3 CPI_t + \varepsilon_t \quad \ldots\ldots\ldots \quad (2)$$

Taking natural log in both sides of linear equation, it becomes the log - linear equation as follows:

$$\ln PVTC_t = \beta_0 + \beta_1 \ln REMI_t + \beta_2 \ln GDP_t + \beta_3 \ln CPI_t + \varepsilon_t \quad \ldots\ldots \quad (3)$$

Where, $PVTC_t$ = Domestic consumption expenditure of private sector as dependent variable,

$REMI_t$ = Remittance received in year 't' as core independent variable,

GDP_t = Gross domestic product at time period 't' as the first control variable,

CPI_t = Consumer price index at time period 't' as second control variables,

β_0 = Constant or intercept where the expected sign may be positive or negative.

β_1, β_2, and β_3 = Parameters to be estimated where the expected sign of parameters of β_1, and β_2 are positive expecting that private consumption increases due to increase in inflow of remittances and RGDP, but the expected sign of β_3 is negative expecting that private consumption increases due to decrease in CPI. and ε_t = Stochastic error term.

Hypothesis of the Study

Depending upon the given research question and objective of the study, the null and alternative hypotheses of this study are as follows:

Null Hypothesis (H_0): $\beta_0 = \beta_1 = \beta_2 = \beta_3 = 0$

i.e., REMI, GDP, and CPI have no significant effects on private consumption.

Alternative Hypothesis (H_1): $\beta_0 \neq \beta_1 \neq \beta_2 \neq \beta_3 \neq 0$

i.e., REMI, RGDP, and CPI have significant effects on private consumption.

Among the methods developed to investigate co-integration, Pesaran and Shin (1999) is used the ARDL bound test approach to identify the co-integration (Dahal, 2013). The general form of the ARDL model (Pesaran & Shin, 1999) is as follows:

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + \ldots + \beta_k Y_{t-p} + \alpha_0 X_t + \alpha_1 X_{t-1} + \alpha_2 X_{t-2} + \ldots + {}_q X_{t-q} + \varepsilon t \quad \ldots\ldots\ldots\ldots\ldots (4)$$

Where, Yt = Dependent variable at time period 't',
Y_{t-i} = Lagged values of Y,
β_i = Coefficients of lagged values of Y,
$X_{t-i.}$ = Lagged values of independent variable 'X',
α_I = Coefficients of lagged values of 'X',
εt = Error term.

Estimation of Auto Regressive Distributed Lag (ARDL) Model

This study employed the ARDL bounds testing model developed by Pesaran and Shin (1999), considered the latest time series data analysis model. The ARDL technique has several advantages over other techniques, such as Engle and Granger (1987) and Johansen (1991). Firstly, it can be applied regardless of the order of integration, either I (1) or I (0), or a combination of both. Secondly, it can be applied even in the case of a small data size, as other techniques require a large data size. Thirdly, it also allows the variables to have different lags, which is not applicable in other techniques. Moreover, the technique determines long-run and short-run relationships among the selected variables (Pesaran & Shin, 1999; Dahal, 2013; Lawal et al., 2016). To identify the co-integration among the selected variables as stated in equation (3), the ARDL framework is as outlined in equation (5), and the error correction model in equation (6) is as follows:

$$\Delta \ln PVTC_t = \alpha_0 + \sum_{i=1}^{p} a_{1i} \Delta \ln PVTC_{t-i} + \sum_{i=1}^{q} a_{2i} \Delta \ln REMI_{t-i} + \sum_{i=1}^{q} a_{3i} \Delta \ln GDP_{t-i} + \sum_{i=1}^{q} a_{4i} \Delta \ln CPI_{t-I} + \alpha_{11} \ln PVTC_{t-1} + \alpha_{12} \ln REMI_{t-1} + \alpha_{13} \ln GDP_{t-1} + \alpha_{14} \ln CPI_{t-1} + \varepsilon_{1t.} \quad \ldots\ldots\ldots (5)$$

Similarly, the corresponding Error Correction Model (ECM) is given as:

$$\Delta \ln PVTC_t = \alpha_0 + \sum_{i=1}^{p} a_{1i} \Delta \ln PVTC_{t-i} + \sum_{i=1}^{q} a_{2i} \Delta \ln REMI_{t-i} + \sum_{i=1}^{q} a_{3i} \Delta \ln GDP_{t-i} + \sum_{i=1}^{q} a_{4i} \Delta \ln CPI_{t-I} + \beta ECT_{t-1} + \varepsilon_{1t} \ldots (6)$$

Where, $a_{1i,}$ a_{2i}, $a_{3i,}$ and a_{4i} = Short run dynamic coefficients adjustments in long-run equilibrium,

$a_{11,}$ a_{12}, a_{13} and a_{14} = Long run coefficients

β = Speed of adjustment parameter with negative sign

ECT = Error correction term

Results and Discussion

Unit Root Test

This study attempts to explore the effect of remittance on private consumption in Nepal with the help of the ARDL model using time series data. The basic common problem of using time series data is the stationary or unit root problem in the series of data. Thus, the first step in applying the ARDL Approach is to identify whether the selected variables are stationary or not, i.e., order of integration. To apply the ARDL model, the variables used in the model should be stationary at I (0) and I(1), or a combination of both. However, none of the variables should be integrated at I (2) (Pesaran et al., 2001; Dahal, 2013; Shukla, 2020). The most popular unit root test is the Augmented Dickey-Fuller (ADF) test developed by Dickey-Fuller, which is the following equation (Dahal, 2013).

$$\Delta Y_t = \alpha + \beta_t + \lambda Y_{t-1} + \delta_1 \Delta Y_{t-1} + \ldots\ldots\ldots + \delta_p \Delta Y_{t-p} + \varepsilon_t \quad \ldots\ldots\ldots\ldots (5)$$

Where, Y = Time series variable,

α = Constant,

β = Coefficient on a time trend(t),

p = Lag order of the autoregressive process, and

ε_t = Pure white noise error term.

While calculating ADF unit root, hypothesis is tested as follows:

Null Hypothesis (H_0): Variables are not stationary i. e., they have unit roots.

Alternative Hypothesis (H_1): Variables are stationary i. e., they have no unit root.

Decision Making Criteria: Rejection of the Null Hypothesis implies that the variables are stationary.

Table 1: Result of ADF Test for Unit Root

Variables	Model	Level: I (0)		First Difference: I (1)	
		t-statistic	p-value	t-statistic	p-value
lnPVTC	Trend & Intercept	- 2.3232	0.4031	- 4.8771	0.0057
lnREMI	Trend & Intercept	- 0.9762	0.9237	- 3.6571	0.0515
lnGDP	Trend & Intercept	- 2.3482	0.3905	- 4.2652	0.0201
lnCPI	Trend & Intercept	- 2.2132	0.4563	- 5.6723	0.0013

Source: Author's estimation using EViews10.

Table 1 shows that all variables used in this study are stationary at first difference; I (1). Thus, ARDL model suits in the study (Pesaran, et al., 2001).

Descriptive Statistics

The summary statistics of selected variables of the study are given in Table 2.

Table 2: Descriptive Statistics

Particulars	ln PVTC	ln REMI	ln GDP	ln CPI
Mean	13.1166	11.7109	13.3586	5.2205
Median	13.0901	11.7852	13.3519	5.2183
Maximum	13.4835	12.4742	13.7866	5.8777
Minimum	12.7628	10.7401	12.9979	4.6052
Std. Dev.	0.2386	0.6401	0.2549	0.4402
Skewness	- 0.0026	-0.3351	0.1494	0.0461
Kurtosis	1.5426	1.5497	1.8222	1.5404
Jarque-Bera	1.7700	2.1271	1.2305	1.7825
Probability	0.4127	0.3452	0.5405	0.4101
Sum	262.3321	234.2192	267.1712	104.4103
Sum Sq. Dev.	1.0813	7.7856	1.2342	3.6812
Observations	20	20	20	20

Source: Author's estimation using E Views 10.

Table 2 shows the summary statistics of all selected dependent and independent variables. It includes the calculated mean, median, standard deviation, etc. All the variables are normally distributed as the p-value of the Jarque-Bera test is more than 5 percent.

Lag Length Selection

To estimate the ARDL model for the F-Bound Test and Long Forms and Error Correction models, lag length is required (Mamun & Kabir, 2023). The most popular lag operators researchers use include FPE, AIC, SC, and HQ. The optimal lag length is that it has the lowest values as calculated by each method (Pesaran & Shin, 1999; Pesaran et al., 2001). The calculation of the appropriate lag length for this study is presented in Table 3 based on AIC criteria.

Table 3: Lag Length Criteria

Lag	Log L	LR	FPE	AIC	SC	HQ
0	80.3591	NA	2.43e-09	- 8.4843	- 8.2865	- 8.4571
1	174.4025	135.8406*	4.42e-13*	- 17.1558*	- 16.16654*	- 17.0194*
2	183.4222	9.0196	1.34e-12	- 16.3802	- 14.5995	- 16.1347

Source: Author's estimation by using EViews 10.
Note: * = Optimum Lag Length.

ARDL Model Estimation

The first step of the ARDL bounds test for co-integration, estimation of long-run coefficients, and error correction model is the estimation of the ARDL model based on lag length criteria. The Auto Regressive Distributed Lag (ARDL: 1, 0, 0, 0) model is selected based on AIC, SC, and HQ criteria as estimated in Table 3. This study used time series data for 20 observations of the 20 years. So, the maximum lag order is 1 (Pesaran et al., 2001). Table 4 shows the empirical findings of the ARDL Model based on AIC criteria as presented in Table 3. Based on the ARDL Model, bounds test and long-run coefficients are estimated.

Table 4: Empirical Result of ARDL Model

Dependent Variable: ln PVTC			Method: ARDL (1,0,0,0)	
Variables	**Coefficients**	**Std. Error**	**t-Statistic**	**Prob.**
lnPVTC (-1)	0.5685	0.1566	3.6291	0.0025
lnREMI	0.0938	0.0455	2.0626	0.0569
lnCPI	- 0.1242	0.0577	- 2.1541	0.0479
lnGDP	0.3917	0.1535	2.5517	0.0221
R-squared	0.9882	Mean dependent var		13.1352
Adjusted R-squared	0.9858	S. D. dependent var		0.2297
S. E. of regression	0.0274	Akaike info criterion		- 4.1736
Sum squared resid	0.0112	Schwarz criterion		– 3.9748
Log likelihood	43.6496	Hannan -Quinn criterion		–4.1399
Durbin-Watson Stat	2.0922	-		-

Source: Author's estimation using EViews 10.

ARDL Bounds Test for Cointegration and Error Correction Model

Bound tests for cointegration are carried out to identify the relationship between dependent and independent variables. It is an econometric tool used to identify whether a long-run relationship exists between the dependent and independent variables used in a study or a short-run relationship between them. According to Pesaran et al. (2001), the ARDL bound test is based on Joint F – Statistics. It is tested under the null hypothesis (H0), i.e., there is no cointegration

among the variables used in the model against the alternative hypothesis (H1), i.e., there is cointegration using lower bound I (0) and upper bound I (1). Table 5 shows the empirical result of bound tests for cointegration.

Table 5: Results of ARDL F- Bound Test for Cointegration and Long-Run

Test Statistic	Value	Significance	I (0)	I (1)
F-statistic	11.6730	10%	2.01	3.1
K	3	5%	2.45	3.63
-	-	2.5%	2.87	4.16
-	-	1%	3.42	4.84

Source: Author's estimation using EViews 10.

Table 5 shows the ARDL bound test results for cointegration. The F-statistic for the bound test is 11.6730, which is greater than the lower bound value of 3.42 and upper bound of 4.84 at a 1 percent level of significance. Thus, the empirical results justify that there is a long-run relationship between private consumption (PVTC) and remittance (REMI), gross domestic product (GDP), and consumer price index (CPI) of Nepal.

Estimation of Long-Run Coefficients

Having gone through the cointegration of variables for the long run, the next step in the ARDL model is to estimate the long-run coefficients. Equation (2) is the long-run model of this study. To estimate the long-run ARDL model, the appropriate lag length is calculated according to AIC criteria. The appropriate lag length for the model is ARDL (1,0,0,0), as presented in Table 3. Table 6 presents the estimated long-run coefficients using the ARDL model.

Table 6: Long-Run Coefficients Using ARDL (1,0,0,0) Model Based on AIC

Dependent Variable: LNPVTC:		Model Selected: ARDL (1,0,0,0) based on AIC.		
Variables	**Coefficients**	**Std. Error**	**t-statistic**	**Prob.**
lnREMI	0.2177	0.1201	1.8093	0.0905
lnGDP	0.9076	0.0525	17.2964	0.0000
lnCPI	- 0.2878	0.1473	- 1.9543	0.0696

Source: Author's estimation by using E Views 10.

Table 6 presents the estimated long-run coefficients using the ARDL model. The relationship of lnREMI and lnGDP with lnPVTC are positive and statistically significant at 10 percent and 1 percent levels respectively. However, lnCPI is negative and statistically significant with lnPVTC.

When remittance inflow increases by 1 percent, it leads to a 0.22 percent increase in private consumption in the long run. Likewise, 1 percent increase in GDP leads to a 0.91 percent increase in private consumption. Similarly, a 1 percent increase in CPI reduces private consumption by 0.29 percent. The

results of this study is consistent with the results of several other studies like- Qamruzzaman and Jianguo (2020); Adhikari (2020); Ramcharran (2019); Aslam and Sivarajasingham (2020); Yousafza (2015); Makina (2022); Synder and Chern (2009); Anjum et al. (2011); Quisumbing and McNiven (2007); Javid (2017); and Neupane (2010)).

Error Correction Model

The empirical finding of the error correction model is presented in Table 7. The coefficient of the cointegration equation is negative (- 0.4315), and the probability is significant. It indicates a long-run equilibrium relationship between the variables selected in this study.

Table 7: ARDL Error Correction Regression

ECM Regression:			**Case 1:** No Constant and No Trend	
Variables	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Coint Eqⁿ (-1) *	- 0.4315	0.0576	- 7.4853	0.0000

Source: Author's estimation using EViews 10.

The negative coefficient of error correction model (- 0.43) shows that our model is theoretically correct, and probability shows that it is statistically significant. The absolute value of the coefficient of ECM indicates the speed of adjustment towards long-run equilibrium through several short-run adjustments. The model tends toward equilibrium by the speed of adjustment of around 43 percent per year.

Residual Diagnostics

Once the empirical model is estimated, residual diagnostic tests are applied to evaluate the model residuals and test the model adequacy. For the same, serial correlation (LM Test), Heteroscedasticity, and Normality tests are conducted, and their results are presented in Table 8, Table 9, and Figure 6.

Table 8: Breusch-Godfrey Serial Correlation (LM Test)

F-statistic	0.0552	Prob. F (2,13)	0.9465
R-squared	0.1599	Prob. Chi-Square (2)	0.9232

Source: Calculated by the Author using EViews 10.

The serial correlation problem in the data is examined through the Breusch-Godfrey Serial Correlation (LM Test). Table 8 shows that there is no serial correlation in the data set studied because the calculated p-value of the F-statistic is more than 10 percent.

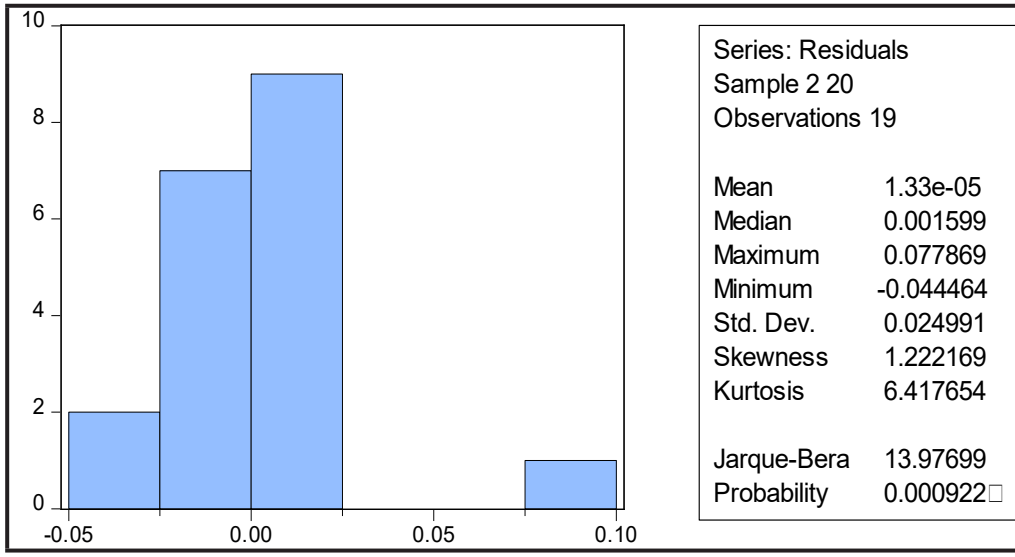
Table 9: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.0869	Prob. F (4,14)	0.1369
R-squared	7.0971	Prob. Chi-Square (4)	0.1308
Scaled explained SS	11.9881	Prob. Chi-Square (4)	0.0174

Source: Author's estimation using EViews 10.

The Breusch-Pagan-Godfrey test is applied to examine the heteroskedasticity problem in the model. The empirical result is presented in Table 9. It indicates that there is no problem of heteroskedasticity in the model studied since the calculated p-value of the F-statistic is greater than 10 percent.

Figure 6: Normality Test



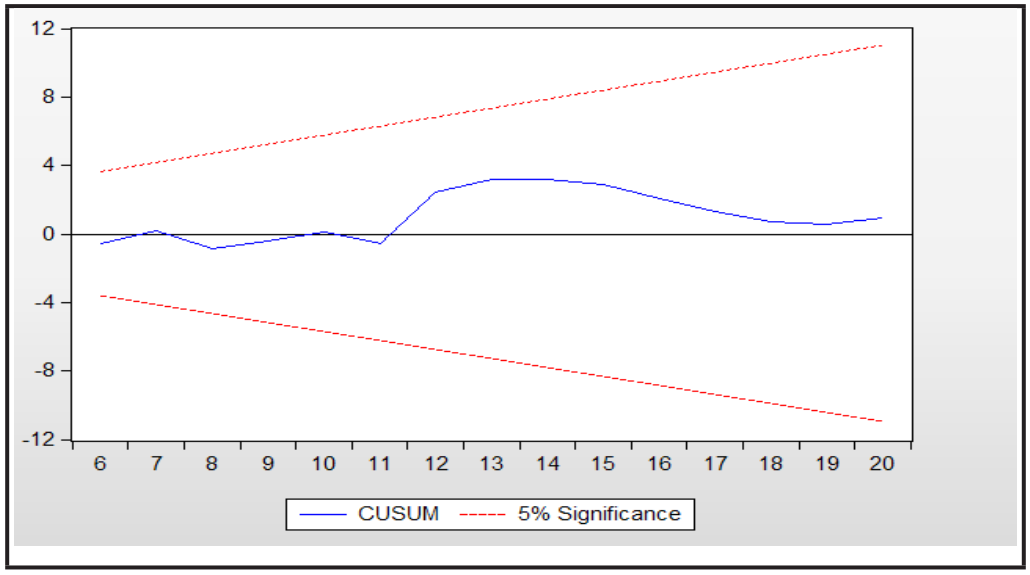
Source: Calculated by the Author using E Views 10.

Figure 6 shows the normality test of the set of data under study. The probability of 'J-B test' is less than 10 percent. It shows that data are not normal. So, the study could assume that there is no way to convert such data into normal.

Stability Diagnostics

The stability test for the private consumption model has been applied to investigate the stability of the long-run and short-run parameters. For this purpose, cumulative sum (CUSUM) and cumulative sum of squares (CUSUM SQ) tests are employed. It verifies the stability of the ARDL model for the structural break. Two red straight lines represent critical bounds at a 5 percent significance level. If the plot of CUSUM statistics lies within the critical bounds of 5 percent, the model is stable. The plot of CUSUM is between the critical boundaries at a 5 percent significance level. It justifies that the model of the study is stable. The results of the CUSUM test are shown in Figure 7.

Figure 7: Plot of Cumulative Sum (CUSUM) of Recursive Residuals



Source: Author's estimation by using EViews 10.

Conclusion

Based on the findings of the regression analysis by employing the Autoregressive Distributed Lag (ARDL) Model with time series data for 20 years spanning 2001 – 2020, several conclusions can be drawn regarding the relationship between private consumption expenditure (PVTC) with remittance inflows (REMT), gross domestic product (DGP), and consumer price index (CPI). This analysis reveals that remittance inflow and gross domestic product (GDP) show positive associations with private consumption expenditure (PVTC), which is statistically significant. This suggests that an increase in remittances from Nepalese workers abroad and improvements in domestic economic performance contribute to higher levels of consumer spending within the country. Conversely, the consumer price index (CPI) shows a negative relationship with consumption expenditure, which is statistically significant. This indicates that a rising inflationary level will tend to shrink consumer spending in Nepal.

These findings highlight the importance of remittances and economic growth in driving private consumption dynamics in Nepal while also highlighting the adverse impact of inflation on consumer behavior. As such, policymakers should prioritize measures to foster remittance inflow, promote sustainable economic growth, and effectively manage inflation to support healthy consumption patterns and overall economic development. Our study has added new knowledge and literature in the field of remittance-private consumption interconnection in Nepal. It has added a new empirical finding, and thus, new knowledge in the

field of academia, and justified that remittance supports significantly for private consumption.

Hence, this study provides valuable insights into the factors influencing consumption expenditure in Nepal and underscores the significance of targeted policy interventions to utilize the positive effects of remittances and GDP while addressing inflationary pressures. By implementing well-thought-out policies that strengthen remittance channels, stimulate economic activities, and safeguard against inflationary risks, policymakers can contribute to sustainable consumption-led growth and improved welfare outcomes for Nepalese households.

Future Prospect of Research

The study used the time series data only for 20 years, spanning from 2001 to 2020, due to the unavailability of sector-wise breakdown data of GDP before 2000. As the study is based on a single equation model, future research could explore the dynamic effects of remittance inflow, GDP, and CPI on private consumption expenditure using more advanced time series models, such as Vector Autoregression Model (VARM) or Vector Error Correction Models (VECM). This could provide insights into these variables' short-term and long-term dynamics and their implications for consumption behavior in Nepal. Likewise, additional research shall be directed toward exploring the effects of remittance inflow on the savings and investment behavior of remittance-receiving households in Nepal.

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Appendix – I: Time Series Data of the Variables Used in the Study

Years	PVTC	REMI	Real GDP	CPI Inflation
2001	348989	47216.1	441518	2.4
2002	360947	47536.3	442049	2.9
2003	371421	54203.3	459488	4.7
2004	374057	58587.6	481004	4.0
2005	392219	65541.2	497739	4.5
2006	413217	97688.5	514486	8.0
2007	425419	100144.8	532038	5.9
2008	430763	142682.7	564517	6.7
2009	455469	209698.5	590107	12.6
2010	491176	231725.3	618529	9.6
2011	1297998	253551.6	639694	9.6
2012	1336938	359554.4	670279	8.3
2013	1372459	434581.7	697954	9.9
2014	1413613	543294.1	739754	9.1
2015	1449769	617278.8	764336	7.2
2016	1511106	665064.0	768853	9.9
2017	1521254	695452.0	832060	4.5
2018	1615490	775068.6	887817	4.2
2019	1744320	879367.0	949886	4.6
2020	1806374	875027.0	971500	6.2

Source: NRB, 2021; NSO, 2021

Appendix – II: Log Data of the Variables Used in the Study

Years	ln PVTC	ln REMI	ln GDP	ln CPI
2001	12.7628	10.7624	12.9980	4.6051
2002	12.7965	10.7401	12.9992	4.6353
2003	12.8251	10.8254	13.0379	4.6802
2004	12.8322	10.8641	13.0836	4.7193
2005	12.8796	10.9317	13.1178	4.7639
2006	12.9317	11.2536	13.1509	4.8411
2007	12.9608	11.2227	13.1845	4.8968
2008	12.9733	11.5106	13.2437	4.9629
2009	13.0291	11.7771	13.2881	5.0815
2010	13.0877	11.7860	13.3351	5.1724
2011	13.0924	11.7844	13.3687	5.2641
2012	13.2415	12.0548	13.4154	5.3430
2013	13.2697	12.1499	13.4559	5.4373
2014	13.3097	12.2859	13.5141	5.5246
2015	13.3379	12.3442	13.5468	5.5940
2016	13.3317	12.3244	13.5526	5.6884
2017	13.3560	12.3254	13.6317	5.7320
2018	13.3887	12.3928	13.6965	5.7730
2019	13.4423	12.4742	13.7641	5.8179
2020	13.4835	12.4095	13.7866	5.8777

Source: Calculated by the author.