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**ADBI Working Paper Series** 

## REMITTANCES AND ECONOMIC GROWTH: THE ROLE OF FINANCIAL DEVELOPMENT IN NEPAL

Pradeep Panthi and Jeevanath Devkota

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## **Asian Development Bank Institute**

Pradeep Panthi is a Consultant-Economist at the Asian Development Bank Institute, Tokyo, Japan. Jeevanath Devkota is a Lecturer at the Japan College of Social Work, Tokyo, Japan.

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Please contact the authors for information about this paper.

Email: ppanthi@adbi.org

Asian Development Bank Institute Kasumigaseki Building, 8th Floor 3-2-5 Kasumigaseki, Chiyoda-ku Tokyo 100-6008, Japan

Tel: +81-3-3593-5500 Fax: +81-3-3593-5571 URL: www.adbi.org E-mail: info@adbi.org

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#### Abstract

How remittances contribute to the economies of remittance-receiving developing countries is a global issue. Considering Nepal as a highly remittance-receiving country, this paper primarily examines the impact of remittances on economic growth using annual time series data from 1980 to 2021. The study further investigates whether financial development intermediates the effects of remittances on economic growth. The bound test approach of cointegration and the error correction model (ECM) under the autoregressive distributed lag (ARDL) model is employed as the estimation technique. Our findings reveal that remittances and financial development significantly and positively enhance the economic growth of Nepal despite remittances mainly being used for primary consumption. Additionally, the one-year lagged interaction term between remittances and financial development is negative and marginally significant, suggesting that the positive impact of remittances on real GDP per capita decreases as financial development increases. It indicates a diminishing marginal return of remittances in more financially developed contexts. Therefore, policymakers must promote a careful synergy between remittances and financial development to maximize their beneficial impact on economic growth.

Keywords: remittances, financial development, economic growth, ARDL

JEL Classification: C22, E51, F24, O43

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## 1. INTRODUCTION

In recent decades, remittance inflows, hereafter referred to as "remittances," have been considered a crucial external source of finance for developing countries. Cross-border employment, globalization, migrants, and their family members are critical to achieving various sustainable development goals (SDGs). According to the United Nations (UN), eight SDGs are related to safe migration and remittances. They are: i) no poverty, ii) zero hunger, iii) good health and well-being, iv) quality education, v) clean water and sanitation, vi) decent work and economic growth, vii) industry, innovation, and infrastructure, and viii) reduced inequalities. Though remittances bring several challenges, such as trade deficit, labor shortages, and potential threats to export competitiveness due to the slow-performing manufacturing sector, it is considered a resilient catalyst for economic development for developing economies (Ratha et al. 2016). Despite the rapid trend in trade and investment integration, stable capital flows such as foreign direct investments (FDIs) and portfolio investments are inconsistent and stagnated after the global financial crises of 2007-2008. Besides, international capital does not flow easily from high-income to low-income countries (Lucas 1990). Therefore, the significance of migrants' remittances to the socio-economic development of low- and middle-income economies has increased in recent decades as it suppressed the level of net official development assistance and official aid by almost 2.3 times as of 2021.

The impact of remittances on socio-economic development and their transmission mechanism is widely discussed in recent literature (Brown, Carmignani, and Fayad 2013; Cazachevici, Havranek, and Horvath 2020; Chitambara 2019; Hassan and Holmes 2013; Jansen, Vacaflores, and Naufal 2012; Williams 2017). Despite the diverse importance of remittances for low- and middle-income countries, existing research does not have a clear consensus on the effects of remittances on economic growth (Cazachevici, Havranek, and Horvath 2020). For example, a study shows that remittances have poverty-alleviating and consumption-smoothing effects but do not positively impact long-term economic growth (Barajas et al. 2009). While some studies note negative and insignificant impacts in certain regions, most emphasize the positive contribution of remittances to economic growth and poverty reduction globally (Sutradhar 2020). For example, in Africa, remittances offer an alternative means to finance investments, contributing positively to economic growth (Fayissa and Nsiah 2010). Similarly, in some Balkan countries, remittances to GDP ratio (Meyer and Shera, 2017).

Some studies have examined the various channels of remittances on economic growth. For example, remittances are likely to support long-term growth in countries with better institutions and financial development (Catrinescu et al. 2009). On the other hand, remittances themselves promote financial development (see, for example: Aggarwal, Demirgüc-Kunt, and Pería 2011; Ambrosius and Cuecuecha 2016; Ben Naceur, Chami, and Trabelsi 2020; Brown, Carmignani, and Fayad 2013; Donou-Adonsou Pradhan, and Basnet 2020; Basnet et al. 2021Fromentin 2017; Jongwanich and Kohpaiboon 2019). Remittances positively correlate with financial development, notably in bank deposits and credit ratios to GDP, persistently supporting economic activities (Aggarwal, Demirgüç-Kunt, and Pería 2011; Demirgüç-Kunt et al. 2011). The complementary and supplementary effects of financial development to enhance the long-run economic growth of remittances are also critically examined by various studies (see, for example: Masuduzzaman 2014; Mohamed and Sidiropoulos 2010; Mundaca 2009; Sobiech 2019). For example, Chami, Fullenkamp, and Jahjah (2005) found that migrants' remittances can sustainably contribute to development capital. Their results highlight the pivotal role of financial institutions in efficiently allocating remittances. However, some studies focus on the stages or thresholds of financial development in the relationship between remittances and economic growth. For example, remittances significantly boost economic growth in nations characterized by underdeveloped financial systems by providing an alternative source for investment financing and overcoming liquidity constraints (Giuliano and Ruiz-Arranz 2009).

Seminal works on financial development indicate that countries having well-functional financial sectors can achieve long-term economic growth (see, for example: King and Levine 1993; Levine 1997; Levine, Loayza, and Beck 2000; Rajan and Zingales 1998). Furthermore, financial intermediations are a critical mechanism for achieving economic growth through total factor productivity growth, physical capital accumulation, and savings (Beck, Levine, Loayza 2000). Therefore, in this study, we argue that the economic growth effects of remittances may depend on the level of financial development, particularly in countries highly reliant on remittances and have undergone various financial reforms. Remittances serve as a vital external source of finance that strengthens domestic demand through stabilized consumption. When paired with a robust domestic financial sector, these remittances can be effectively channeled into productive investments, including human capital, physical capital, and savings. This synergy not only enhances economic stability but also drives sustainable economic growth.

Nepal, recently elevated to a lower-middle-income country, has been experiencing an extreme economic shift from a "subsistence-based agricultural economy" to a "remittance-driven consumption economy" (Panthi and Devkota 2023). Being one of the largest remittance-receiving economies with regard to the size of GDP, Nepal is significantly benefiting in terms of livelihoods, financial and social capital, and supporting health and education sectors through migrants' remittances (Acharya and Leon-Gonzalez 2012; Sapkota 2013; Wagle 2012). Remittances shape economic activities in developing countries like Nepal, with positive and negative impacts on its growth. A few studies note a contradictory relationship between remittances and the economic growth of Nepal (Dhungel 2019; Uprety 2017). However, most studies confirm a positive influence on economic growth, highlighting remittances' significance on stabilized consumption and aggregate demand (Panthi and Devkota 2023; Singh and Pradhan 2023).

Nepal has substantially progressed in financial development, particularly in financial institutions, especially after the financial liberalization of the mid-1990s. Several studies have documented that financial sector development has demonstrated a positive impact on the economic growth of Nepal (Bist and Bista 2018; Chettri 2022). However, there is a gap in understanding how financial development intermediates the impact of remittances on economic growth in Nepal. In this study, we argue that remittances impact economic growth through the channel of disposable income-stabilized consumption-aggregate demand. Additionally, as remittances ease liquidity constraints (Rapoport and Docquier 2006), a well-developed financial sector can channel funds into productive investments, fostering economic growth through investment expenditure.

Nepal's industrial sector has weakened due to conflict and political instability, while agriculture suffers from low productivity. Insufficient foreign investment has also hindered economic growth. In this context, we believe that remittances have been a key driver behind the significant expansion of Nepal's service sector over the past two decades.

Using annual time series data from 1980 to 2021 under the bound test approach of the cointegration and error correction model (ECM) under the autoregressive distributed lag (ARDL) model, we conclude that remittances and financial development are independently significant and positive in enhancing the economic growth of Nepal. We

further confirm that the joint effect of remittances and financial development negatively affects economic growth, emphasizing the need for policymakers to cultivate a careful synergy between them.

The subsequent sections of the study are structured as follows: Section 2 provides an overview of relevant literature; Section 3 explains the data, methodology, and model specification; Section 4 presents the results and discussions; Section 5 entails the robustness and stability test; and Section 6 concludes the paper by presenting policy implications based on the findings.

## 2. LITERATURE REVIEW

In this section, we first discuss some of the implications of remittances for developing economies in terms of their merit and demerits. Following that, we highlight the consequences of remittances with regard to economic growth and explain how financial intermediation can shape this relationship.

Extensive literature highlights the significance of remittances for economic development and poverty reduction (Cazachevici, Havranek, and Horvath 2020; Sobiech 2019). However, remittances bring several "boon or bane" effects in remittance-receiving developing economies (Sapkota 2013). For example, remittances minimize the depth and severity of poverty (Adams and Page 2005), increase disposable income, and improve credit constraints of migrants' families (Giuliano and Ruiz-Arranz 2009), stabilize aggregate output through increased demand and consumption (Chami, Hakura, and Montiel 2009), promote human capital through investment in health and education (Azizi 2018), increase foreign exchange reserve and create countercyclical effects on macroeconomic stability (Singer 2010), promote entrepreneurship transferring technical skills, knowledge, and seed capital (Kakhkharov 2019; Woodruff and Zenteno 2007), enhance economic growth through capital formation if they transmit through saving and investment activities (Lartey 2013), and mitigate poverty and contribute to financial development (Gupta, Pattillo, and Wagh 2009). They may also alleviate credit constraints and stimulate investment (Rapoport and Docquier 2006).

However, studies also confirm that remittances may increase the consumption of imported goods and trade deficits (Bhatta 2013), deteriorate innovations, and cause brain drain (Beine, Docquier, and Rapoport 2001, 2008; Özden and Schiff 2006), resulting in exchange rate appreciation (Amuedo-Dorantes and Pozo 2004), a shortage of skilled labor, a rise in wage rate and cost of production, and diminished export competitiveness (Woodruff and Zenteno 2007). Outward migration may result in a shortage of skilled labor, raising wage rates, and potentially diminishing export competitiveness and long-term economic growth (Barajas et al. 2009; Chami, Fullenkamp, and Jahjah 2005; Rao and Hassan 2011; Ratha, Eigen-Zucchi, and Plaza 2016).

Concerning the impact of remittances on economic growth, a wide range of literature suggests a negative or insignificant relationship between remittances and economic growth (see, for example: Barajas et al. 2009; Chami, Fullenkamp, and Jahjah 2005; Rao and Hassan 2011). However, when channeled through financial institutions, remittances may contribute to savings and improve domestic investment, fueling economic growth through increased aggregate demand (Adams and Page 2005). Household investments in health and education may also play a crucial role in contributing to long-term economic growth (Acosta et al. 2008; Koechlin and Leon 2007).

The impact of remittances on economic growth can be reflected through multiple channels, such as savings, investments, entrepreneurship, institutions, human capital, and financial development (Rao and Hassan 2011; Senbeta 2013; Sobiech 2019; Ziesemer 2009). Remittances go directly to the migrant's family, and if used for health and education, they can foster economic growth through physical and human capital channels. Human capital is crucial for channeling international capital inflows such as foreign direct investment (FDI) in economic development activities (Lucas 1990). Returnee migrants can bring technical knowledge and seed capital, leading to social and entrepreneurship skills (Adams and Page 2005; Devkota 2016). Remittances also contribute to financial development and foster financial liquidity through banking channels (Aggarwal, Demirgüc-Kunt, and Pería 2011). They serve as vital funding to bridge financing gaps and support development goals, especially in countries facing financial challenges. In countries with weak credit markets, remittances can straighten investment in small and medium-sized enterprises (Amuedo-Dorantes and Pozo 2006). Remittances increase disposable income, fostering consumption during low domestic aggregate demand periods, especially during shocks (Yang and Choi 2007).

Despite this, remittances may also dampen economic growth through various channels. Financial intermediation may catalyze leisure consumption and imports, weakening economic growth in high remittance-receiving economies. Remittances can cause Dutch disease by reducing labor supply and increasing consumption demand biased towards nontradable sectors in developing countries (Acosta, Lartey, and Mandelman 2009). Excessive remittances can improve household welfare by smoothing income and increasing consumption at leisure levels, leading to the appreciation of the real exchange rate (Amuedo-Dorantes and Pozo 2004; Hassan and Holmes 2013; Lartey, Mandelman, and Acosta 2012; Singer 2010). Some studies claim that remittances lead to excessive consumption and investment in unproductive sectors, dampening long-term economic growth (Chowdhury, Dhar, and Gazi 2023).

Some endogenous growth approaches highlight remittances' potential to enhance total factor productivity facilitated by financial development, among others, in remittancereceiving economies. A well-functioning financial sector is crucial for absorbing and disseminating technology and fostering economic growth (Beck, Levine, and Loayza 2000). The financial sector's depth, size, access, and efficiency are essential for effectively utilizing remittances in productive sectors of receiving economies. Most migrants or recipients save funds in financial institutions, contributing to gross national savings (Rapoport and Docquier 2006). The savings channels of remittances may help expand the depth and access of the financial sector of receiving economies. Through financial intermediation, these savings are mobilized for domestic investment (Adams and Page 2005). The intermediation role of the financial sector facilitates the utilization of remittances for economic activities (Aggarwal, Demirgüç-Kunt, and Pería 2011; Mundaca 2009; Sobjech 2019). Financial development in remittance-receiving countries plays a direct role in facilitating the impact of remittances. A well-functioning financial sector is crucial for effectively absorbing and disseminating technology from external sources of finance, thereby promoting economic growth (Beck, Levine, and Loayza 2000; Levine, Loayza, and Beck 2000). However, the financial sector and its interaction with economic growth may exhibit nonlinear effects (Barajas et al. 2009; Rioja and Valev 2004). The pattern of utilizing remittance income varies across economies, determining the diverse impact of remittances on long-term economic growth. Variances in consumption and investment of remittance-receiving economies explain the heterogeneity of the remittance–output relationship (Francois et al. 2022).

As a recently uplifted lower-middle-income economy, Nepal has transformed from an "agriculture-based subsistence economy" to a "remittance-based consumption economy" in the last few decades. Remittances are a crucial financial source, enhancing household income, stabilizing consumption, and mitigating poverty in Nepal. Additionally, remittances improve livelihoods, enhance financial and social capital, and support health and education (Acharya and Leon-Gonzalez 2012; Sapkota 2013; Wagle 2012). Various studies explore their role in poverty reduction, improved living standards, education access, and household income stability (see, for example: Devkota 2014; Pant 2011; Thieme and Wyss 2005). Remittances maintain macroeconomic stability, supporting gross national savings and foreign exchange reserves in Nepal (Pant 2004; Sapkota 2013). Remittances foster entrepreneurship and the development of small and medium enterprises (SMEs) and create job opportunities at the community level in Nepal (Dahal 2014). Despite their positive impact on various socio-economic dimensions, remittances have led to a labor shortage in the agriculture sector, increased imports, and a trade deficit in Nepal, requiring careful policy considerations (Bhatta 2013; Sapkota 2013). Therefore, redirecting remittance income into productive investments is crucial for sustained economic growth, as Nepal aspires to be a middle-income country by 2030 (Cosic, Dahal, and Kitzmuller 2017). Hence, examining the economic growth impacts of remittances and examining the intermediation role of financial development is essential for setting synergy on policies related to the utilization of remittances through financial intermediaries for developing countries like Nepal.

# 3. DATA, METHODOLOGY, AND MODEL SPECIFICATION

## 3.1 Data

This study uses annual time series data from 1980 to 2021. Data are obtained from the World Bank's World Development Indicators (WDIs) and the financial development database of the International Monetary Fund (IMF) developed by Svirydzenka (2016). Nepal's remittance data are available only after 1993 in WDIs. Therefore, remittance data from 1980 to 1992 is sourced from the data set created by Giuliano and Ruiz-Arranz (2009) and carefully combined with data from the WDIs. We measure economic growth using the real GDP per capita (GDPPC) in constant 2015 US dollars. Remittances (REM) is the key explanatory variable in this study, which is measured as the inward personal remittances percentage to GDP. Financial development (FD) is another critical explanatory variable, measured as a unified index of the depth, access, and efficiency of both financial institutions and the market. Gross domestic savings (GDS), trade (TRD) as the sum of imports and exports of goods and services, and general government final consumption expenditure (GOV) as size of government are used as standard control variables. These control variables are measured in the percentage of GDP. Finally, annual percentage change of GDP deflator as inflation (INF) is also used to account for price distortion effects on economic growth. We believe that these variables represent the Nepalese economy's financial sector, real sector, and public sector. The list of

selected variables, their indication short definition, and sources are reported in Appendix 1.

## 3.2 Methodology and Model Specifications

This study primarily explores how remittances influence economic growth, focusing on the intermediary role of financial development using dynamic regression models. The study utilizes the bound test approach within the autoregressive distributed lag (ARDL) framework as outlined by Pesaran and Shin (1998) and Pesaran, Shin, and Smith (2001) to validate the cointegration and long-term relationship. Short-term causality and the speed of adjustment towards long-term equilibrium are assessed through the error correction model (ECM) under the ARDL framework, with the significance and sign of the one-period lagged error correction term providing confirmation. The ARDL model, a standard tool in time series analysis, examines the relationship between a dependent variable and its explanatory variables by incorporating the regressors' current and lagged values. This model, a specialized form of ordinary least squares (OLS) regression, is suitable for analyzing time series data, regardless of whether the variables are stationary or nonstationary. It employs an F-test to identify the presence of long-run cointegration. It also provides a short-term dynamic error correction form, facilitating the return to longrun equilibrium via a simple linear transformation (Shrestha and Bhatta 2018). The ARDL estimation models are represented in Equations (1) and (2). The primary model hypothesizes that economic growth is driven by remittances, with real GDP per capita as the dependent variable in Equation 1. In contrast, remittances as a percentage of GDP, financial development, and other control variables act as the explanatory variables.

$$\Delta \ln GDPPC_{t} = \alpha + \sum_{i=1}^{p} \lambda_{1i} \Delta \ln GDPPC_{t-i} + \sum_{j=0}^{q} \lambda_{2j} \Delta REM_{t-j} + \sum_{k=0}^{r} \lambda_{3k} \Delta FD_{t-k} +$$

$$\sum_{l=0}^{S} \lambda_{4l} \Delta GDS_{t-l} + \sum_{m=0}^{t} \lambda_{5m} \Delta TRD_{t-m} + \sum_{n=0}^{u} \lambda_{6n} \Delta GOV_{t-n} +$$

$$\sum_{o=0}^{v} \lambda_{7o} \Delta INF_{t-o} + \delta_{1} \ln GDPPC_{t-1} + \delta_{2} REM_{t-1} + \delta_{3} FD_{t-1} +$$

$$\delta_{4} GDS_{t-1} + \delta_{5} TRD_{t-1} + \delta_{6} GOV_{t-1} + \delta_{7} INF_{t-1} + \varepsilon_{t}$$

$$(1)$$

The endogenous estimation model assumes that the interaction between remittances and financial development influences economic growth. In Equation (2), economic growth is the dependent variable. In contrast, the explanatory variables include remittances, financial development, their interaction term, and additional control variables.

$$\Delta \ln GDPPC_{t} = \alpha + \sum_{i=1}^{p} \lambda_{1i} \Delta \ln GDPPC_{t-i} + \sum_{j=0}^{q} \lambda_{2j} \Delta REM_{t-j} + \sum_{k=0}^{r} \lambda_{3k} \Delta FD_{t-K} + \sum_{l=0}^{s} \lambda_{4l} \Delta (REM \times FD)_{t-l} + \sum_{m=0}^{t} \lambda_{5m} \Delta GDS_{t-m} + \sum_{n=0}^{u} \lambda_{6n} \Delta TRD_{t-n} + \sum_{o=0}^{v} \lambda_{7o} \Delta GOV_{t-o} + \sum_{p=0}^{w} \lambda_{8p} \Delta INF_{t-p} + \delta_{1} \ln GDPPC_{t-1} + \delta_{2} REM_{t-1} + \delta_{3} FD_{t-1} + \delta_{4} (REM \times FD)_{t-1} + \delta_{5} GDS_{t-1} + \delta_{6} TRD_{t-1} + \delta_{7} GOV_{t-1} + \delta_{8} INF_{t-1} + \varepsilon_{t}$$

$$(2)$$

Here,  $\Delta$  denotes the first difference of the variable, InGDPPC stands for the natural logarithm of real GDP per capita, REM represents remittances, and FD serves as the proxy for financial development. The other control variables are GDS, TRD, GOV, and INF. The parameters  $\lambda_{1-}\lambda_{8}$  and  $\delta_{1}-\delta_{8}$  denote the short-run and long-run coefficients, respectively. The letters p, q, r, s, t, u, v, and w represent the optimum number of lags selected automatically based on the Schwarz information criterion (SIC). The maximum lag length for the chosen variables is identified using the standard vector autoregression (VAR) method, with the findings detailed in Appendix 2. Given the nature of key variables, we applied the SIC criteria to determine the optimal lag selection for the ARDL model. We set the maximum lag length to 1 based on the lag length selection criteria result under VAR. Equations (1) and (2) under the ARDL specification are deterministic, incorporating a restricted constant and excluding a trend. The presence of a long-term relationship or cointegration is determined using the ARDL bound test approach, involving an F-test for the joint significance of the coefficients of the lagged variables. The Wald coefficient restriction test is conducted to assess the joint effect of the selected variables. The null hypothesis for no level effect is:

$$H_0: \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = \delta_7 = \delta_8 = 0$$

We determine the joint significance of the regressor coefficients in the long-run cointegration by comparing the F-statistic to the upper-bound critical value. If the calculated F-statistic exceeds the upper-bound critical values of I (1) at a certain confidence level, the null hypothesis of no cointegration will be rejected. Conversely, if the calculated F-statistic falls below the lower bound values I (0), the null hypothesis will not be rejected. Finally, the cointegration judgment becomes inconclusive if the calculated F-statistic falls within the lower- and upper-bound critical values. After confirming the cointegrating relationship between the dependent variable and independent regressors, their level relationship is estimated using Equations (1) and (2).

If cointegration is present between two variables, there may be at least one direction of causality or even bidirectional causality (Engle and Granger 1987). Consequently, we use the ECM to verify further the causality between remittances, financial development, and economic growth. As a result, the ARDL estimation Equations (1) and (2) are expressed as ECM equations to explore the short-run relationship.

$$\begin{split} \Delta \ln GDPPC_{t} &= \alpha + \sum_{i=1}^{p} \lambda_{1i} \Delta \ln GDPPC_{t-i} + \sum_{j=0}^{q} \lambda_{2j} \Delta REM_{t-j} + \sum_{k=0}^{r} \lambda_{3k} \Delta FD_{t-k} + \\ &= \sum_{l=0}^{s} \lambda_{4l} \Delta GDS_{t-l} + \sum_{m=0}^{t} \lambda_{5m} \Delta TRD_{t-m} + \sum_{n=0}^{u} \lambda_{6n} \Delta GOV_{t-n} + \\ &= \sum_{o=0}^{v} \lambda_{7o} \Delta INF_{t-o} + \varphi ECT_{t-1} + \varepsilon_{t} \end{split}$$

$$\Delta \ln GDPPC_{t} &= \alpha + \sum_{i=1}^{p} \lambda_{1i} \Delta \ln GDPPC_{t-i} + \sum_{j=0}^{q} \lambda_{2j} \Delta REM_{t-j} + \sum_{k=0}^{r} \lambda_{3k} \Delta FD_{t-k} + \\ &= \sum_{l=0}^{s} \lambda_{4l} \Delta (REM \times FD)_{t-l} + \sum_{m=0}^{t} \lambda_{5m} \Delta GDS_{t-m} + \sum_{n=0}^{u} \lambda_{6n} \Delta TRD_{t-n} + \\ &= \sum_{o=0}^{v} \lambda_{7o} \Delta GOV_{t-o} + \sum_{p=0}^{w} \lambda_{8o} \Delta INF_{t-p} + \varphi ECT_{t-1} + \varepsilon_{t} \end{split}$$

In this context,  $\Delta$  indicates the first difference of the variable. The parameters  $\lambda_{1-}\lambda_{8}$  indicate the short-run coefficients, while p,q,r,s,t,u,v,and w denote the number of lags automatically selected based on the Akaike information criterion (AIC) (Akaike 1974). ECT\_{t-1} represent the one-period lagged values of the error correction terms. The coefficient of the one-period lagged ECT confirms the presence of long-run causality and indicates the speed of adjustment toward equilibrium.

## 4. RESULTS AND DISCUSSIONS

## 4.1 Descriptive Statistics and Correlation Matrix

Table 1 presents a summary of the descriptive statistics and the correlation matrix. All indicators, except for the financial development measure, have data covering 42 years (1980 to 2021). The maximum recorded real GDP per capita is US\$1,061.49, while the minimum is 333.21. There have been notable fluctuations in the remittance proxies throughout this period. Due to the slow economic growth, the country took nearly 35 years to uplift into lower-middle-income status by 2020, following economic and financial liberalization in the mid-1990s. The main reasons behind rapid outward migration were domestic violence, prolonged political transition, and poor industrial performance. Therefore, the remittances reached 27.63% of GDP in 2015, up from the lowest of 0.98% in 1996. Remittances began rising after 2002 when the domestic civil war climaxed in Nepal because youths left the country for better opportunities. Economic growth was also affected during that time. However, the 2015 earthquake changed the direction of the migration and remittance trend. The earthquake reconstruction activities and the political stability after the promulgation of new constitutions in 2015 might have contributed to creating employment opportunities within the nation. As a result, outward migration significantly decreased again.

The maximum level of financial development reached 0.21 in 2021 compared to the lowest of 0.06 in 1983. The percentage of remittances to GDP and financial development positively correlates with real GDP per capita at 91% and 96%, respectively. On the other hand, remittances and financial development also have a strong correlation of 84%. It indicates that economic growth and financial development strongly correlate with remittances. The correlation between critical variables such as remittances and financial development used as endogenous variables may show a multicollinearity issue in the model specified above. As a result, the Lagrange multiplier (LM) test is conducted postestimation to identify the potential multicollinearity issues of the designed models. Trade is also positively correlated with real GDP per capita. However, other variables, such as gross domestic savings, general government final consumption expenditure, and inflation, negatively correlate with economic growth.

Summary of Statistics								
Detail	GDPPC	REM	FD	GDS	TRD	GOV	INF	
Mean	600.74	10.74	0.12	10.66	43.18	8.72	8.80	
Median	551.65	2.32	0.11	10.59	44.41	8.75	7.68	
Maximum	1,061.49	27.63	0.21	15.66	64.04	10.78	26.40	
Minimum	333.21	0.98	0.06	3.64	30.10	6.70	3.07	
Std. Dev.	217.14	10.34	0.04	2.77	8.99	0.81	4.62	
Observations	42	42	42	42	42	42	42	
			Correlatio	n Matrix				
Correlation	InGDPPC	REM	FD	GDS	TRD	GOV	INF	
InGDPPC	1.00							
REM	0.91	1.00						
FD	0.96	0.84	1.00					
GDS	-0.22	-0.40	-0.20	1.00				
TRD	0.38	0.11	0.37	0.45	1.00			
GOV	-0.11	-0.08	-0.12	0.11	0.09	1.00		
INF	-0.24	-0.15	-0.22	-0.12	-0.36	0.15	1.00	

#### **Table 1: Summary of Statistics and Correlation Matrix**

Note: InGDPPC: Natural logarithm of GDP per capita (constant at 2015 US\$); REM: Personal remittances received (% of GDP); FD: Financial development index; GDS: Gross domestic savings (% of GDP); TRD: Trade (% of GDP); GOV: General government final consumption expenditure (% of GDP); INF: Inflation, GDP deflator (annual %) Source: Authors' calculation.

## 4.2 Unit Root Test

Appendix 3 illustrates the trends of the selected variables at their level values. Key variables such as real GDP per capita, remittances, and financial development exhibit an upward trend. In contrast, other variables show mixed stationarity characteristics concerning intercept and trend over the observed period. Consequently, it is crucial to assess the stationarity properties of these variables before choosing specific econometric methods to analyze the relationship between remittances, financial development, and economic growth. We use the augmented Dickey-Fuller (ADF) test (Dickey and Fuller 1979) and the Phillips-Perron (PP) test (Phillips and Perron 1988) to determine the order of integration for the selected variables.

Table 2 summarizes the results of these unit root tests. The first model specification includes only an intercept, while the second incorporates both trend and intercept. The results reveal that the variables exhibit a mix of stationary and nonstationary behaviors

at their level values. However, all variables are stationary at their first differences in both specifications, indicating that they share the same order of integration at I (1). These findings allow us to use the ARDL bound test method for the specified equations.

		Intercept Only		Trend	and Intercept
Variables	Test Method	Level	First Difference	Level	First Difference
InGDPPC	ADF t-Statistic	0.623	-6.268***	-2.112	-7.142***
	PP-Adj. t-Statistic	2.876	-7.366***	-1.935	-16.446***
REM	ADF t-Statistic	-0.402	-5.418***	-1.684	-5.341***
	PP-Adj. t-Statistic	-0.43	-5.376***	-1.736	-5.293***
FD	ADF t-Statistic	1.048	-7.796***	-2.075	-8.104***
	PP-Adj. t-Statistic	2.052	-8.049***	-2.075	-9.765***
GDS	ADF t-Statistic	-3.833**	-6.202***	-3.991**	-6.092***
	PP-Adj. t-Statistic	-3.712**	-13.933***	-3.691**	-15.676***
TRD	ADF t-Statistic	-1.826	-5.688	-1.565	-5.686***
	PP-Adj. t-Statistic	-1.826	-5.675***	-1.565	-5.658***
GOV	ADF t-Statistic	-4.064***	-6.984***	-4.148***	-7.024***
	PP-Adj. t-Statistic	-4.070***	-7.582***	-4.088***	-7.720***
INF	ADF t-Statistic	-3.990***	-9.177***	-4.162***	-9.072***
	PP-Adj. t-Statistic	-3.990***	-17.326***	-4.162***	-18.030***

#### Table 2: Summary of Unit Root Test

Notes: The optimal lag selection criteria for the ADF test are the Schwarz criterion (SIC), with a maximum lag length of 2. The automatic bandwidth for the PP test is the Newey–West Bandwidth. The null hypothesis for both tests is the existence of a unit root. \*\*\*, \*\* and \* indicate significance at 1%, 5%, and 10%, respectively. InGDPPC: Natural logarithm of GDP per capita (constant at 2015 US\$); REM: Personal remittances received (% of GDP); FD: Financial development index; GDS: Gross domestic savings (% of GDP); TRD: Trade (% of GDP); GOV: General government final consumption expenditure (% of GDP); INF: Inflation, GDP deflator (annual %); ADF: Augmented Dickey and Fuller; PP: Phillips–Perron Source: Authors' calculation.

Yet, these standard unit root tests do not incorporate events such as structural changes and crises that shift the path of the macroeconomic variables (Lee and Chang 2005). As mentioned previously, Nepal has faced multiple socio-economic changes during the selected study period, which may significantly shift the paths of the critical variables, especially the dependent variable, real GDP per capita, and the key explanatory variables for remittances and financial development. Therefore, the study further confirms the properties of stationarity of the selected variables in the presence of at least one structural break. Thus, Zivot and Andrews's (2002) (ZA) unit root test was performed, which endogenously captured one structural break while confirming the cointegrating orders of the selected variables. The results of the Zivot and Andrews (ZA) test at the level-value and first differenced value of selected variables are reported in Table 3<sup>1</sup>. The Zivot and Andrews (ZA) unit root test results also reveal that the variables exhibit stationary and nonstationary behaviors at their level values. However, all variables are stationary at their first differences, confirming that they share the same order of integration at I (1) in the presence of a structural break.

The results indicate that critical variables such as real GDP per capita, remittances, and financial development had structural breaks in 2010, 2002, and 2015 in their level value, respectively. Political transitions that reached the climax after the year 2001, mainly due to the Royal Massacre and state of emergency declaration, pushed the overall economy

<sup>&</sup>lt;sup>1</sup> The results consider intercept only. Since the study uses annual time-series data, the optimal lag length of 2 is assigned to identify the properties of the series with structural breaks.

into a downturn as the nation had been facing domestic civil war since 1996. The real GDP growth rate recorded a negative value in 2001. As a result, the outward migration and remittances surged dramatically due to the poor presence of the domestic industrial sector. The principal causes of these structural breaks could be the domestic civil war and political insurgency, the 2015 earthquake, and the promulgation of a new constitution in 2015 in Nepal. Structural breakpoints are noted in gross domestic savings in 1995, trade in 1992, the size of government in 2011, and inflation in 2009.

		Level		First Difference	9	
Variables	t-Statistic	Break Year	Result	t-Statistic	Break Year	Result
InGDPPC	-2.689	2010	nonstationary	-7.874***	2008	Stationary
REM	-4.662	2002	nonstationary	-6.314***	2002	Stationary
FD	-3.313	2015	nonstationary	-5.628***	1997	Stationary
GDS	-4.620	1995	nonstationary	-6.515***	2001	Stationary
TRD	-3.831	1992	nonstationary	-6.952***	1998	Stationary
GOV	-5.485***	2011	Stationary	-5.914***	2011	Stationary
INF	-4.952	2009	nonstationary	-9.923***	2012	Stationary

**Table 3: Zivot and Andrew Breakpoint Unit Root Test** 

Note: The null hypothesis of the Zivot and Andrew breakpoint unit root is the existence of a unit root with a structural break in the intercept. \*\*\*, \*\* and \* indicate significance at 1%, 5%, and 10%, respectively. The critical value at 1% is -5.34, 5% is -4.93, and 10% is -4.58. InGDPPC: Natural logarithm of GDP per capita (constant at 2015 US\$); REM: Personal remittances received (% of GDP); FD: Financial development index; GDS: Gross domestic savings (% of GDP); TRD: Trade (% of GDP); GOV: General government final consumption expenditure (% of GDP); INF: Inflation, GDP deflator (annual %).

Source: Authors' adaptation from EViews 13.

## 4.3 ARDL Bound Test Cointegration Results

Table 4 summarizes the ARDL bound test results for assessing cointegration. The results indicate that the F-statistics exceed the upper-bound threshold for Equations (1) and (2) when real GDP per capita is used in the dependent variable. This result suggests a long-term relationship between remittances, financial development, and other explanatory variables with real GDP per capita. Furthermore, when the interaction term of remittances and financial development (REM×FD) is included as an independent regressor, the F-statistic still surpasses the upper-bound value. It indicates that remittance inflows, financial development, their interactions, and economic growth are exhibited in the long-term co-movement. Thus, the level of relationship supports the significance and direction of long-term causality among these variables.

Table 4: ARDL	Bound Testing	Results for th	ne Existence o	of a Level	Relationship

					Bound Value						
					10	)%	5	%	1'	%	Outcomes
Models		Detail	ARDL (SIC)	F-Stat.	Lower	Upper	Lower	Upper	Lower	Upper	-
1	Dep. var.:	Natural Log of GDP Per Capita (InGDPPC)	(1,1,0,0,0,1,0)	16.024	2.218	3.314	2.618	3.863	3.505	5.121	Cointegrated
_	Regressor:	REM FD GDS TRD GOV INF	( ) ) - ) - ) - ) - )								-
2	Dep. var.:	Natural Log of GDP Per Capita (InGDPPC)	(1 0 0 1 0 0 1 0)	16 705	0.450	2 206	0.500	2 020	2 402	E 021	Caintagrated
	Regressor:	REM FD REM×FD GDS TRD GOV INF	(1,0,0,1,0,0,1,0)	10.795	2.152	3.296	2.323	3.629	3.402	5.031	Contegrated

Notes: The numbers in parentheses represent the selected ARDL model under SIC criteria. InGDPPC: Natural logarithm of GDP per capita (constant at 2015 US\$); REM: Personal remittances received (% of GDP); FD: Financial development index; GDS: Gross domestic savings (% of GDP); TRD: Trade (% of GDP); GOV: General government final consumption expenditure (% of GDP); INF: Inflation, GDP deflator (annual %).

Source: Authors' calculation.

## 4.4 Long-run Estimation Results

The established cointegration among proxies for remittances, financial development, and economic growth has facilitated estimating their long-term relationship, as outlined in Equations (1) and (2). Table 5 presents the results of the long-run estimations, with real GDP per capita (InGDPPC) serving as the dependent variable to represent economic growth.

Dependent Variable	InGDPPC	Sample:	1981–2021				
Lag Selection Method:	Schwarz information criterion (SIC, Automatic, Max 1)						
Deterministic:	Restricted constant and no trend	Restricted constant and no trend					
Model:	1		2				
Selected model:	ARDL (1,1,0,0,0,1,0)	ARDL (1,0	),0,1,0,0,1,0)				
Variables	Coefficient	Coef	ficient				
REM		0.0	39***				
		(0.	009)				
REM (–1)	0.027***						
	(0.005)						
FD	2.249**	5.8	56***				
	(1.112)	(1.	605)				
FD (–1) × REM (–1)		-0.	.140*				
		(0.	076)				
GDS	0.028**	0.0	23***				
	(0.012)	(0.	009)				
TRD	0.004	0.	000				
	(0.003)	(0.	003)				
GOV (–1)	-0.027	-0	.023				
	(0.026)	(0.	019)				
INF	-0.008*	-0.	010**				
	(0.005)	(0.	004)				
Constant	5.778***	5.6	31***				
	(0.241)	(0.	180)				
No. of Observations	41		41				
LM Test: F- Stat. (Prob.)	2.277	1.	134				
	(0.142)	(0.	296)				
Ramsay Test: F-Stat. (Prob.)	2.817 (0.104)	0. (0.	556 462)				

#### Table 5: Long-run Estimation Results for Economic Growth

Notes: \*\*\*, \*\* and \* indicate significance at 1%, 5%, and 10%, respectively. Standard errors are in parenthesis. Coefficients are derived from the conditional error correction (CEC) regression. InGDPPC: Natural logarithm of GDP per capita (constant at 2015 US\$); REM: Personal remittances received (% of GDP); FD: Financial development index; GDS: Gross domestic savings (% of GDP); TRD: Trade (% of GDP); GOV: General government final consumption expenditure (% of GDP); INF: Inflation, GDP deflator (annual %); LM: Lagrange multiplier.

Source: Authors' calculation.

The results indicate that the one-period lagged value of remittances positively and significantly impacts real GDP per capita in Model 1, suggesting that increased remittance levels promote long-term economic growth. In Model 2, remittances for the current year also show a positive and significant effect on real GDP per capita, implying that economic growth in Nepal is positively responsive to remittance levels. Both models confirm that financial development positively and significantly affects real GDP per capita, indicating that a well-developed financial sector supports long-term economic growth. It suggests that Nepal's economic growth is also positively responsive to financial development.

In Model 2, the one-year-lagged interaction term between financial development and remittances (FD×REM) exhibits a negative and significant effect at the 10% level. This finding indicates that past financial development negatively moderates the impact of past remittances on GDP per capita, highlighting a substitutive role of financial development in the relationship between remittances and economic growth. Although the interaction term reflects the combined effect of remittances and financial development, the individual coefficients for remittances (REM) and financial development (FD) remain positive. It highlights that the influence of remittances is significantly affected by the level of financial development captured by the interaction term.

Gross domestic savings also positively and significantly affect real GDP per capita in both models. However, trade and government size variables do not significantly explain real GDP per capita. Additionally, inflation predominantly exerts a negative and significant impact on real GDP per capita, suggesting that higher inflation leads to a deterioration in economic performance.

## 4.5 Short-run Estimation Results

The short-term dynamics between remittances, financial development, and economic growth are examined using an error correction model (ECM), which helps estimate short-run elasticities and confirm the adjustment process. Given the limited number of observations, the model restricts the lag length to one year. Table 6 presents the estimation outcomes, with the first differenced real GDP per capita ( $\Delta$ InGDPPC) as the dependent variable, while remittances, financial development, and other control variables serve as independent regressors.

The findings indicate that remittances do not have a significant short-term impact on real GDP per capita in Nepal, suggesting that remittances are inelastic with regard to short-term economic growth. However, when the interaction between remittances and financial development is included in the model, a negative and significant effect on real GDP per capita is detected. It suggests that financial development substitutes the positive impact of remittances on short-term economic growth. Additionally, the general government's final consumption expenditure significantly and negatively affects economic growth in the short run.

Moreover, the results demonstrate the long-term adjustment of variables such as remittances and financial development in fostering economic growth. The significant coefficient of the lagged error correction term (ECT) in both models indicates the speed of adjustment toward long-run equilibrium. These insights are essential for policymakers and stakeholders in Nepal to understand and address economic growth dynamics.

Dependent Variable:	∆InGDPPC	Sample:	1981–2021
Deterministic:	Restricted constant and no trend	Lags:	1 Max. (Automatic)
Model selection method:	Schwarz criterion (SIC)		
Model:	1		2
Selected model:	ARDL (1,1,0,0,0,1,0)	ARDL	(1,0,0,1,0,0,1,0)
Number of models evaluated:	64		128
Variable	Coefficient	С	oefficient
COINTEQ*	-0.190***	-	-0.232***
	(0.015)		(0.017)
ΔREM	0.001		
	(0.001)		
Δ(FD×REM)		-	-0.070***
			(0.011)
Δ(GOV)	-0.021***	-0.020***	
	(0.004)		(0.003)
R-squared	0.593		0.665
Adjusted R-squared	0.572	0.648	
S.E. of regression	0.017	0.015	
Sum squared resid	0.011	0.009	
Log-likelihood	110.314	114.290	
F-statistic	27.740	37.744	
Prob(F-statistic)	0.000	0.000	
Schwarz criterion	-5.109	-5.30	
Durbin–Watson stat	2.491	2.34	
Included observations	41	41	

Notes: \*\*\*, \*\* and \* indicate significance at 1%, 5%, and 10%, respectively. Standard errors are in parenthesis. InGDPPC: Natural logarithm of GDP per capita (constant at 2015 US\$); REM: Personal remittances received (% of GDP); FD: Financial development index; GDS; GOV: General government final consumption expenditure (% of GDP); COINTEQ\*: Cointegration Equation. P-values are incompatible with t-bounds distribution.

Source: Authors' calculation.

## 5. ROBUSTNESS AND STABILITY TEST

After performing several tests to check the validity of empirical estimation, it is confirmed that the data are consistent and model specifications are error-free. The LM test is conducted to deal with multicollinearity issues. The results are reported in Table 5, indicating the absence of multicollinearity in the designed model specification. Similarly, the Ramsey test is conducted for the stability test of dynamic models. Furthermore, both models' cumulative sum (CUSUM) and cumulative sum square (CUSUM square) of recursive residuals are examined for the stability test. They indicate that the residuals are moving within the upper- and lower-bound values on both models, indicating that the selected models are stable and do not require additional considerations, such as using dummy variables to address structural breaks of the critical variables. The graphs are reported in Appendix 4.

## 6. CONCLUSION AND POLICY IMPLICATIONS

This study finds that remittances positively and significantly impact Nepal's GDP per capita growth in the long run. The economic growth effects of remittances might be transmitted through stabilized consumption and a widening share of service sectors in the Nepalese economy. It is believed that an economic crisis in migrant destinations may have profound and multifaceted effects on a remittance-dependent economy like Nepal. which may affect livelihood, consumption, financial stability, and well-being. So, it is crucial to diversify the economy in the long run concerning sources of finance and investment. As a stable source of external finance, remittances may have played a critical role in shielding the Nepalese economy during economic crises without other stable capital flows. However, excessive dependency on a single source of external finance might be riskier for countries like Nepal, which is in the early stages of economic and institutional development. Therefore, long-term policies that encourage the channeling of remittances into productive activities seem urgent. Efficient government institutions, including a well-functioning bureaucracy, alongside robust measures to control corruption and infrastructural development, can shift a consumption-driven economy to an investment-driven one. Enhancing financial access in semi-urban and rural areas is crucial for fostering banking activities and ensuring the security of migrants' income. The adverse joint effects of remittances and financial development indicate a signal for policymakers to promote careful synergy in mobilizing external sources of finance through financial development.

While gross domestic savings also positively affect economic growth, utilizing remittance income for saving purposes is crucial. In the Nepalese context, financial institutions should responsibly allocate these savings to productive sectors. The oversight role of central banks on commercial banks and financial institutions, particularly in monitoring the allocation of savings, is of utmost importance in this context.

In conclusion, remittances and financial development have positively impacted Nepal's economic growth. However, remittances and financial development have a substituting role in moderating economic growth in the long run. Efforts to strengthen the financial sector in terms of depth, access, and stability of both financial institutions and the financial market in the presence of improved institutional quality will contribute to sustained and robust economic development in Nepal. It is a fact that most remittances are used for primary consumption rather than investment purposes in Nepal. Therefore, policy measures aimed at channeling remittances into productive investments, such as offering incentives for savings and investment in local enterprises, are crucial for maximizing their long-term impact on economic growth.

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## APPENDIX 1: LIST OF SELECTED VARIABLES, INDICATION, SHORT DEFINITION, AND SOURCES

Variables	Indicator	Definition	Sources
Economic Growth	InGDPPC	Natural logarithm of GDP per capita (constant at 2015 US\$)	WDIs
Remittances	REM	Personal remittances received (% of GDP)	WDIs and Giuliano and Ruiz-Arranz (2009)
Financial Development	FD	Financial development index	IMF
Savings	GDS	Gross domestic savings (% of GDP)	WDIs
Trade	TRD	Trade (% of GDP)	WDIs
Size of the Government	GOV	General government final consumption expenditure (% of GDP)	WDIs
Inflation	INF	Inflation, GDP deflator (annual %)	WDIs

Source: Authors' collection from WDI, World Bank, and International Monetary Fund (IMF).

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## APPENDIX 2: LAG ORDER SELECTION CRITERIA UNDER STANDARD VAR

#### Endogenous variables: InGDPPC REM FD GDS TRD GOV INF Exogenous variables: Constant 1980-2021 Sample: Included observations: 41 LR FPE AIC SC HQ Lag LogL 0.0000 18.7064 -364.9898 NA 0.2821 18.5995 18.8950 1.0000 -160.6899 0.0001 10.8345 13.19893\* 11.68940\* 326.8798 2.0000 -101.2267 74.32899\* 9.28e-05\* 10.31134\* 14.7447 11.9143

#### 3.1 Without Interaction Term

#### 3.2 With Interaction Term

Endogenous variables: InGDPPC REM FD REM×FD GDS TRD GOV INF									
Exogenous variables: Constant									
Sample 1980–2021 Included observations: 41						41			
:									
Lag	LogL	LR	FPE	AIC	SC	HQ			
0	-343.0801	NA	0.0091	18.0041	18.3454	18.1265			
1	-89.3473	390.3582	0.0000	8.2742	11.34541*	9.3761			
2	-6.5530	93.40900*	0.0000	7.3104	13.1116	9.3918			
3	96.2330	73.7951	1.89e-07*	5.321383*	13.8525	8.382263*			

Notes: \* indicates lag order selected by the criterion; LogL: Log-likelihood; LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan–Quinn information criterion.



## APPENDIX 3: GRAPHICAL REPRESENTATIONS OF SELECTED VARIABLES

Source: Authors' adaptation from EViews 13, using data from WDIs, World Bank, IMF, and Giuliano & Ruiz-Arranz (2009).



## APPENDIX 4: PLOTS OF CUSUM AND CUSUM SQUARES TESTS

Source: Authors' adaptation from EViews 13.