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Impact of remittance on school enrollment in Nepal: An empirical analysis through the ARDL approach

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Abstract

Education is widely recognized as a fundamental driver of socio-economic development and individual empowerment. Researchers and policy makers have discussed the international migration and development nexus from a variety of perspectives. Despite the multidimensional effects of education on development, the relationship between remittance and school enrollment is not sufficiently studied yet in Nepal. Therefore, the major objective of the study is to investigate the effects of foreign remittance on school enrollment in Nepal. The ARDL bounds testing model is employed in this study to uncover the relationship between primary school enrollment (SENROL) and foreign remittance (REMI) in Nepal. The time series data for 31 years, spanning from 1993 to 2023, are collected from various secondary sources like economic survey published by Ministry of Finance (MOF), quarterly economic bulletins published by Nepal Rastra Bank (NRB). The empirical results show a positive and statistically significant relationship between remittance inflow and school enrollment, signifying that remittance inflows play a crucial role in enhancing household investment in education. Conversely, the number of schools exhibits a negative and significant impact on enrollment in our study. The number of teachers, however, shows no significant effect on enrollment. The inflow of remittance supports for school enrollment in Nepal. These findings underscore the importance of channeling remittance income effectively in education and improving policy alignment between infrastructure expansion and educational outcomes.

Keywords
Remittance, school enrollment, time series, ARDL bounds testing, long run

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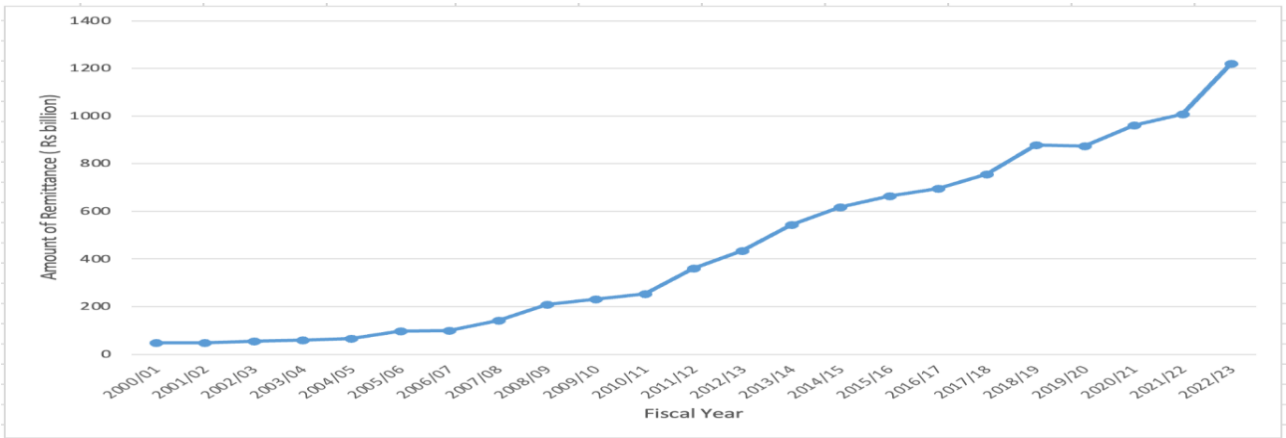
1. Introduction

Foreign remittance has become an important focus in discussions about development in Nepal, where international labor migration shapes the economic and social lives of many households. As Nepalese work force move abroad in search of better employment opportunities, the remittance they send back has increasingly become a vital source of income for families and the national economy as well (Lamsal, 2024). While migration have mixed effects on communities, remittance is often seen as a positive outcome, especially in terms of improving living standards (Ustubici & Irdam, 2012). For many households in Nepal, remittance income provides not only basic consumption support but also the financial means to invest in children's education (Gajurel & Niroula, 2024). With increased financial capacity, families are better able to pay for school-related costs, reduce the need for children to engage in labor, and encourage regular school participation. This flow of remittance therefore plays a key role in expanding school enrollment and contributes to broader processes of human development by enabling more young people to acquire skills and knowledge (Forhad & Alam, 2021). Understanding how remittance influences educational access and outcomes is essential for grasping its wider contribution to Nepal's development strategy.

United Nations' current estimate shows that there are around 281 million international migrants in the world, which is around 3.6 percent of the global population as compared with 221 million migrants in 2010, 173 million in 2000 and 153 million in 1990 (McAuliffe & Oucho, 2024). This trend shows that international migration has increased by around 87 percent over the past 22 years. Even though migration theory has identified both positive and negative impacts of migration on home and host countries, remittance received is considered as universal positive benefits of migration (Orekoya & Tijani, 2023).

Out of the total international remittance US $ 831 billion in 2022, low- and middle-income countries received US $ 647 billion remittance in the same year. In South Asia, Nepal stood at 4th position after India, Bangladesh, and Pakistan; and stood at 10th position in terms of remittance received as of GDP (Lamsal, 2024). With a substantial portion of its population working abroad, Nepal is one of the largest recipients of remittances in the world relative to its GDP. The inflow of remittance in Nepal since last 23 years, spanning from 2000 to 2023 is presented in Figure 1.

Figure 1. *Inflow of Remittance in Nepal (Rs. Billion)*



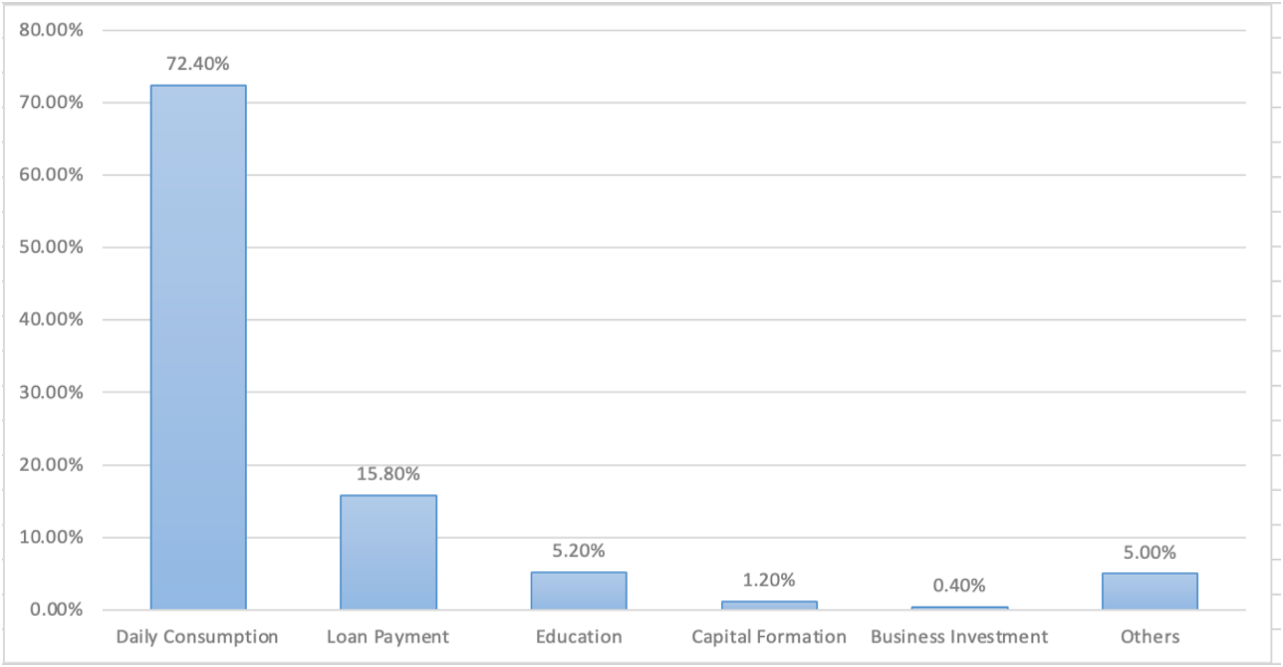
Note. NRB, 2024.

The challenge of delivering quality education is widespread in many developing countries, and Nepal faces the same problem (Devkota & Bashyal, 2024). Nepal's National Education Policy 2019 sets the goal of nurturing an educated, cultured, and healthy population that can guide the nation toward prosperity (MoEST, 2019). Likewise, the School Education Sector Plan 2022–2031 seeks to develop a capable, well-governed, responsible, and competitive public school system that ensures access to relevant, high-quality education meeting both national and international standards (MoEST, 2022). Despite these policy commitments, the country's education system has yet to effectively tackle its diverse social and economic challenges.

One of the vital areas where the effects of remittances are being scrutinized is in the realm of education. Education is widely recognized as a fundamental driver of socio-economic development and

individual empowerment. In Nepal, where educational attainment has historically been constrained by economic barriers, remittances could potentially play a transformative role in enhancing school enrollment rates. By providing additional financial resources, remittances may alleviate the direct and indirect costs associated with schooling, such as tuition fees, uniforms, books, and transportation. The remittance received by Nepalese household is used for multiple purposes. Only around 5 percent is used in education (NSO,2024). The multiple uses of remittance in Nepal are presented in Figure 2.

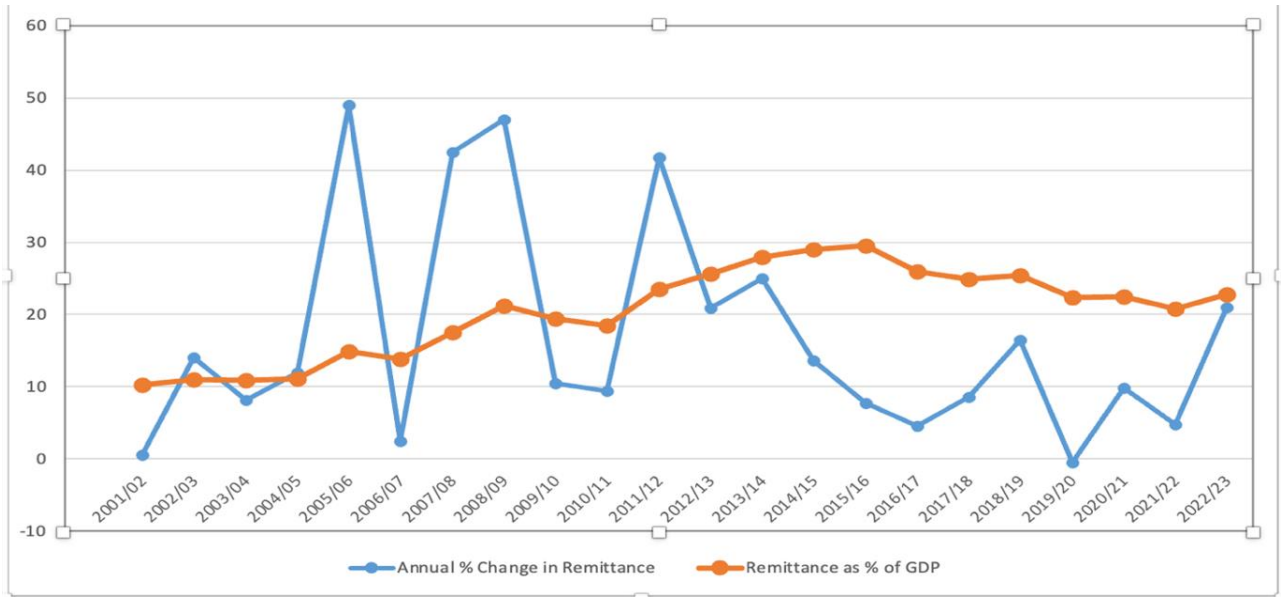
Figure 2. *Uses of Remittances in Nepal (in Percentage)*



Note. NSO, 2024.

Figure 2 demonstrates the multiple uses of remittance by Nepalese recipients. More than 72 percent is used only for consumption purposes; nearly 16 percent remittance is used for loan payment; very insignificant, i.e., around 5 percent is used in education of children in Nepal and abroad. The annual percentage change in remittance and as percentage of GDP is presented in Figure 3.

Figure 3. *Remittance Inflow: Annual Percentage Change and as Percentage of GDP.*



Note. NRB, 2024.

Most of the research scholars have analyzed the effects of remittance on economic growth, domestic consumption, private investment and so on while very few have analyzed the effects of remittance on school enrollment in Nepal. This is an area which is not sufficiently explored yet. Thus, this study aims to objectively investigate the impact of remittance on school enrollment in Nepal. Thus, the extent to which remittance supports to boost up the school enrollment in Nepal is the main motivating factor of this research.

This study is guided by the research question: "Does foreign remittance affects school enrollment in Nepal?" Accordingly, its primary aim is to examine how remittance inflows impact school enrollment levels. Since remittance is the central variable of interest of this analysis, the study anticipates that an increase in foreign remittance contribute positively to school enrollment in Nepal. In addition to this main focus, the study also seeks to assess how remittance, the number of schools, and the number of teachers collectively affect school enrollment.

2. Review of Literature

Theoretical Literature Review

The pure altruism theory justifies why international migrants sent money back to their home and family as migrants are connected with the wellbeing of his/her family members in their country of origin. Among the three basic assumptions of pure altruism theory; the first is that the amount of remittance is directly proportional with migrant's income; the second is that the amount of remittance to be sent depends upon the income earned by family members at home, and, last but not least, is the extent to which the migrant is attached to his/her family members at home country (Kaasschieter, 2014; Orekoya & Tijani, 2023). The responsibility and family affection of international migrants, their satisfaction from family left behind at unfavorable economic conditions is another reason for sending remittance (OECD, 2006). The New Economics of Labour Migration theory of Stark and Bloom (1985) found that migration is not just an individual decision, rather it is a means of diversifying the income of households. However, the Human Capital Theory of Schultz (1961) argues that investment in human capital is more worthwhile than investing in physical capital.

Empirical Literature Review

A number of empirical studies have established significant positive relationship between remittance inflow and human capital development due to improved health and education in home country. Focusing particularly on Nigerian economy, Orekoya and Tijani (2023) explored the effects of remittances on human capital development through the investment in education by using time series data for 41 years, spanning from 1980 to 2021. By employing ARDL model, the study found positive and significant effect of remittance on school enrollment rate in Nigeria. Likewise, Xia, Qamruzzaman and Adow (2022) also found positive impact of remittance on educational development and human capital development.

Gajurel and Niroula (2024) studied the impacts of foreign remittances inflow on educational outcomes in Nepal by using the yearly time series data for 41 years spanning 1981-2021. The study used gross enrollment in secondary level and tertiary level as the proxied for educational outcomes and remittance as main explanatory variable. By employing the ARDL and Granger Causality models, the study claimed positive and statistically significant effect of remittance on educational outcome in Nepal. By using secondary data for 30 years, spanning from 1990 to 2019; a study conducted by Chen, Raza and Alharthi (2023) found positive effect of remittance on school enrollment and educational development.

Quality education is 4th sustainable development goal of UN which plays vital role to achieve rest sixteen goals of SDGs by 2030. Connecting this issue, Sezgin et al. (2023) employed regression models to identify the impact of remittance on educational attainment in 18 emerging economies for 20 years, spanning from 2000 to 2020. This study found positive effect of remittance on educational attainment in 18 emerging countries. Shafiq, Yang and Nawaz (2022) studied the impact of remittances on child education in 90 developing countries over the period 1991-2020. By employing dynamic panel GMM, this study found positive and significant impact of remittance on educational outcome.

Zhunio et al. (2021) argued that international remittance has positive role in boosting the primary and secondary level education by using the panel data of 69 low and middle-income countries. Likewise, Arief

et al. (2019) found that foreign remittance has significant responsibility on the development of educational outcomes. Forhad and Alam (2021) also claimed that remittance supports on school enrollment and development of education in remittance receiving country.

Analyzing the effect of international remittance on human capital development in South Asian countries, Sahoo et al. (2020) found positive effect of remittance on school enrollment and human capital development by employing OLS method. Likewise, a study conducted by Ahmad, Shafiq and Gillani (2019), to explore the impact of remittance on human resource development in developing nations, found significant positive effect of remittance on secondary school enrollment. However, Hildebrandt and Mckenzie (2005) found negative effect of remittance in school enrollment in Mexican Municipality.

Foreign employment and remittance including personal transfers as well as compensation of foreign employees have grown significantly with globalization and liberalization after 1990s. Bucheli, Bohara and Fontenla (2018) expressed the view that the additional income received by households in the form of remittance relaxes the budget constraints, which increases the capacity of investing in child education. Using the secondary data and by employing Bivariate Probit model, the study found both positive and negative effects on remittance on school education. The effect of remittance is positive on poorer urban family and negative effect on rural family as the children have additional work burden due to migration of their parents. Remittance positively influences school enrollment and educational attainment to foster educational investment made by families and countries (Bucheli et al., 2018; Gyimah-Brempong and Asiedu 2015). However, few studies have found negative relation between remittance and education due to multiple tasks to be performed by children or they have to complete parental responsibilities due to absence of their parents (McKenzie & Rapoport, 2011; Hapsari, 2019; Kumar, 2019). This argument is also supported by Cortes (2015); and claimed that mother's migration, in contrast to father, has a negative effect on educational outcome of Fillipino children.

Bucheli, Bohara and Fontenla (2018) examined the effects of remittance on secondary school enrollment in Ecuador by using bivariate Probit model. The study found positive impact of remittance on school enrollment. Mawuena and Okey (2021) studied the impacts of foreign remittance on education expenditure in Togo by employing Logit model. They found positive effects of remittance on education. Amakom and Iheoma (2014) explored the effects of remittance on educational outcomes in 18 Sub-Saharan African (SSA) countries by using regression model and found positive outcome of remittance on education. Ustubici and Irdam (2012) have also found positive correlation between remittance inflow and human development via education.

Over the last few decades international remittance is playing a significant role in socio-economic development as well as development of education. By using the primary data collected from 396 households, Kumar (2019) employed statistical and econometric models to identify the effects of remittance on education in Bangladesh. The study found that international remittances have significant negative impact on education.

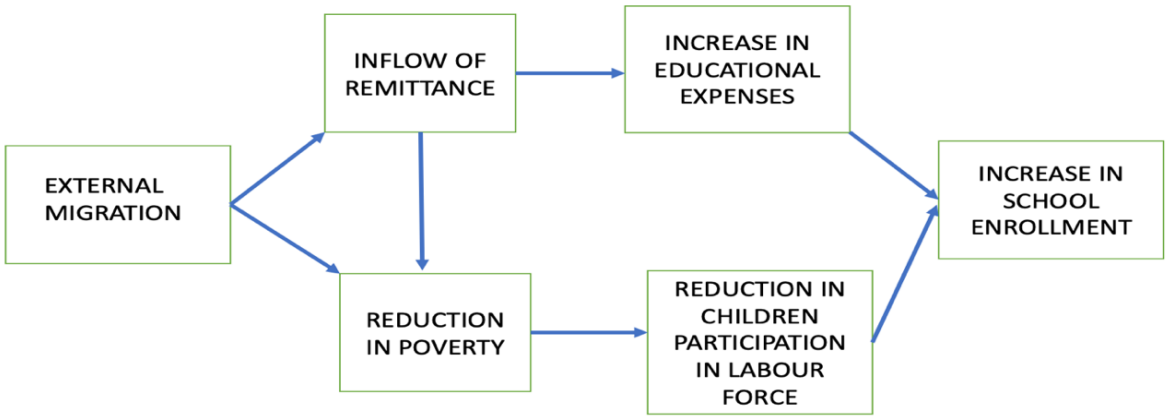
Remittance is considered as one of the sources of funding in education due to positively supporting to the income of recipient households (Kanaiaupuni & Donato, 1999). The study claimed that remittances are positively correlated with education by solving the liquidity constraints. Consistent with these findings, Chaaban and Mansour (2012) identified significant positive relationship between remittance inflow and child education in Syria, Jordan and Lebanon. Another study conducted by Edwards and Ureta (2003) explored the effects of international remittances on households schooling decision and school retention in EL Salvador and found positive relationship between them. Most of the studies found positive correlation between foreign remittance and educational development (Antman, 2011; Lee & Park, 2010; Mansour & Quillin, 2006).

Most empirical studies show that remittance inflows play a positive role in improving human capital by helping households spend more on education and health, especially through higher school enrollment and educational attainment in developing countries. Evidence from Nigeria, South Asia, Sub-Saharan Africa, and other emerging economies consistently suggests that remittances ease financial constraints and encourage investment in children's education. Thus, a lacuna is found in Nepalese perspective covering the effect of remittance on primary school enrollment, and the present study aims to fulfill this research gap.

Conceptual Framework

Keeping in view theoretical and empirical literature, and using authors' own insights, the conceptual framework of this study is as sketched in Figure 4.

Figure 4. *Conceptual Framework*



3. Methods and Materials

This section deals with the variables used, sources of data, econometric model specification and estimation followed by results of empirical findings and interpretation of results.

Data, Sources, and Variables

This research relies entirely on secondary data, using an annual time-series dataset covering 31 years, from 1993 to 2023. The data were obtained from various editions of the Economic Survey published by the Ministry of Finance (MoF), the Quarterly Economic Bulletin of Nepal Rastra Bank (NRB), and publications of the Ministry of Education, Science and Technology (MoEST) available through the Education and Human Resource Development Centre. While remittance serves as the primary variable of interest, the study also incorporates two control variables: the number of schools and the number of teachers up to grade ten. The variables used and sources of data are presented in Table 1.

Table 1. *List of Variables used and Sources of Data*

Code	Variables	Sources	Units of Measurement
SENROL	Primary school enrollment number	MOF	Number
REMI	Foreign remittance inflow in Nepal	NRB	NRs. billion
NSCH	Number of schools	MOEST	Number
NTEA	Number of teachers	MOEST	Number

Note. Authors' illustration.

Among the available techniques for time-series analysis, the ARDL approach is appropriate for both small and large sample sizes; therefore, the ARDL Bounds testing model has been chosen for the empirical investigation. The stationarity of the variables is examined using the ADF unit root test, and all empirical estimations are carried out with the help of EViews 10 software.

Model Specification

The study objectively aims exploring the effects of remittance on primary school enrollment (SENROL) in Nepal. Though foreign remittance (REMI) is the central variable of concern of this study, two significant controls were also added to investigate its effect on school enrollment i.e., number of schools (NSCH), and number of teachers (NTEA). We adopted the model of Shafiq, Yang and Nawaz (2022) incorporating number of schools and teachers for our study. The functional relationship between dependent and independent variables becomes as follow:

$$SENROL_t = f(REMI_t, NSCH_t, NTEA_t) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

The linear form of equation (1) is:

$$SENROL_t = \beta_0 + \beta_1 REMI_t + \beta_2 NSCH_t + \beta_3 NTEA_t + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots \quad (2)$$

The log - linear equation of equation (2) is written as follows:

$$LnSENROL_t = \beta_0 + \beta_1 LnREMI_t + \beta_2 LnNSCH_t + \beta_3 LnNTEA_t + \varepsilon_t \quad \ldots\ldots (3)$$

Where, SENROLt = Primary School enrollment number as the dependent variable, REMIt = Remittance received in year 't' as core independent variable, NSCHt = Number of schools in year 't' as the first control variable, NTEAt = Number of teachers in year 't' as second control variables, β_0 = Constant or intercept. β_1, β_2, and β_3 = Parameters to be estimated, where the expected sign of parameters β_1, and β_2 are positive expecting that school enrollment increases due to increase in remittances inflow and number of schools, the expected sign of β_3 may be positive or negative; and εt = Stochastic error term;

Hypothesis of the Study

Depending upon the above research question and objective, the null hypothesis and alternative hypothesis of the study are:

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

i.e., REMI, NSCH, and NTEA have no significant effects on school enrollment in Nepal.

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

i.e., REMI, NSCH, and NTEA have significant effects on school enrollment in Nepal.

Estimation of Auto Regressive Distributed Lag (ARDL) Model

This study used the Auto Regressive Distributed Lag (ARDL) bounds testing approach proposed by Pesaran and Shin (1999), which is widely regarded as an advanced and flexible method for analyzing time-series data. The ARDL methodology offers several advantages over earlier co-integration techniques, such as those introduced by Engle and Granger (1987) and Johansen (1991). One of its key strengths is that it can be used whether the variables are integrated of order I(0), I(1), or a mix of both. Additionally, unlike many traditional methods that require a large dataset, the ARDL approach remains suitable even when the sample size is relatively small. Another benefit is that it accommodates different lag lengths for the variables, a feature not permitted in several other techniques. Furthermore, this method is capable of estimating both the long-run and short-run dynamics among the variables under consideration (Pesaran & Shin, 1999).

To examine the presence of co-integration among the variables specified in equation (3), the ARDL model is structured as shown in equation (4), while the corresponding error correction representation is presented in equation (5).

$$\begin{aligned}\Delta (LnSENROL)t = {} & \alpha_0 + \sum_{i=1}^{p} a_{1i} \Delta (LnSENROL)_{t-i} + \sum_{i=1}^{q} a_{2i} \Delta (LnREMI)_{t-i} \\ & + \sum_{i=1}^{q} a_{3i} \Delta (LnNSCH)_{t-i} + \sum_{i=1}^{q} a_{4i} \Delta (LnNTEA)_{t-i} + \alpha_{11}(LnSENROL)t_{-1} \\ & + \alpha_{12} (LnREMI)_{t-1} + \alpha_{13} (LnNSCH)_{t-1} + \alpha_{14} (LnNTEA)_{t-1} + \varepsilon_{1t.} \quad \ldots\ldots\ldots (4)\end{aligned}$$

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

$$\begin{aligned}\Delta (LnSENROL)t = {} & \alpha_0 + \sum_{i=1}^{p} a_{1i} \Delta (LnSENROLC)_{t-i} + \sum_{i=1}^{q} a_{2i} \Delta (LnREMI)_{t-i} \\ & + \sum_{i=1}^{q} a_{3i} \Delta (LnNSCH)_{t-i} + \sum_{i=1}^{q} a_{4i} \Delta (LnNTEA)_{t-i} + \gamma\, ECT_{t-1} + \varepsilon_{1t} \quad \ldots\ldots (5)\end{aligned}$$

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, γ = Speed of adjustment parameter with negative sign, ECT = Error correction term.

4. Empirical Findings

Unit Root Test

In time series econometric analysis, firstly stationary or unit root test is conducted to reduce the risk of misleading result. In the ARDL bounds testing approach of cointegration, the variables used in the model should be stationary at I (0) or I (1) or a combination of both. However, none of the variables should be integrated at I (2) (Pesaran et al., 2001; Dahal, 2013; Lamsal, 2023). One of the most popular unit root tests is the Augmented Dickey – Fuller (ADF) technique developed by Dickey-Fuller. To detect the order

of integration of all variables used in the school enrollment model, the general form of the equation for the ADF unit root test is as follows (Lamsal et al., 2025).

$$\Delta Y_t = \alpha + \beta_t + \lambda Y_{t-1} + \delta_1 \Delta Y_{t-1} + \ldots\ldots\ldots + \delta_p \Delta Y_{t-p} + \varepsilon_t \quad \ldots\ldots\ldots\ldots (6)$$

Where, Y = Time series variable, α = Constant, β = Coefficient on a time trend(t), p = Lag order of the autoregressive process, and, εt = error term.

Table 2. *Result of ADF Test for Unit Root*

Variables	Model	Level: I (0)		First Difference: I (1)	
		t-statistic	p-value	t-statistic	p-value
LnSENROL	Intercept	- 3.2805	0.0250	- 4.3089	0.0021
LnREMI	Intercept	- 1.7815	0.3820	- 5.9927	0.0000
LnNSCH	Intercept	- 0.9408	0.7608	- 3.9484	0.0052
LnNTEA	Intercept	- 0.8965	0.7748	- 3.4270	0.0181

Note. Author's estimation by using EViews10.

Results presented in Table 2 indicate that all dependent and independent variables used in this study are stationary at first difference, I (1), and none of them are stationary at I (2). It justifies that ARDL model is suitable for its empirical analysis (Pesaran, et al., 2001).

Descriptive Statistics

The summary statistics of all the selected variables of the study are as mentioned in the Table 3.

Table 3. *Descriptive Statistics*

Particulars	Ln SENROL	Ln REMI	Ln NSCH	Ln NTEA
Mean	14.49668	25.54100	9.699351	12.19042
Median	14.59575	26.06904	9.749870	12.24321
Maximum	14.88332	27.99347	10.50592	12.75004
Minimum	13.72120	21.95583	8.797548	11.57018
Std. Dev.	0.391325	1.936532	0.472807	0.390591
Skewness	- 0.660067	-0.529952	-0.262759	-0.069944
Kurtosis	1.986406	1.956255	1.912865	1.425247
Jarque-Bera	3.578084	2.858051	1.883291	3.228412
Probability	0.167120	0.239542	0.389986	0.199049
Sum	449.3971	791.7711	300.6799	377.9029
Sum Sq. Dev.	4.594068	12.5047	6.706399	4.576849
Observations	31	31	31	31

Note. Author's estimation by using EViews 10.

Data presented in the Table 3 shows the summary statistics of all dependent and selected explanatory variables of the study. It shows the empirically calculated values of mean, median, standard deviation, etc. The p-value of the Jarque-Bera test is more than 5 percent. So, all the variables used in the study are normally distributed.

Lag Length Selection

For estimating the ARDL model used in the F-Bound test, long-run form, and the error-correction specification, determining the appropriate lag length is essential (Dahal, 2013; Lamsal, 2024). Researchers typically rely on several well-known lag selection criteria, such as FPE, AIC, SC, and HQ. The optimal lag order is identified by selecting the model that yields the minimum value under each respective criterion (Pesaran & Shin, 1999; Pesaran et al., 2001). The statistics corresponding to various lag orders across the different selection criteria are presented in Table 4.

Table 4. *VAR Lag length Criteria*

Lag	Log L	LR	FPE	AIC	SC	HQ
0	42.12398	-	7.72e-07	- 2.723141	- 2.532826	- 2.664960
1	151.6627	179.9565	9.83e-10	- 9.404480	- 8.452905*	- 9.113574
2	172.5937	28.40637*	7.48e-10*	- 9.756695	- 8.043860	- 9.233064
3	193.0805	21.95017	6.72e-10	- 10.07718*	- 7.603088	- 9.320827*

Note. Author's estimate using EViews 10; * = Optimum Lag Length.

ARDL Model Estimation

In order to estimate the ARDL bounds test for co-integration, estimation of long-run coefficients, and error correction model, the first step is the estimation of ARDL model based on lag length criteria as estimated in Table 4. The ARDL (2, 2, 3, 1) model is selected on the basis of AIC, criterions as estimated in Table 4. Appendix 1 shows the empirical findings of ARDL Model. Bounds test and long-run coefficients are estimated on the basis of ARDL model presented in Appendix 1.

ARDL Bounds Test for Cointegration and Error Correction Model

Bound tests for cointegration are executed to examine the nature of the relationship between the dependent and independent variables. This econometric technique helps determine whether a long-run equilibrium relationship exists among the variables or whether their interactions are limited to the short run. As explained by Pesaran et al. (2001), the ARDL bound test relies on the Joint F-statistic and is conducted under the null hypothesis (H_0) that no cointegration exists among the variables, against the alternative hypothesis (H_1) that a cointegrating relationship is present. The test utilizes a lower bound I(0) and an upper bound I(1) for comparison. The empirical findings of the cointegration bound tests are presented in Table 5, while the results from the corresponding error correction model are specified in Table 6.

Table 5. *Results of ARDL Bound Test for Cointegration and Long-Run*

F-Bound Test				
Test Statistic	Value	Significance	I (0)	I (1)
F-statistic	8.491418	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Note. Author's estimation by using EViews 10.

The Table 5 displays the results of ARDL bound test for cointegration. The value of F-statistic for the bound test is 8.491418 which is greater than the lower bound value of 3.65 and upper bound of 4.66 at a 1 percent. Hence, the empirical results, shown in Table 5, justifies that there is a long-run association between school enrollment (SENROL) with remittance (REMI), number of schools (NSCH), and number of teachers (NTEA) in school level in Nepal.

Estimation of Long-Run Coefficients

After establishing the existence of long-run cointegration among the variables, the subsequent step in the ARDL approach is to estimate the long-run coefficients. In this study, Equation (2) represents the long-run model. To obtain the long-run ARDL estimates, the optimal lag length is determined based on the AIC criterion. For the present model, the selected lag structure is ARDL (2,2,3,1), as shown in Table 3. The estimated long-run coefficients, derived from the ARDL model, are reported in Table 6.

Table 6. *Long -Run Coefficients Using ARDL (2,2,3,1) Model Based on AIC (Dependent Variable: LnSENROL)*

Variables	Coefficients	Std. Error	t-statistic	Prob.
LnREMI	0.502862	0.123578	4.069178	0.0009
LnNSCH	-1.953977	0.901218	-2.168152	0.0456
LnNTEA	0.609111	0.424322	1.435492	0.1704
C	13.24069	1.360837	9.729811	0.0000

Note. Author's estimation using EViews 10.

Table 6 presents estimated long-run coefficients using ARDL model. The relationship of LnREMI with LnSENROL is positive and statistically significant at 1 percent level. However, LnNSCH is negative and statistically significant with LnSENROL. When remittance inflow increases by 1 percent, it leads to 0.50 percent increase in school enrollment in the long-run. The result of this study is similar with Gajurel and Niraula (2024); Orekoya and Tijani (2023); Sezgin et al. (2023); Chen, Raza and Alharthi (2023); Xia, Qamruzzaman and Adow (2022); Shafiq, Yang and Nawaz (2022); Zhunio et al. (2021); Forhad and Alam (2021); Arief et al. (2019); Sahoo et al. (2020); Ahmad, Shafiq and Gilani (2019); Bucheli, Bohara and Fontella (2018) and others. However, our findings contrast with the findings of Kumar (2019); Mckenzie and Rapoport (2011); Hapsari (2019); Cortes (2015). Even though only 5.2 percent of remittance inflowed in Nepal is used in education in Nepal, it has multiple effects in long run educational outcome. Inflow of foreign remittance helps to frees up the household income. Spending small amount of remittance in educational outcome at present has high marginal utility in the long-run.

Error Correction Model: Short Run Dynamics

Table 7 shows the empirical finding of the error correction model (ECM). The coefficient of Cointegration Equation is negative (- 0.319285) and statistically is significant as the p-value is 0.0000. It indicates that there is a long-run equilibrium relation among the selected variables in this model.

Table 7. *ARDL Error Correction Regression*

Variables	Coefficient	Std. Error	t-Statistic	Prob.
Δ(LNSENROL (-1))	-0.222977	0.128408	-1.736470	0.1017
Δ(LNREMI)	0.002001	0.020229	0.098933	0.9224
Δ(LNREMI (-1))	-0.062447	0.019776	-3.157682	0.0061
Δ(LNSCH)	-0.163264	0.073064	-2.234541	0.0401
Δ(LNSCH (-1))	0.538022	0.098354	5.470263	0.0001
Δ(LNSCH (-2))	0.566535	0.097023	5.839180	0.0000
Δ(LNTEA)	-0.104514	0.070750	-1.477225	0.1590
Coint Eq^{n} (-1) *	- 0.319285	0.043828	- 7.285009	0.0000

Note. Author's estimation by using EViews 10.

The coefficient of error correction model (ECM) is negative (-0.31), indicating that the model is theoretically sound, with the probability being statistically significant. The absolute value of the ECM coefficient represents the rate at which the system adjusts to restore long-run equilibrium through short-run changes. In this case, the model corrects deviations from equilibrium at an approximate speed of 31 percent per year.

Residual Diagnostics

After estimating the empirical model, residual diagnostic tests are performed to assess the behavior of the residuals and to verify the overall adequacy of the model. Specifically, tests for serial correlation (LM Test), heteroscedasticity, and normality are carried out, with the results summarized in Table 8, Table 9, and Figure 5.

Table 8. *Breusch-Godfrey Serial Correlation (LM Test)*

F-statistic	1.380760	Prob. F (2,14)	0.2836
Obs*R-squared	4.613100	Prob. Chi-Square (2)	0.9096

Note. Calculated by the Author using EViews 10.

The presence of serial correlation in the data is tested using the Breusch-Godfrey Serial Correlation (LM) test. As shown in Table 8, the results indicate that there is no serial correlation in the dataset, since the p-value of the F-statistic exceeds 10 percent.

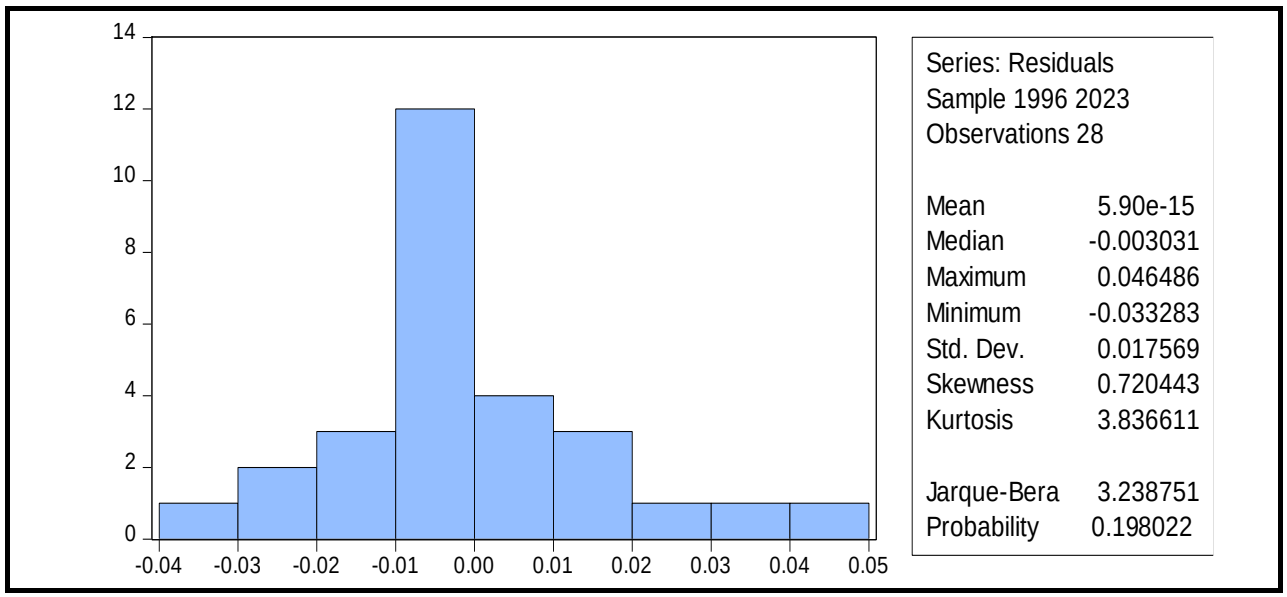
Table 9. *Heteroskedasticity Test: Breusch-Pagan-Godfrey*

F-statistic	0.730721	Prob. F (11,16)	0.6967
Obs*R-squared	9.362785	Prob. Chi-Square (11)	0.5884
Scaled explained SS	4.336095	Prob. Chi-Square (11)	0.9590

Note. Calculated by the Author using EViews 10.

The Breusch-Pagan-Godfrey test is used to detect the presence of heteroskedasticity in the model. The results, shown in Table 9, suggest that heteroskedasticity is not an issue in the analyzed model, as the p-value of the F-statistic is greater than 10 percent.

Figure 5. *Normality Test (Histogram)*



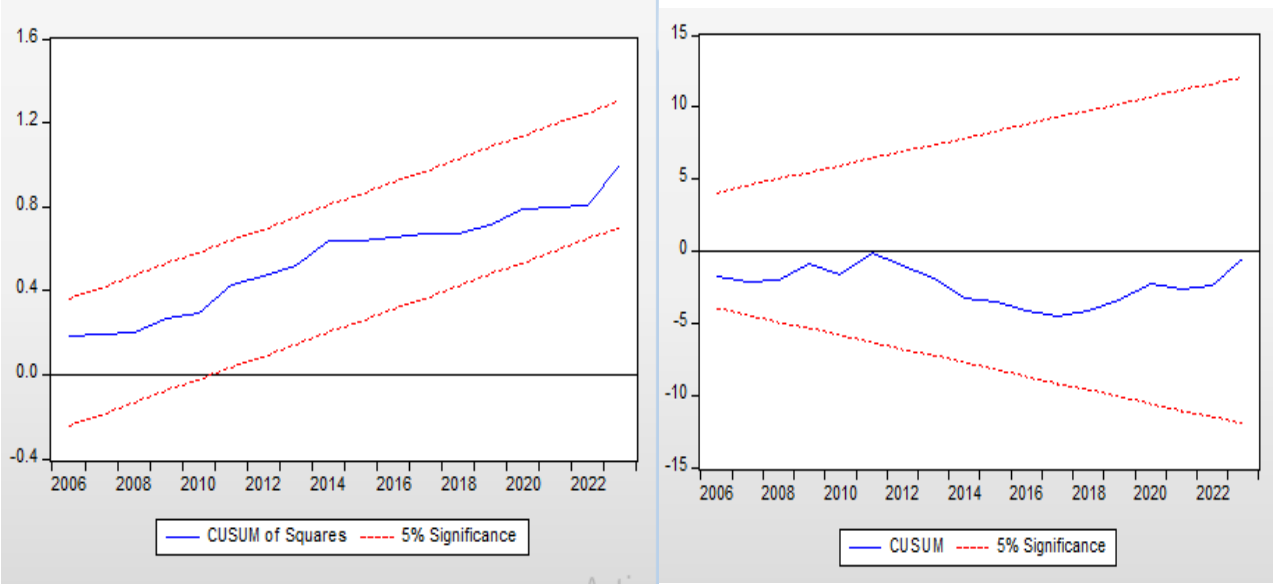
Note. Calculated by the Author using EViews 10.

Figure 5 shows the results of normality test of the study. The probability of 'J-B test' is more than 10 percent. It displays that the data used in the study are normally distributed.

Stability Diagnostics

A stability test has been conducted for the school enrollment model to examine whether the long-run and short-run parameters remain stable over time. For this purpose, the Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUM SQ) tests are employed, which assess the model's stability in the presence of potential structural breaks. The two red lines in the plots represent the critical bounds at a 5 percent significance level. If the CUSUM statistics remain within these bounds, the model is considered stable. In this study, the CUSUM plot lies entirely within the critical limits at the 5 percent level, indicating that the estimated model is stable. The results of the CUSUM test are presented in Figure 6.

Figure 6. *Plot of Cumulative Sum (CUSUM) and CUSUM of SQ of Recursive Residuals*



Note. Calculated by the Author using EViews 10.

5. Discussion

The present study was designed to explore the effects of remittance on primary school enrollment in the context of Nepal by using the Auto Regressive Distributed Lag (ARDL) model. The time series data for 31 years, spanning from 1993 to 2023 are collected from various secondary sources such as-various issues of economic survey published by ministry of finance (MOF), quarterly economic bulletins published by Nepal Rastra Bank (NRB). The result of this study aligns with the previous studies conducted by Gajurel and Niraula (2024), Orekoya and Tijani (2023), Sezgin et al. (2023), Chen, Raza and Alharthi (2023), Xia, Qamruzzaman and Adow (2022), Shafiq, Yang and Nawaz (2022), Zhunio et al. (2021), Forhad and Alam (2021); Arief et al. (2019); Sahoo et al. (2020); Ahmad, Shafiq and Gilani (2019);,Bucheli, Bohara and Fontella (2018) among others. However, our findings contrast with the findings of Kumar (2019), Mckenzie and Rapoport (2011), Hapsari (2019) and Cortes (2015).

This study found positive and statistically significant relation between primary school enrollment and remittance inflow from foreign countries. As the migrant workers send remittance, family members at home use it for the better education of their children. Remittance reduces the financial barriers of poor families as well. It helps to boost up the school enrollment. However, a negative relationship between the number of schools and primary school enrollment in Nepal may appear counterintuitive, but can be explained by several structural and contextual factors. First, in remote or rural areas, the government may establish more schools to improve access, yet these areas often face low population densities, high poverty rates, and limited awareness about the value of education, all of which can suppress enrollment despite the presence of schools. Second, many new schools might be under-resourced—lacking trained teachers, learning materials, or adequate infrastructure—making them unattractive or ineffective for students and parents. Additionally, declining birth rates or migration to urban centers and abroad may lead to fewer school-aged children in certain regions, creating a statistical illusion where more schools exist but enrollments remain low or decline. Finally, poor data coordination and inefficiencies in educational planning may result in redundant school construction in low-demand areas rather than addressing the actual barriers to enrollment, such as quality, affordability, and cultural attitudes toward education.

The insignificant effect of the number of teachers on primary school enrollment in Nepal can be attributed to several underlying issues beyond mere teacher quantity. Firstly, increasing the number of teachers does not necessarily address the core barriers to enrollment, such as poverty, child labor, gender discrimination, or lack of transportation, which prevent many children from attending school in the first place. Secondly, in many cases, newly recruited teachers are deployed to areas where student populations are already low due to migration or demographic changes, limiting their impact. Moreover, issues of teacher absenteeism, lack of motivation, and inadequate training mean that simply having more teachers does not guarantee a better learning environment that would encourage higher enrollment. In some rural or disadvantaged communities, the quality and consistency of education remain poor despite having a sufficient number of teachers, leading parents to perceive limited value in sending their children to school. Therefore, without significant improvements in education system, quality of teacher, infrastructure, and social awareness, increasing teacher numbers alone has little effect on boosting school enrollment.

6. Conclusion and Policy Recommendations

This study empirically examined the effects of foreign remittance on school enrollment in Nepal by using Auto Regressive Distributed Lag (ARDL) model. It uses the time series data for 31 years, spanning from 1993 to 2023. The findings reveal a statistically significant and positive relationship between foreign remittance and school enrollment, highlighting remittance as a crucial driver of educational investment in remittance-receiving households. This suggests that increased household income from remittances helps overcome financial barriers to schooling, such as tuition fees, educational materials, and opportunity costs associated with children's labor. On the other hand, the number of schools (NSCH) showed a negative and significant association with enrollment, possibly reflecting issues of underutilization, inefficiencies in school distribution, or a mismatch between infrastructure and

population needs. The number of teachers (NTEA), while theoretically important, did not exhibit a statistically significant effect on school enrollment.

The positive influence of remittance on school enrollment underscores the need for policies that leverage remittance flows toward sustainable educational outcomes. The government and financial institutions should promote formal channels of remittance transfers to ensure stable inflows and encourage the use of these funds for productive human capital development. Additionally, the negative effect of school numbers suggests a need to reevaluate the spatial planning and resource allocation within the education sector. It is vital to focus not only on expanding physical infrastructure but also on improving school quality, accessibility, and student retention strategies. Furthermore, given the insignificant role of the number of teachers, policymakers should shift their focus toward enhancing teacher quality, training, and accountability rather than merely increasing headcount. It implies that Nepal government and concerned authorities should focus on enhancing the quality of teacher, providing regular trainings, and discouraging absenteeism rather than increasing the number of teachers.

Through an analysis of recent data and trends, this study seeks to contribute to the ongoing discourse on the role of remittances in national development strategies. By providing insights into the relationship between foreign remittance and educational outcomes, the research aims to inform policy-makers, educators, and development practitioners about potential pathways to leverage remittances for enhancing educational opportunities and addressing disparities in school enrollment.

Future Prospects of Research

While this study establishes a foundational link between remittance and school enrollment, future research could explore several unexplored dimensions. Disaggregated analyses at the regional or household level could offer deeper insights into how remittance impacts vary by income group, gender, or urban-rural divide. Moreover, extending the model to include other socio-economic factors such as household consumption patterns, government educational spending, etc could enrich the explanatory power of the analysis.

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Appendix

Empirical Result of ARDL Model

Dependent Variable: Ln SENROL		Method: ARDL (2,2,3,1)		
Variables	Coefficients	Std. Error	t-Statistic	Prob.*
LnSENROL (-1)	0.457738	0.187301	2.443868	0.0265
LnSENROL (-2)	0.222977	0.198592	1.122791	0.2781
LnREMI	0.002001	0.027203	0.073571	0.9423
LnREMI (-1)	0.096108	0.025951	3.703410	0.0019
LnREMI (-2)	0.062447	0.024465	2.552480	0.0213
LnNSCH	- 0.163264	0.091320	- 1.787814	0.0928

Dependent Variable: Ln SENROL		Method: ARDL (2,2,3,1)		
Variables	Coefficients	Std. Error	t-Statistic	Prob.*
LnNSCH (-1)	0.077411	0.224891	0.344217	0.7352
LnNSCH (-2)	0.028513	0.169964	0.167759	0.8689
LnNSCH (-3)	-0.566535	0.125682	-4.507672	0.0004
LnNTEA	-0.104514	0.098529	-1.060739	0.3046
LnNTEA (-1)	0.298994	0.106698	2.802230	0.0128
C	4.227549	1.042712	4.054378	0.0009
R squared	0.997060	Mean dependent var		14.57452
Adjusted R squared	0.995038	S. D. dependent var		0.324014
S. E. of regression	0.022823	Akaike info criterion		-4.424582
Sum squared resid	0.008334	Schwarz criterion		-3.853638
Log likelihood	73.94415	Hannan -Quinn criterion		-4.250039
D.W. Statistic	2.367643	Prob (F-statistic)		0.000000

Note. Author's estimation by Using EViews 10.