Nexus between Foreign Remittance and Secondary Level Private School Enrollment in Nepal: A Comprehensive Analysis

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ABSTRACT

This study investigates the relationship between secondary level private school enrollment and key economic indicators in Nepal, namely per capita GDP and remittances. The research uses quantitative techniques and secondary data analysis, applying a vector error correction model (VECM) to investigate dynamics over both long-term and short-term periods. This study used analytical and descriptive methodologies in a quantitative fashion. The variables were measured, and the effect of independent factors on the dependent variable was quantified, using secondary data. In order to investigate the main goal of the study, the time series method analyses were conducted. The EViews statistical tool, version 10, was then used to analyze and interpret the collected data. The findings reveal significant correlations between economic prosperity and private school enrollment, emphasizing the pivotal role of economic factors in shaping educational choices. While rising per capita GDP suggests improvements in living standards, remittances positively contribute to household income, potentially boosting school enrollment rates. On the one hand, increasing per capita GDP indicates higher standards of living and remittances represent an additional source of household income, which might help increase school enrollment rates. Still, there were also lessons in these data that are relevant today — and the game serves as a reminder of how much work we still have to do to eradicate inequities and make opportunities equal for all children. The findings point to the necessity of targeted policies in favor of the private education sector and towards broader economic growth, focusing on educational equity and access in Nepal. It also highlights the need for more academically rigorous outcome evaluations that investigate underlying mechanisms linking these relationships and for longer-term monitoring of uptake trajectories to better inform educational and economic development interventions.

Keywords: Foreign Employment, Remittance, School Education, Household Income

I. INTRODUCTION

The phenomenon of remittances and school enrollment in Nepal has been researched to a great extent by economists. Remittances, money sent from foreign workers back to their home countries can have both positive and negative effects on an economy and society of a nation, including education (Zhunio et al., 2022). Higher remittances are likely to improve household income and also education investment (Khatri, 2017). Such remittances contribute to payment of school fees and purchase of materials which restore and rise in the enrolment (Bhandari, 2020).

Children who live in homes where remittances make up a significant part of the income may feel less pressure to work and contribute. Thereby, reduce child labor and enable them to go to school (Bhandari, 2020). The funds recipients spend remittances on school transport and other beneficiaries related costs increase access to education. This is particularly relevant in rural areas where schools are usually located far away from homes (Neupane, 2020).

Different households, different communities have unique remittance income allocations. If remittances are skewed towards some groups or regions, it could lead to income inequality and disparities in education (Mishra et al., 2022). Remittances alone can lead to an over focus and lack of investment in critical areas such as education

(Bhandari, 2020). Quezada: But if for whatever reason remittances start coming in less, that could lead the household to no longer be able to afford education. Enrollments records increase due to remittances but there have zero effect on the quality of education (Bhandari, 2020). It does not mean that only an educator who is of quality makes a school good, but there are so many factors like the facilities, change in curriculum which also makes an education more or less effective (Neupane, 2020).

In Nepal, remittances have two major effects: they augment household income and reduce the opportunity costs of education allowing parents to send their children to school. Yet, lawmakers need to account for socioeconomic factors and they must develop an ultimate plan in order to make quality education great again (Bhandari, 2020).

This paper provides a systematic approach to understand the complex link between remittances and private schools' enrollment at the secondary level in Nepal including identification of potential causal pathways, focusing on both its socioeconomic aspects and consequences.

This study addresses the gap in understanding the effects of remittance income and per capita GDP on educational choices in Nepal, specifically focusing on secondary-level private school enrollment. While remittances can elevate household income and ease financial barriers to education, their direct impact on enrollment decisions for private schooling at the secondary level remains underexplored. Additionally, economic growth indicators, such as per capita GDP, may interact with remittances to shape educational access, potentially highlighting disparities across socio-economic groups. This research aims to clarify these relationships by analyzing the influence of remittances on secondary private school enrollment, investigating the role of per capita GDP in educational access, and examining whether remittance income fosters educational equity across different socio-economic groups in Nepal

1.1 Statement of the Problem

Nepal has experienced profound economic transformation evident from remittance and per capita GDP. These economic changes are also said to shape the education sector. Much research has been done on the impact of remittances on household income and consumption, however little attention has been focused around how economic factors i.e. per capita GDP and remittances mold private schooling attendance at secondary level This relationship is important for policymakers to understand because private school enrollment reflects larger trends in education equity and access. With such a framework in hand, it is possible to estimate the effects on private schooling of income from remittances and changes in standards of living due to GDP growth, at the household level during a period when more children were entering primary school. The present study aims to fill this gap by analyzing the linkages between economic aspects to secondary private school enrollment in Nepal, over time and thus provides some insights into how prosperity shapes students' educational choices.

1.2 Research Objectives

i. To explore the association between per capita GDP and enrollment of private schools at secondary level in Nepal.
ii. For an analysis of the impact of remittances on household decisions to send children to private schools
iii. Using a Vector Error Correction Model (VECM) to explore the long-term and short-term dynamic relationships between economic indicators (per capita GDP, remittances) and private school enrollment

1.3 Research Hypotheses

Ho_1: Remittance income has a positive effect on secondary level private school enrollment in Nepal.
Ho_2: There is a significant relationship between per capita GDP and the rate of secondary level private school enrollment.
Ho_3: Higher remittance levels contribute to greater educational access among lower-income households.

II. LITERATURE REVIEW

One should study why a house member left the native place and why only some one specific was selected to attend school. The growth is attributed to a larger population of low-income elementary school students. The stratified panel has less bias by weak instruments and omitted variable patterns compared to the annual cross-sectional estimates which makes it more robust.

Al-Islam et al. (2022) has studied on influence of remittances on school attendance in Bangladesh. The researchers examined cross-sectional data from the Household Income and Expenditure Survey conducted in 2016. Remittances and school attendance have a positive correlation, as predicted by probit regression. Furthermore, a parent's level of education positively affects the academic achievement of their child. Families with two or three

children are more likely to enroll their children in school than those with one or four children, according to the study. Urban household location and male child gender negatively impact enrollment. That study suggested that the government could offer additional incentives to children from remittance-receiving families in addition to those already offered to migrant workers. The study recommended that policymakers need to create innovative intervention programs and increase public awareness of the advantages of education to tackle the decreasing participation rates among urban children, boys, and single-child households.

2.1 Empirical Review

Yousaf et al. (2023) examined how remittances and poverty affect GCC economic growth. The study used 2000–2021 panel data. The data analysis methods included panel unit root tests, ARDL models, and Granger causality tests. Over time, the panel ARDL analysis showed several significant correlations with GCC economic growth. Economic growth was positively correlated to labor, gross fixed capital production, and secondary school enrollment. However, the GCC countries' poverty headcount ratios and economic progress are inversely correlated. There were effects on labor, gross fixed capital formation, poverty, and remittances. That study showed that in the Gulf Cooperation Council (GCC) nations, remittances boost growth while poverty hindered it. Thus, GCC nations should take proactive steps to boost remittances and reduce poverty to boost economic growth.

Khan and Khan (2016) examined how remittances affect school attendance and achievement in Pakistani 4–15-year-olds. It was used the 2010/11 Pakistan Social and Living Standards Measurement Survey, which covered the entire nation. The village-level migrant network variable interacted with household adult numbers to measure remittances. The instrumental variable Probit model indicates that children from households that receive remittances were more likely to attend school. This effect was especially noticeable for girls and children living in rural regions. The study concluded that in Pakistan, remittances contributed to the reduction of gender and regional differences in children's school attendance. The impact of remittances on children's academic achievement was investigated using the IV censored ordered Probit model. The study further found that except for urban children, the estimated impact was mostly negative and statistically significant, lowering the probability of grade advancement.

Joseph and Wodon (2014) used meteorological data, a recent nationally representative household survey, and matching techniques to investigate the relationship between remittances and markers of poverty and human development in Yemen. Malnutrition, vaccination status, and school enrollment were some of factors under study. Estimates were made for the country and for various climates. Based on the study, remittances—especially those from outside that provide recipients with more income—had a significant effect on the indices. In areas with difficult weather, such as higher temperatures or less precipitation, remittances had a greater impact on poverty and hunger. School attendance was more impacted by remittances in climate-friendly areas. The results showed that more affluent households used their remittances toward education, whereas less affluent households utilized them to pay for necessities.

Murakami (2019) examined how international migration affected Tajikistani children's education. A comprehensive household survey that accurately represented the nation was used for this analysis. A switching Probit model addressed endogeneity and self-selection issues in migration, remittance, and school enrollment studies. To investigate the effects of migration and remittances on children in different homes, counterfactual scenarios were developed. According to the statistics, children who lived in homes with migrant relatives missed school by 10%. This study covered remittance-receiving households, those with and without migrant parents, and homes with and without migrants. The movement of parents had a greater effect than that of other household members. Remittances reduced migration's negative consequences by 1-3 percentage points, with the greatest advantages being shown in impoverished homes led by young, illiterate people.

Stanley and Fleming (2019) stressed the importance of migration and remittances for Nepal, but the country still struggles with financial development. The nation's labor movements can boost human capital investments by encouraging more school-aged children to enroll. These gains can be greatly improved by understanding microeconomic processes. The study investigated how children's school attendance in Nepal was affected by remittances from both households and non-household sources. The benefits and drawbacks of migration and remittances were examined independently. 9,335 school-age children's data from the Nepal Living Standards Survey (NLSS III) were used in this research. The marginal impacts of enrollment were estimated by an external approach. Studies revealed that children's school enrollment rises by 2% as a result of remittances. In order to minimize the effects on families while bringing remittance senders and recipients closer together, the study recommended that policymakers promote domestic migration.

Gyimah-Brempong and Asiedu (2015) examined how remittances affected Ghana's educational funding. Families' propensity to enroll their children in elementary and secondary school was influenced by remittances, indicating that remittances encouraged the expansion of education. Remittances from overseas had a big influence on

primary and secondary school admissions. Remittances to families headed by women appeared to encourage education investment more than remittances to households headed by males, according to empirical study. The study showed that via investing in human capital, overseas remittances promoted long-term economic growth and reduced poverty.

Sami and El-Aziz (2018) investigated how remittances impact the educational outcomes of Egyptian children aged 6-21. Schoolchildren and university students were the two age categories in the study. In contrast to other studies that concentrated on school attendance, the one also looked at the impact of remittances on educational success. The Egypt Labor Market Panel Survey (ELMPS, 2012), which offered comprehensive socioeconomic and migratory data on households, was used in the study. The study evaluated the impact of receiving remittances on academic performance using an instrumental variable (IV) method in an Ordered Probit Model. Remittances seemed to have minimal impact on kids, according to the data, but they aided university students in overcoming financial difficulties and advancing their study.

Nguyen and Purnamasari (2011) conducted a thorough empirical investigation to look at the consequences of remittances and foreign migration in Indonesia. Their study looked at how female migration affects the labor supply and child outcomes in the homes that transfer their children abroad. The researchers used instrumental variable estimation to evaluate the data from the Indonesia Family Life Survey. Migration and remittance earnings were calculated using historical movement networks. Research indicated that the impact of international migration on Indonesian families varied according on the gender of the migrants. Household workers' hours were typically reduced by migration. It had less effect in houses when there were female migrants. Meanwhile, child labor was reduced when women relocate and send money home. Remittances and migration did not, however, statistically significantly affect school attendance. Bhandari (2020) used third-generation Nepal Living Standard Survey data to investigate. Quality education using indicators like private school admission rates, tutor use, tutoring service investment, and school tuition fees. Instrumental variable (IV) regression was used to analyze migrant households to address the issues.

The study found that there was no empirical evidence connecting remittance to private school enrollment or tutoring after adjusting for family and child variables as well as a geographical fixed effect. Remittances had a limited positive effect on private and school tuition.

2.2 Conceptual framework of study variables

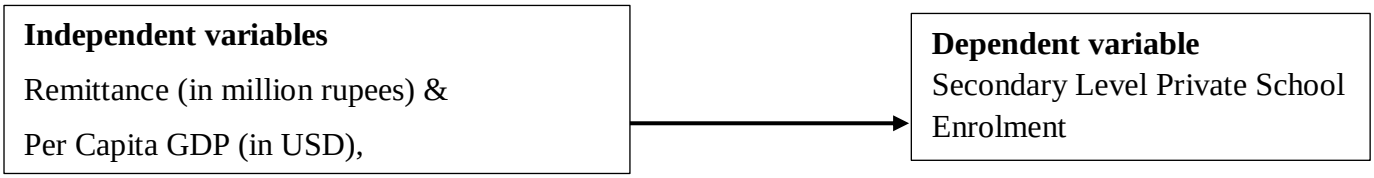

Figure 1
Relationship between Dependent and Independent Variables

III. METHODOLOGY

This study used analytical and descriptive methodologies. The variables were measured, and the effect of independent factors on the dependent variable was quantified, using secondary data. The EViews statistical tool, version 10, was then used to analyze and interpret the collected data.

$LNPVTESL = \beta_0 + \beta_1 t + \beta_2 LNPCGDP + \beta_3 LNREM + e_t$

Where,

LNPVTESL= Natural Logarithms of Secondary Level Private School Enrolment

LNPCGDP = Natural Logarithms of Per Capita GDP (in USD),

LNREM = Natural Logarithms of Remittance (in million rupees)

e_t = error term

β_i = constant coefficient

3.1 Sources of Data

This study solely used secondary data and combined analytical and descriptive methodologies. In line with the goals of the study, the body of existing material from books, journals, and the Nepal Rastra Bank was used. The Ministry of Finance of Nepal's Economic Survey provided statistics on student enrollments from 2000 to 2022. The

Quarterly Economic Bulletin 2023–October of the Nepal Rastra Bank provided data on per capita GDP (in USD) and remittances (in million rupees).

Table 1

Variables, Abbreviations, Units and Data Sources Used in Research

Variable names	Symbols	Units	Data sources
Secondary level private school enrolment	PVTESL	Head	MoF, Economic Survey
Per Capita GDP	PCGDP	USD	QEB 2023, NRB
Remittance	REM	Million (Nrs.)	QEB 2023, NRB

3.2 Econometric Method

In order to investigate the main goal of the study, which was to assess the link between Secondary level private school enrollment, Per Capita GDP (in USD), and Remittance (in million rupees), the time series method analyses were conducted using the following methodologies.

3.2.1 Stationery Test

Most time series econometric methods work under the assumption that the variables in the time series are stationary. As a result, the dynamic time series model was estimated and tested using standard techniques. "Integrated to the order one," or I(1), is the term used to describe a series with a unit root process. Conversely, I(0) process is the name given to a stationary process. Time series are frequently categorized using this terminology according to their stationarity characteristics.

3.2.2 Co-integration Test

The co-integration test determines if non-stationary time series variables share a long-term equilibrium relationship. When these variables exhibit a common stochastic trend, they are co-integrated, indicating a meaningful connection over time (Engle & Granger, 1987). This test is essential for analyzing long-term relationships and ensuring accurate econometric inferences (Johansen, 1991), helping to avoid misleading results from non-stationary data (Stock & Watson, 2007).

3.2.3 Vector Error Correction Model

The Vector Error Correction Model (VECM) analyzes and predicts sets of cointegrated variables whilst also allowing for long-run equilibrium relationships and short-run deviations from them, extending the VAR model. It may be helpful to understand dynamics among variables both short-term and long-term.

3.2.4 Long Run and Short Run Relationship

Given the long-term link between the variables, the vector error correction model may be applied.

3.2.5 Granger Causality Test

Pair Wise Granger Causality Test is used to find the relationship between the variables. Granger-cause theory states that x is responsible for y if past values of x can be utilized to forecast future values of y given past values of y. Granger causality is commonly evaluated by regressing y on both the lagged value of x and its own lagged values. According to the null hypothesis, all calculated coefficients on the x-lag values are 0 collectively. Rejecting the null hypothesis in Granger's model entails rejecting the null hypothesis that x does not cause y.

3.2.6 Autocorrelation Test

Autocorrelation, which looks at the relationship between a variable's past and present values, is also known as lag correlation or serial correlation. Autocorrelation in the model's residuals typically means that the model's specification was incorrect or incorrect in some other manner. One cause might be that a crucial variable, or set of crucial elements, is missing from the model. The Breusch-Godfrey Lagrange multiplier test is used in this instance by the auto correlation test.

3.2.7 Test of Normality

In statistics, normality tests determine whether a data set is suitable for a normal distribution and if a randomly distributed variable underlying the data set would also have a normal distribution. To ascertain whether the data are normal, the Jarque-Bera test is performed. The Jarque-Bera test quantifies the degree to which the kurtosis and skewness of sample data conform to the properties of a normal distribution.

A result of one indicates the rejection of the null hypothesis at the 5% significance level. In other words, the distribution of the data is not normal. The information is considered to be given on a regular basis if the value is zero.

3.2.8 Heteroskedasticity

When the variability of one variable is distributed unevenly over the values of the second variable that predicts it, the phenomenon is known as heteroskedasticity. This example of a violation of a linear regression modeling assumption may affect the validity of an economic study. Because ordinary least squares (OLS) regression assumes that all residuals come from a population with a fixed variance (homoscedasticity), heteroskedasticity is an issue.

IV. FINDINGS & DISCUSSIONS

4.1 Students Enrolments

This pattern emphasizes how important it is to keep funding private schools in order to guarantee top-notch educational opportunities for all students.

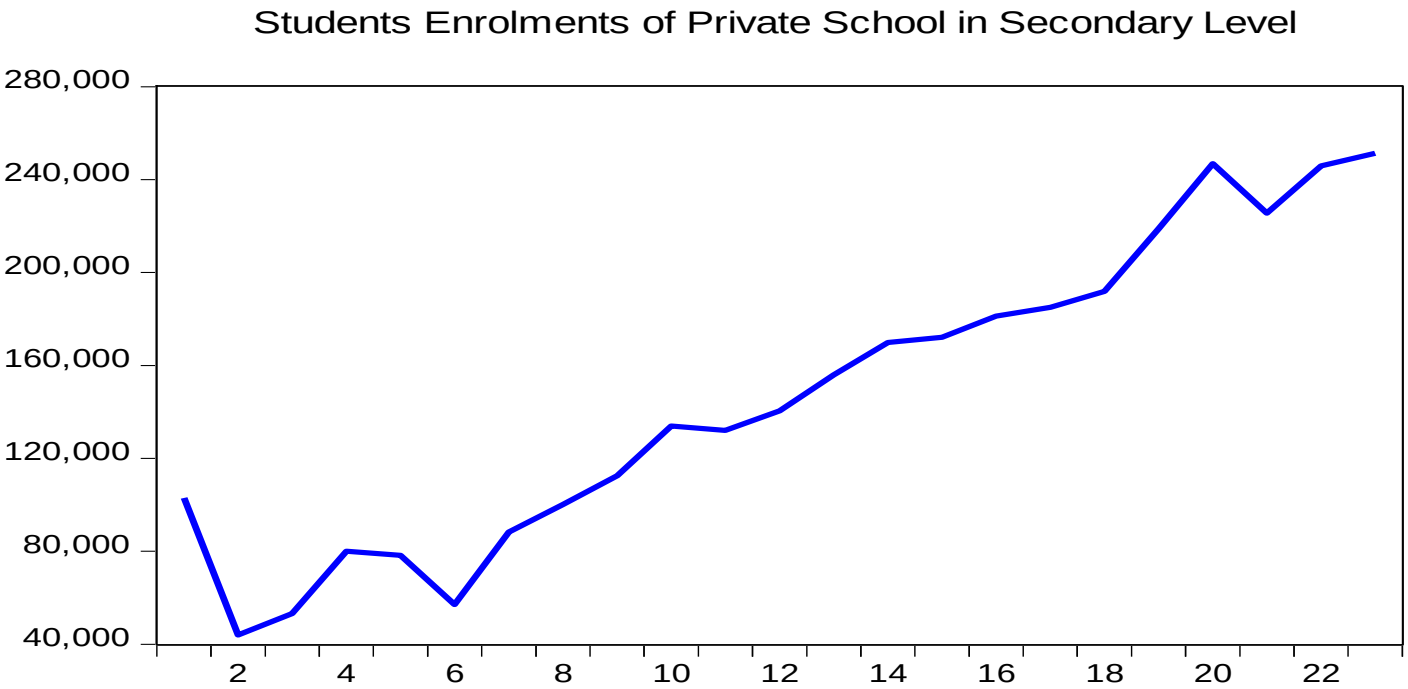

Figure 2

Trend Line of Students Enrolments of Private School in Secondary Level in Nepal

4.2 Per Capita GDP (in USD)

The GDP per person in Nepal has been rising in US dollars. It increases points to a steady rise in Nepal's average living level. It's crucial to keep in mind, though, that $1399 is still a little amount in comparison to many other nations, suggesting that further economic growth is possible.

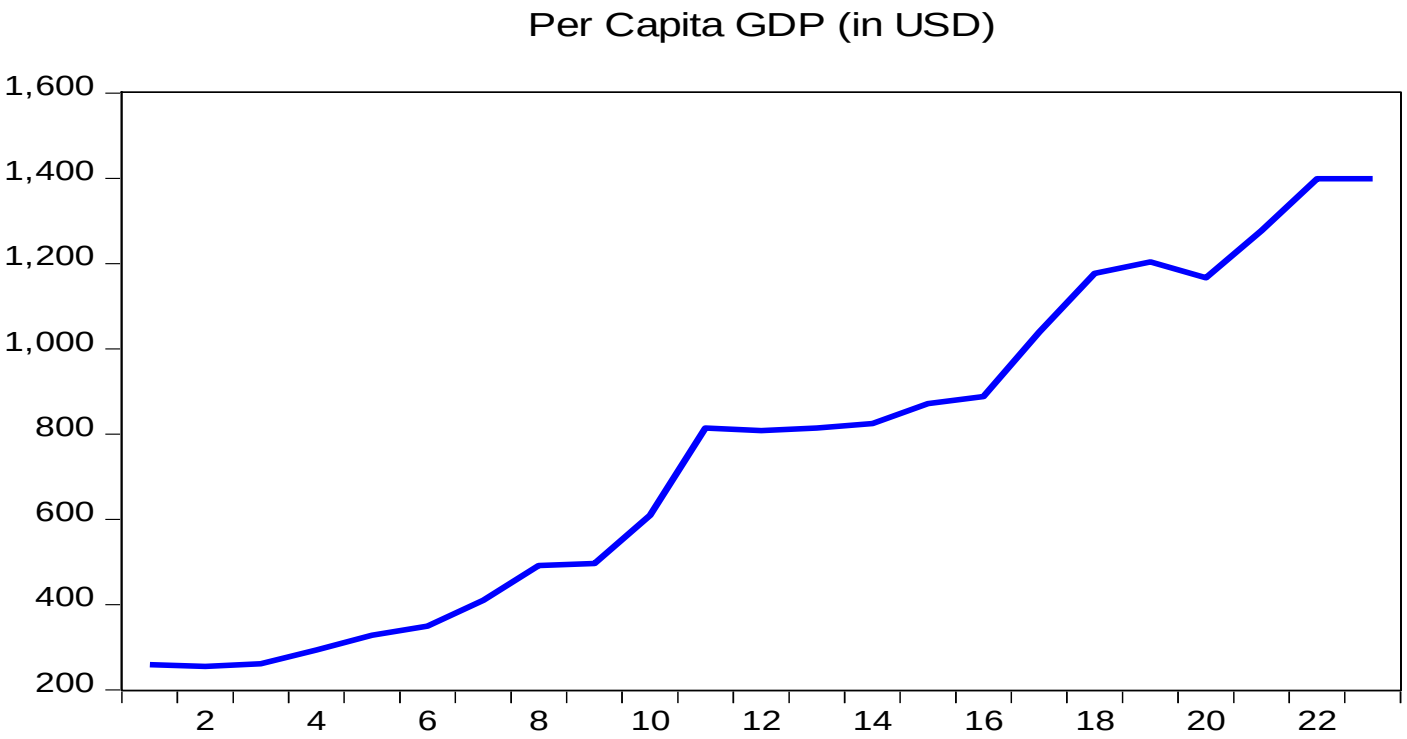

Figure 3
Trend Line of Per Capita GDP (in USD)

4.3 Remittance (In Million Rupees)

While remittances have the potential to boost household income and school enrollment rates in Nepal, there are some potential negative effects as well. These include parental absence and child labor. To mitigate these effects, specific policies and interventions that support equal access to education for all children are needed.

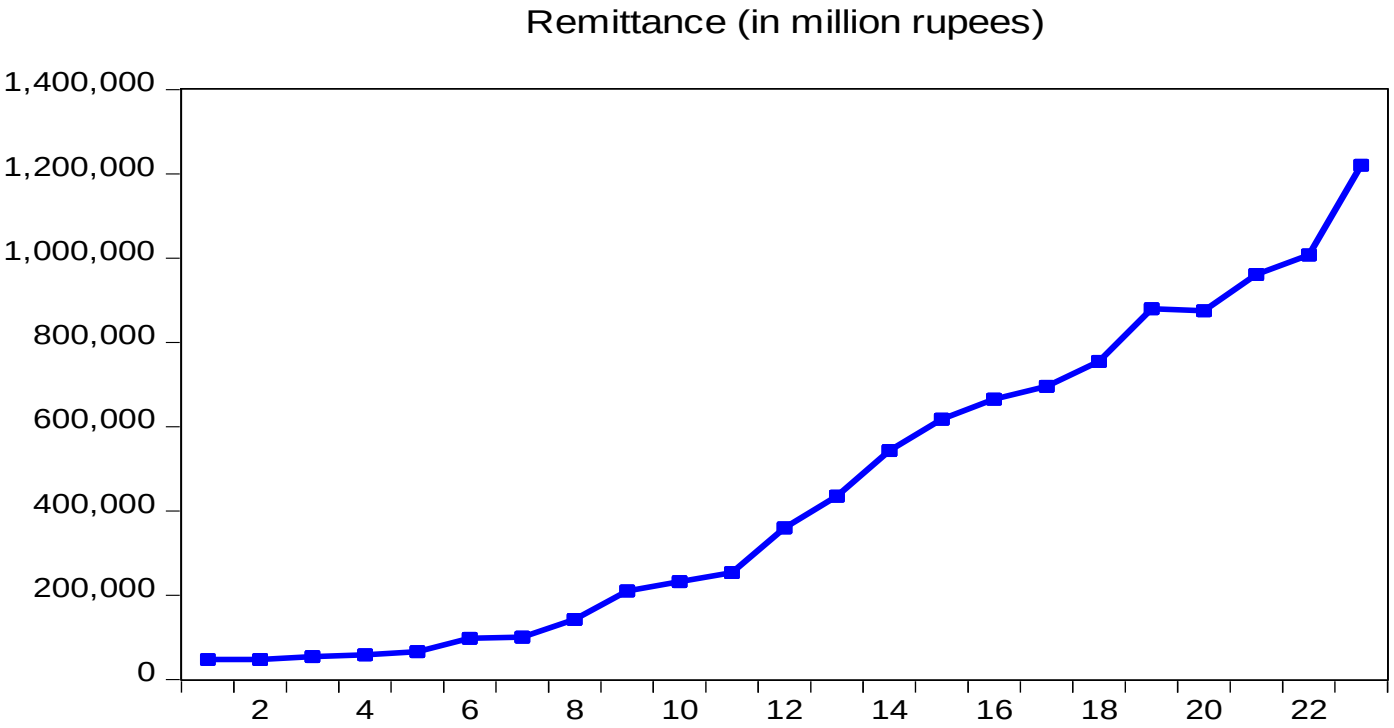

Figure 4
Trend Line of Remittance (in Million Rupees)

4.4 Econometric Analysis

4.4.1 The Unit Root Test

The stationarity of the data is evaluated using the unit root test. The stationarity condition of the variables is tested using the unit root test, or ADF test (Poudel, 2022).

Table 2

Results of Individual Unit Root Test

Series	On Level		On First Difference	
	t-Stat	Prob-Value	t-Stat	Prob-Value
LNPVTESL	-1.3916	0.5655	-8.4425	0.0000*
LNPCGDP	-0.9502	0.7521	-3.8814	0.0082*
LNREM	-1.0067	0.7322	-4.4415	0.0024*

Source: Author's calculations performed using E-Views

* Demonstrates the great importance of the finding at the 1% significance level.

At a significance level of 5%, the results of the Augmented Dickey-Fuller (ADF) test are as follows: (i) When the variables exhibit their initial difference, the null hypothesis is accepted; but, (ii) when the level series of each variable has a unit root, it is rejected. This implies that all series are integrated of order one since, after being differentiated once, all series become stationary. The fact that the variables are co-integrated suggests that there may be a long-term link between them (Poudel et al., 2024).

4.4.2 VAR Lag Order Selection Criteria

The right lag duration must be established prior to doing the co-integration test. The majority of the factors suggest using two lags, as shown in the table below. As a result, we choose lag (2) for our further testing.

Table 3

VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	8.996963	NA	0.000110	-0.599696	-0.450336	-0.570540
1	70.00504	97.61293	6.17e-07	-5.800504	-5.203065	-5.683878
2	84.62694	19.00847*	3.80e-07*	-6.362694	-5.317175*	-6.158598*
3	93.81289	9.185953	4.57e-07	-6.381289*	-4.887691	-6.089723

4.4.3 Co-Integration Result

Co-integration is the result of combining multiple time series variables with the same level of integration. The co-integration of LNPVTESL, LNREM, and LNPCGDP indicates a strong relationship and a potential long-term association. It is possible for these variables to exhibit many co-integrating relationships. The number of co-integrating equations is ascertained using the Johansen test, which also offers test statistics and estimates (Mackinnon, 2010). Table 4 displays the results of the Johansen co-integration test.

Table 4

Results of Johansen Co-integration Test

Unrestricted Co-integration Rank Test (Trace)				
Hypothesized		**Trace**	**0.05**	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.669264	33.47684	29.79707	0.0180
At most 1	0.328188	11.34818	15.49471	0.1910
At most 2	0.156025	3.392640	3.841466	0.0655
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.669264	22.12867	21.13162	0.0361
At most 1	0.328188	7.955537	14.26460	0.3832
At most 2	0.156025	3.392640	3.841466	0.0655

One co-integrating equation is shown by the trace and max-eigenvalue tests at the 0.05 level. These test findings suggest that there may be more than one co-integrating connection between the variables, if there isn't already one.

4.4.4 Vector Error Correction Model

Now that the long-term link between the variables has been established, we may evaluate and estimate the VECM. All computations employ level data, and the model's variables are immediately translated into their beginning differences. The VECM equation for the dependent variable, secondary student enrollment at private schools (PVTESL), is as follows:

D(LNPVTESL) = C(1)*(0.00505*LNREM(-1) - 0.7952*LNPCGDP(-1) - 5.9809 - LNPVTESL(-1)) + C(2)C(3)*D(LNREM(-1)) + C(4) + *D(LNPVTESL(-1))C(5)*D(LNPVTESL(-2)) + C(6)*D(LNREM(-2)) + C(7)*D(LNPCGDP(-2)) + C(8) *D(LNPCGDP(-1))

Where, C (8) = Constant / intercept and C (1) = Coefficient of co-integrating equation (long-term causation), C (2), C (3), C (4), C (5), C (6), and C (7) = Coefficient of co-integrating equation (short-term causality).

Table 5

Results of Vector Error Correction Model

Constant	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C (1)	-0.899346	0.365557	-2.460211	0.0300
C (2)	0.323618	0.228657	1.415298	0.1824
C (3)	0.771052	0.184126	4.187644	0.0013
C (4)	0.085078	0.271289	0.313606	0.7592
C (5)	-0.231824	0.120532	-1.923331	0.0785
C (6)	-0.048947	0.151366	-0.323367	0.7520
C (7)	-0.581112	0.275998	-2.105494	0.0570
C (8)	-0.012347	0.041978	-0.294132	0.7737
R-squared	0.867077	Mean dependent var		0.077616
Adjusted R-squared	0.789538	S.D. dependent var		0.157531
S.E. of regression	0.072269	Akaike info criterion		-2.127663
Sum squared resid	0.062674	Schwarz criterion		-1.729370
Log likelihood	29.27663	Hannan-Quinn criter.		-2.049912
F-statistic	11.18252	Durbin-Watson stat		2.210975
Prob(F-statistic)	0.000203			

Table 5 displays the VECM results. The variance of the explanatory components is represented by the R-squared values. It demonstrates how well the model describes the data. With a respectable R-square value of 0.8671 (86.71%), the model demonstrates that it is sufficient and does not exhibit false regression. A long-term relationship between LNPVTESL and the independent components is shown by a substantial and negative coefficient of the VECM.

4.4.5 Long Run Causality

The co-integrating equation (LNPVTESL(-1) - 0.0505*LNREM(-1) - 0.7952*LNPCGDP(-1) - 5.9809) is obtained from the VECM equation. The error correction (EC) term is constructed using the coefficient C(1) of this equation. The long-run causality is then obtained from the EC term. At the 5% significance level, the coefficient of ECM is statistically significant, displays the predicted negative sign, and ranges from zero to one. This emphasizes the importance of the error correcting mechanism and shows that the level of PVTESL and the explanatory variables are in a stable, long-term equilibrium (Gujarati, 2004).

The long-term elasticity is reflected in the ECM, which shows a feedback mechanism of about 89.93% from the disequilibrium created by the explanatory components in the prior year. Stated differently, the coefficient of the error correction term indicates the rate at which the enrollment level adjusts to variations in the explanatory variables to reach long-term static equilibrium. Consequently, one may characterize the pace of adjustment as quick.

4.4.6 Short Run Causality

The short-run causal relationship between remittances and secondary school enrollments at private schools is examined by utilizing the remittances-representative VECM coefficients C (3) and C (6). The correlation between per capita GDP and secondary school enrolment in private schools is examined in further detail using coefficients C (4) and C (7), which represent per capita GDP.

Table 6

Wald Test Results for Short Run Causality

Null Hypothesis: C(3) = C(6)=0 (two lag of remittances)			
Test Statistic	**Value**	**df**	**Probability**
F-statistic	9.169407	(2, 12)	0.0038
Chi-square	18.33881	2	0.0001
Null Hypothesis: C (4) = C(7)=0 (two lag of per capita GDP)			
Test Statistic	**Value**	**df**	**Probability**
F-statistic	2.334634	(2, 12)	0.1392
Chi-square	4.669267	2	0.0968

The study employed the Wald test's chi-square value to determine the short-term causal association between PVTESL and remittances. There exists a short-run causal relationship between remittances and PVTESL if coefficients C (3) and C (6) have a combined effect on the PVTESL. Table 5 displays the Wald test findings. It implies that the PVTESL cannot be simultaneously affected by the H0, or C (3) = C (6) = 0, of lag two. It is possible to reject H0 given that the chi-square value is 18.33881, or less than 1%. This implies that the PVTESL is influenced by the combined action of coefficients C (3) and C (6). So remittances are causally related to PVTESL, in the short run. And the chi-square value between per capita GDP and PVTESL is 4.669267, which is less than 10%, showing a short-run causal relationship between them since C (4) and C (7) jointly affect PVTESL with 90% confident level at least in one direction.

4.4.7 Granger Causality Test

A commonly used method to test this is by using the Granger Causality Test, which can help identify of any way variables in the model are chorological related. A strong result on the Granger Causality Test (examined in Section 3) for (2023), would suggest that autoregressive values of predictor variables could potentially hold information which could be used to forecast the dependent variable.

Table 7

Pairwise Granger Causality Tests

Null Hypothesis	**Obs.**	**F-Statistic**	**Prob.**
LNREM does not Granger Cause LNPVTESL	21	21.9472	3.E-05
LNPVTESL does not Granger Cause LNREM		3.08194	0.0738
LNPCGDP does not Granger Cause LNPVTESL	21	13.2603	0.0004
LNPVTESL does not Granger Cause LNPCGDP		1.25049	0.3129
LNPCGDP does not Granger Cause LNREM	21	6.71872	0.0076
LNREM does not Granger Cause LNPCGDP		4.48002	0.0285

t can be observed from these findings that there may be Granger causality for both pairs from LNREM to LNPVTESL, from LNPCGDP to LNPVTESL but not in the reverse order. There is also a Granger causality from LNREM to LNPCGDP but not the other way.

Model Diagnosis

As diagnostic assessment is a positive and constructive endeavor, researchers may require to revise and update their models due to their findings. It is important to ensure that the selected model remains true to the data economics in practice. In order to do this, several diagnostic tests must be performed such as description of the model parameters, evaluation of the normality, examination of the stability of the model, examining the possibility of serial correlation and an examination of the residuary heteroskedastic.

F-Test

An F-statistic with a p-value of less than 1 percent and an R squared of 86.71 percent indicates a well-fitted best linear model. This F-statistic p value will, therefore be effective in determining the significance of the model fitness since it is less than one percent which is quite impressive.

Normality Test

For investigations of whether the variable distribution of the model follows normal assumptions or not one can use Jarque-Bera test. This test is important as it avers visibility of normal distribution pattern for the variables, and thus is desirable for practice. Thus the test results were:

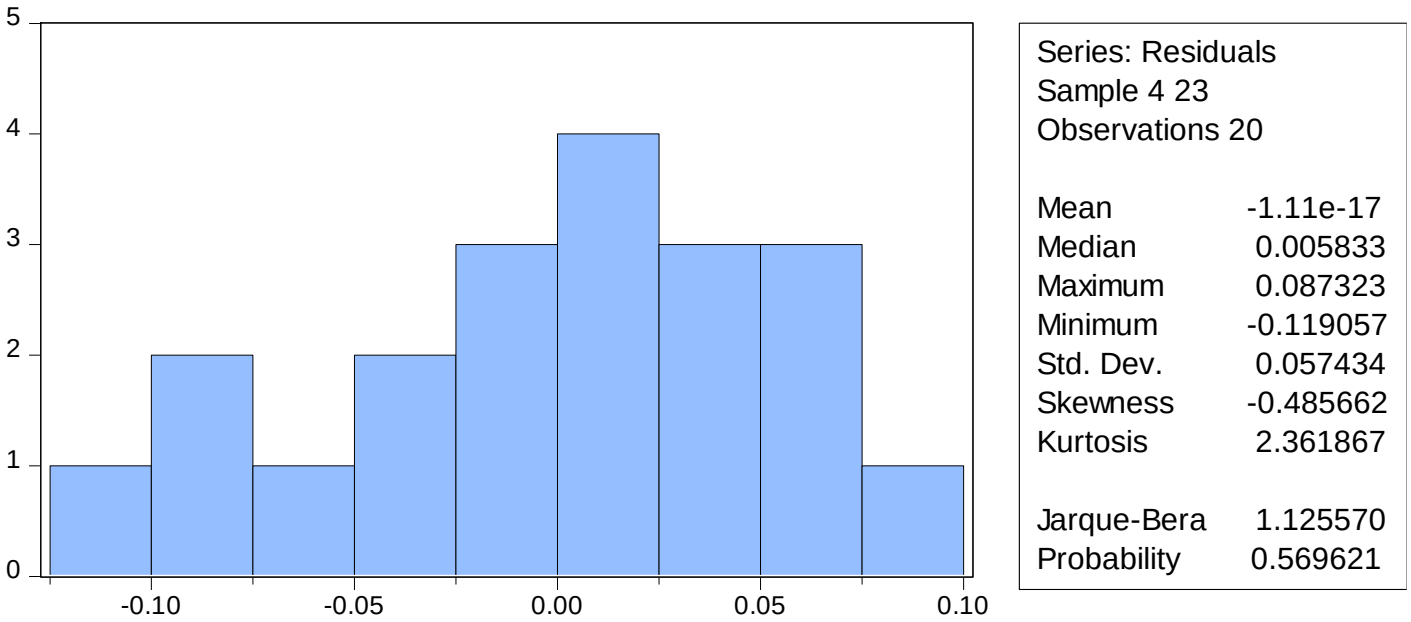

Figure 5

Jarque-Bera Normality Test

Given that the test's probability is greater than the 5% significance level, the Jarque-Bera test result demonstrates that the null hypothesis is upheld. Given that it is greater than five percent, the Jarque-Bera probability value (0.569621) suggests that the model's residuals have a normal distribution.

Heteroskedasticity Test

An issue with econometric regression analysis called heteroskedasticity can be found with the Bruesch-Pagan-Godfrey test. This test's outcomes are shown in the table below.

Table 8

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	3.127976	Prob. F (9,10)	0.0451
Obs*R-squared	14.75778	Prob. Chi-Square (9)	0.0978
Scaled explained SS	3.617665	Prob. Chi-Square (9)	0.9347

The results of the heteroskedasticity test are shown in Table 7. It is feasible to conclude from the data that the model does not exhibit heteroskedasticity given that the null hypothesis of homoscedasticity was not rejected at a 5% significance level. In other words, if the observed R-squared p-value is more than 5%, the data is homoscedastic.

Breusch-Godfrey Serial Correlation LM Test

The serial correlation inside the model is assessed using the Breusch-Godfrey LM test, and the results are displayed as follows:

Table 9
Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.661697	Prob. F (2,10)	0.5372
Obs*R-squared	2.337451	Prob. Chi-Square (2)	0.3108

Table 9 presents the results of the Breusch-Godfrey Serial Correlation LM Test, which show that autocorrelation is present in the model. Since there is no serial correlation and the probability associated with Obs. R-squared is more than the 5% significance level, we conclude that the null hypothesis is accepted.

Stability Test in VECM

In econometrics, such tests yield more confidence in predictions made with estimations and clear understanding of parameters. Most importantly, a stability test helps in determining whether the estimated relationships actually endure across time. The CUSUM test involves the analysis of cumulative residuals regarding a specific coefficient which is used for reference.

CUSUM Test

The long red lines incident to the upper and lower curves depict the upper and lower bounds of the 5percent confidence limits of the CUSUM statistic. The blue line is the actual CUSUM statistic. It was in this case shown that the practice blue line was enclosed between the red borders which in essence indicated that the parameters of the model were stable.

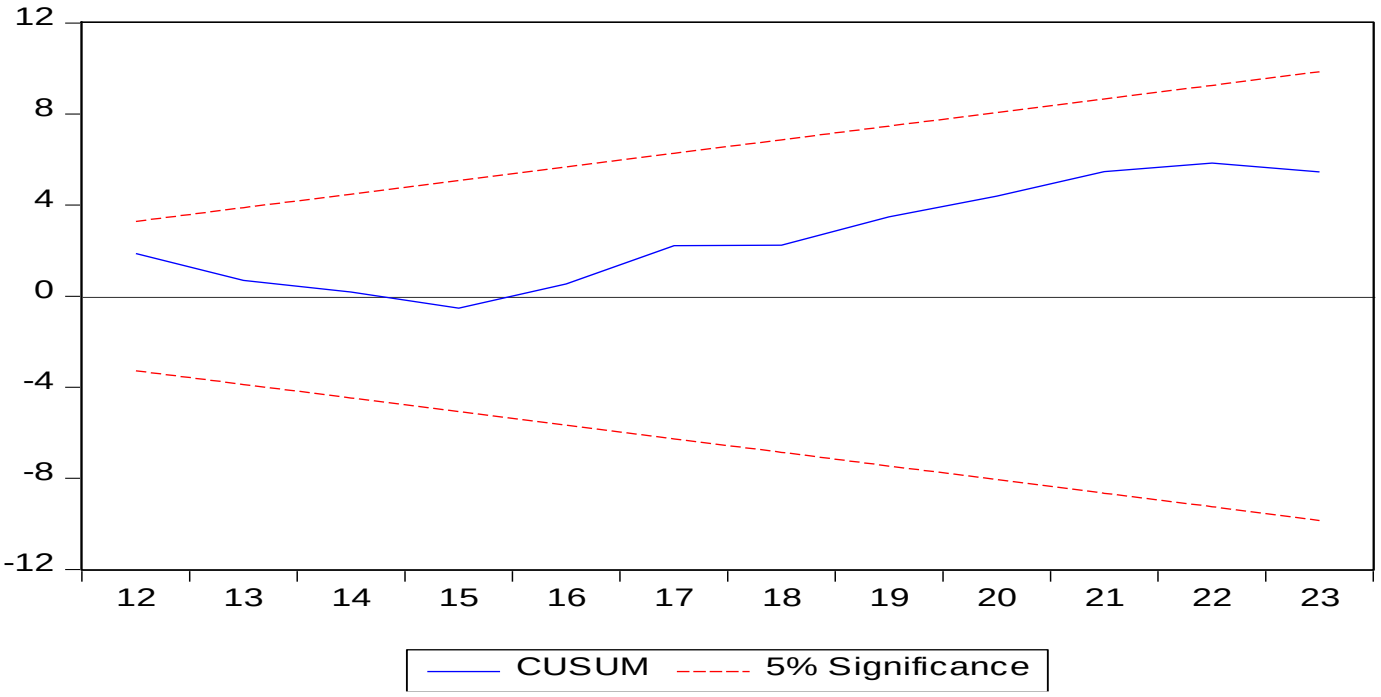

Figure 6
Results of CUSUM Test

CUSUM of Square Test

The Cumulative Sum of Squares test is a statistical measure that helps to detect known types of structural breaks or changes in the variance of the time series model. It does this by observing the cumulative sums of the squared residuals and detecting any temporal volatility and stability changes within the model. This is a test that must be done to ascertain the internal validity of econometric models, especially in changes over factors in the economy.

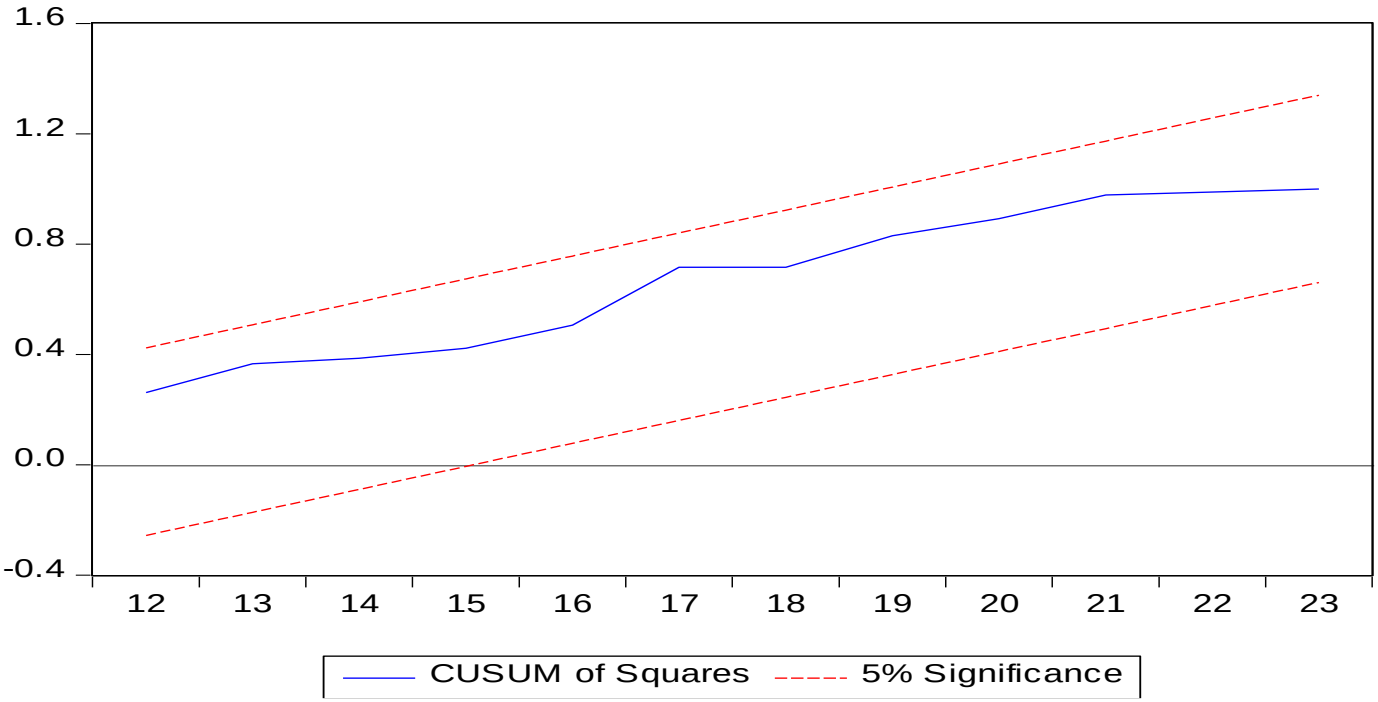

Figure 7
Results of CUSUM Square Test

The red lines are the upper and lower limits of the 5% confidence intervals for the CUSUM statistic. In the figure, the blue line shows the actual CUSUM of squares statistic. In this case the time series demonstrates that the blue line stays within the borders consisting of the red lines. This suggests that the parameters of the model are time invariant.

4.5 Discussion

The paper examines the linkage between remittances, per capita GDP, and the enrollment in private secondary level schools in Nepal to uncover the mixed factor at play influencing educational choices and economic development in one direction. Results of co-integration testing confirm the existence of a long-run equilibrium relationship among these series, thus stressing the need for taking into account the combined impact of these series on educational outcomes. Short-run dynamics indicate that immediate short-run fluctuations of remittances and economic growth have their impact on the immediate short-run dynamics of education. The Granger causality test supports that remittances and per capita GDP influence private school enrollment but not the other way around over the short run.

The relationship between remittances and school enrollment is proved by former research; for instance, Al-Islam et al. (2022), Khan and Khan (2016) and Wodon (2014). The association is positive because, as previously mentioned, remittances positively affect both short- and long-term dynamics involving the enrollment process. These results hold true for our data when we interpret the influence of remittances on private school enrollment in Nepal. The other factors to consider are economic growth and education. The positive relationship between per capita GDP and school enrollment underlines the role of economic growth in making education more accessible. For that reason, the government should channel resources into those policies that will improve economic sustainability to support the education sector. The other necessary interventions comprise targeted programs in financial literacy for the recipients of remittances, scholarships for their households' students, and programs that will stimulate the use and future income of education to maximize remittance impacts on education.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusions

In conclusion, this paper provides a detailed study of the relationship between secondary level private school enrollment and key economic indicators in Nepal. Important results have been brought to light wherein economic factors like per capita GDP and remittances prove to significantly influence the choice of education indicating the need to consider socio-economic dynamics as a basis for educational development policy. Private school enrollment is positively correlated with economic welfare, which means that increased investment in economic development would enhance improvements in access to education and quality of education. The government, therefore, should not only

remove disparities but also ensure that education is accessible to all. The outcomes point towards the need for such specific policies that will facilitate not only the private education market but larger economic growth. Future research is also needed to better understand the mechanisms explaining these relationships and to track enrollment changes over time to advance a more nuanced strategy for education and economic development in Nepal.

5.2 Recommendations

Four key policy recommendations can be drawn from the study findings:

- Government should bring some policies in action which can make the growth of economy at par with the removal of inequity from education. As in other words we can say that as the economy will grow, similarly provision and reach of private sector education will also have to broaden and equalize among the general public for which government should make sure that everyone gets fair chances of study.
- Policies should be formulated to stabilize and improve remittance flows. Financial literacy programmes should be initiated for families receiving remittances in order to induce strategic use of these resources for educational purposes, thus helping households invest more efficiently in private schools.
- To bridge the gap between the haves and have-nots in education, government can give subsidy or voucher to the low-income family to support their children enroll into private school so they can have access for higher quality of education as well.
- Promoting public-private partnerships (PPPs) can help reduce the divide between public and private schooling by upgrading resources and infrastructure which will particularly uplift students in rural areas by facilitating greater reach of private education to the areas that need it most.

Conflict of Interest

Authors declare no competing interests.

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Appendix

FY	PVTESL	Per Capita GDP (in USD)	Remittance (in million rupees)	LNPVTEBL	LNPCGDP	LNREM
2000	102915	258.7799	47216.1	13.21234	5.555978	10.76249
2001	44000	254.5523	47536.3	12.76607	5.539506	10.76925
2002	53213	261.2944	54203.3	12.85553	5.565648	10.9005
2003	80000	293.2073	58587.6	13.1558	5.68088	10.97828
2094	78287	327.8313	65541.2	13.26004	5.792499	11.09043
2005	57050	349.5486	97688.5	12.83079	5.856643	11.48954
2006	88320	410.0724	100144.8	13.2255	6.016334	11.51437
2007	100106	491.3467	142682.7	13.37041	6.19715	11.86838
2008	112586	496.5228	209698.5	13.45504	6.207629	12.25343
2009	133924	609.5348	231725.3	13.69077	6.412696	12.35331
2010	132056	814.318	253551.6	13.61621	6.702351	12.44332
2011	140415	808.2408	359554.4	13.75069	6.69486	12.79262
2012	155902	814.3086	434581.7	13.79252	6.702339	12.98214
2013	169905	824.1442	543294.1	13.77618	6.714345	13.20541
2014	172129	871.4402	617278.8	13.77549	6.770147	13.33308
2015	181177	887.6123	665064.3	13.76923	6.788535	13.40764
2016	185056	1039.025	695452.4	13.74748	6.946039	13.45232
2017	191898	1176.696	755058.6	13.79532	7.070466	13.53455
2018	218935	1203.836	879367.1	14.44555	7.093268	13.68696
2019	246791	1166.629	875027	14.22919	7.061873	13.68201
2020	225607	1276.81	961054.6	14.10026	7.15212	13.77579
2021	245880	1398.851	1007307	14.18469	7.243406	13.82279
2022	251292	1399	1220560	14.26988	7.243513	14.01482