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### **Remittances and Private Sector Credit in Nepal**

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Remittance inflow is taking greater size than the other capital inflow in Nepal. It has multidimensional effects on the economy. However, its impact on private sector credit is absent. Hence, this paper analyses the effects of remittances on private sector credit in Nepal taking time series data spanning from from 1975 to 2021. Alongside remittances as the key explanatory variable, other control explanatory variables such as gross investment, total trade, real gross domestic product, the national consumer price index, and foreign aid were considered. Unit root analysis revealed that all variables were integrated at order one. Consequently, a cointegration test was conducted, indicating the presence of at least one cointegration equation. Subsequently, an ordinary least squares regression was performed using first difference data. The results were subjected to various econometric diagnostic tests, including assessment for autocorrelation, heteroscedasticity, multicollinearity, normality, as well as the Durbin–Watson test, t-tests for coefficients, and the F-test. Both the coefficient of determination and the adjusted coefficient of determination confirmed that the models were well-fitted. The outcomes of the model suggest that remittances have a positive impact on the enhancement of the private sector credit. Based on these findings, the study indorses implementing policies aimed at heightening remittance inflows into the country to further financial development in Nepal, specifically promoting private sector credit.

**Keywords:** Remittances, Private sector credit, Unit root test, Cointegration

#### **Introduction**

Developing countries are receiving large amount of remittance, and it is becoming one of the top sources of international capital inflows. The income remitted from the workers from abroad has dominated the other sources of capital inflows such as official aid and foreign direct investment which were the key sources of foreign reserves in two

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decades ago (Giuliano & Ruiz- Arranz, 2005). The amount of remitted income is now nearly three times the amount of foreign official assistance. It is also equivalent to foreign direct investment (FDI) flows to developing countries. The remittance income encompasses more than 10 percent of gross domestic product (GDP) in several developing countries (World Bank, 2023). Despite multiple development challenges, remittance, a significant foreign exchange source which is around 25 percent of Nepal's GDP, has been sustaining the economy for the past few decades. It has stabilized Nepal's payment balance and financed nearly 89.0 percent of the trade deficit. Nepal received Rs. 12205595.0 million remittances from abroad in fiscal year 2022/23. Global as well as Nepalese remittances have risen for the past two years, however, reduced in COVID-19 periods (MoF, 2024).

Labor movement has been increasing from one country to another because of increasing global integration and the enhancement of communication technology. Such movement has intensified the flow of remittance. The pace of movement of the labors to the developed countries is continuously increasing and the remittance inflow is also increasing in the same rate. It is the outcome of labor migration rules that labors from developing countries are accepted by the developed countries and many other oil exporting countries (Keho, 2020).

Remittances play a significant role, both in macro and micro level. On the macro level, remittance happens to be an increasingly vital and relatively firm source of external finance for the countries aggrieved by economic and political crisis. Such countries regard remittance as one of the most secure and reliable sources of foreign exchange than other capital flows such as foreign direct investment and official development aid. On the micro level, remittance has become a remedy for the marginalized poor people to enhance their livelihood by providing an alternative source of income. The remittance is believed to have a direct impact on the poor and thus contributes to alleviate poverty in a significant way than other sources of external finance. The remittance has been observed as a means to affect the well-being and capacities of not only the households getting the remittance but also the community as a whole (World Bank, 2023).

Nepal has started foreign employment from India in the early period. The trend shifts and the foreign employment has become one of the attractive choices for many to depart the country to work abroad. The argument for the people's interest for foreign jobs, be it in neighboring country or overseas, is attributed to low absorptive capacity of domestic economy caused by the lethargic performance of manufacture and non-

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manufacture sectors, rapid growth of population and labor force, lengthy political instability, changing attitude of the people in their livelihood, and others.

Due to migration of people having limited skills in entrepreneurship, science and technology, and health sector, the domestic labour supply and productivity has been shrunk. Similarly, if such migrants return back to home country, they bring knowledge in different sector of business and development activities. Thus, gains and losses from migration depend on whether migration is temporary or permanent. In essence, Nepal benefits from migration through the Nepalese Diaspora expertise, knowledge, technology, professional capacity building and a great potential for trade and investment links.

Remittance is sent to remitters' homeland via banking and non-banking services. International money transfers are conducted by financial institutions. The mode of money transfer differs according to the choice of remitters. Some of the modes are cash, check, money order, credit card, debit card, or a debit instruction sent by e-mail, phone, or through the internet. Remittances are typically individual transfers from one individual or family member to another individual or household. In each country, banking and financial institutions have legal authority of transfer and maintaining transactions (Fromentin, 2018).

Sound banking and financial institution system both in the host and home country encourages low-cost and quicker remittance transfer system. Such institutions should not only provide remittance transfer facility, but also offer other varieties of banking facilities such as bank account and credit to the remitted family members. Therefore, for less costlier, safer and faster transfer facilities along with other varieties of banking facilities, there should be modernized internet connected chain of banking and financial institutions that have large number of branches that linked all domains of people both urban and rural areas (Chowdhury, 2011). Such services should have easier access to remitted households such that the transport cost of access nil or very little. Hence, for the safe, quicker and inexpensive transfer of remittances along with other varieties of banking services such as bank deposit and credit facilities nearby the residence, there should be sufficient number of banking and financial institutions that are established and connected with modern internet webs and they must be evenly distributed all over the country so that every remitted family member has efficient banking and financial facilities at the door (Azizi, 2019).

Developmental impact of remittances with different dimensions have been analyzed by a large number of studies. These studies covered the areas such as poverty reduction, narrowing of the inequality gap, education, infant mortality, entrepreneurship and finally growth that influenced from remittance inflows (Giuliano & Ruiz-Arranz, 2009). According to Gupta, Pattillo and Wagh (2009), the past key sources of foreign exchanges was foreign aid, however in recent years remittances has become the key sources of foreign exchanges for the most of developing countries.

Apparently, on the one hand, inflows of remittances are mounting rapidly and bank and financial intuitions along with saving and credit cooperatives are receiving such funds in the form of deposits and money transfer. Further, these institutions are advancing remittance transfer facility as well as bank deposits. On the other hand, it intensifies credit facilities to the remitted households. In this context, this paper examines the impact of remittances on private sector credit.

The recent empirical literature showed that remittances might induce financial development encouraging private sector credit (Giuliano& Ruiz-Arranz, 2009; Gupta et al., 2009; Mundaca, 2009; Aggarwal et al., 2011; Agir et al., 2011; Chowdhury, 2011; Hassan, 2011; Cooray, 2012; Coulibaly, 2015; Bhattacharya et al., 2018; Fromentin, 2017, 2018; Azizi, 2019; Basnet et al., 2020; Donou-Adonsou et al., 2020; Keho, 2020 and Mustafa et al., 2020). These studies empirically examined private sector credit channel (PSC) as financial development measure. They indicated that aggregate level of deposits may increase if remittances are held in the banks.

The inflow incomes upsurge private sector credit (PSC) implying that a well-functioning financial market may play an important role to direct the remittances to the projects that yield the highest return and therefore enhance growth rates. Remittances may introduce new households with the banking system and, in turn, this familiarity may result in both more deposits which further enhances credit facilities though private sector credit of an economy, i.e. PSC to GDP ratios would increase (Bhattacharya et al., 2018).

Along with the expansion of numbers of financial institutions, their qualitative fast e-services, the key indicators of financial development such as private sector credit or PSC to GDP reached to 97.1 percent in mid-July 2022. Such ratio was 4.7 percent in mid-July 1975. The average growth rates of PSC to GDP was 21.4 percent (NRB, 2009, & NRB 2022). In the scenarios of increasing both the remittances and financial sector, it is not clear whether there is causation between remittances and financial development in

Nepal. In this background, this study attempts to investigate the connection between remittances and financial development measure for Nepal.

### Research Methodology

During the data collection process, the paper has applied annual data of different variables from FY 1974/75 to 2020/21 comprising 47 observations of each because there were no time series data before the fiscal year 1974/75. All the secondary data related to private sector credit, remittances, gross capital formation, total trade, real per capita GDP, inflation rate measured by National Consumer Price Index are taken from Economic Survey Reports, Ministry of Finance, Government of Nepal and Quarterly Economic Bulletin, Nepal Rastra Bank. Therefore, this paper has applied OLS technique of estimation considering financial development (FD) as dependent variable and remittance (REMIT) as explanatory variable. Hence, the theoretical equation is:

$$\text{Financial Development} = f(\text{REMIT}) \quad (1.1)$$

Financial Development is also affected by a number of other macroeconomic variables, such as gross capital formation, total trade, real GDP, inflation rate, and foreign aid. Thus, the study has introduced a number of control variables (CV) in the equation (1.3). Variability in financial development has been reduced by using the above mentioned control variable (CV). Accordingly, the modified equation of (1.1) financial development is:

$$\text{Financial Development} = f(\text{REM}, \text{CV}) \quad (1.2)$$

On the basis of above equations, the following econometric model in natural logarithmic form, to analyse the influence of private sector credit on remittances in context of Nepal is specified as:

$$\text{LNPSCT}_t = \alpha_0 + \alpha_1 \text{LNREMIT}_t + \alpha_2 \text{LNGCF}_t + \alpha_3 \text{LN TT}_t + \alpha_4 \text{LNRGDP}_t + \alpha_5 \text{LNINF}_t + \alpha_6 \text{LNFA}_t + \varepsilon_t \quad (1.3)$$

Where,

PSC = Private Sector Credit

REMIT = Remittances

GCF = Gross Capital Formation

TT = Total Trade (Imports plus Exports)

RGDP = Real GDP

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INF = Inflation Rate

FA = Gross Foreign Aid (Debts plus Grants)

t = Time

$\varepsilon_t$  = Error term

All variables of the specified model are in Rs. in million rupees. The arithmetic scaled data are converted into natural logarithm form. The conversion of data into logarithmic scale convertsthe non-linear elasticity of coefficients into linear one. Central location (mean) and spread (standard deviation) of the dependent and independent variables to measure descriptive statics. To judge correlation between dependent and independent variable, correlation table is calculated. ADF, Durbin-Watson (DW test) and Breusch-Godfrey Serial Correlation tests of unit root were used to identify autocorrelation the problem. Cochrane-Orcutt method is applied to escape the autocorrelation. Iterative procedures were conducted to avoid complete autocorrelation problem. Problem of heteroscedasticity is detected with Breusch-Pagan test and it will be minimized with an application of weighted least squares technique. To identify multicollinearity, Variance Inflation Factor (VIF) test was applied and one of the variable that have more than 60 percent correlation with another variable was deleted from independent variable list. Jarque-Bera (J-B) test was used to identify normality. Two tests of explanatory power of the model i.e. R-squared and adjusted R-squared are applied. Goodness of fit of model was judged by the F-test. To test individual coefficients of explanatory variables, t-test was conducted. Eviews 10 was applied to estimate the models.

### **Data Analysis and Presentation**

Under this section, the statistical tools that are applied in calculating the results are described. Nature and structure of the variables first inspected by descriptive statistics, partial correlation is used to find out relation and direction between dependent and independent variables. Others tools were unit root test, cointegration test and regression. To examine the impact of remittances on private sector credit econometric diagnostic tools are applied. Then, in each step of testing, calculated results are interpreted and judged.

### **Summary Statistics**

The descriptive statistics tools encompasses arithmetic mean, minimum and maximum values of the variables, standard deviation, skewness, kurtosis, Jarque-Bera (J-B) and number of observations. Table 1.1 displays the summary statistics.

**Table 1.1***Summary Statistics of the Variables*

Variables	PSC	REMIT	GCF	TT	RGDP	NCPI	FA
Mean	527906.7	173648.2	231508.4	308883.1	692667.3	43.29856	33952.37
Maximum	4139555.0	961054.6	1304902.	1680900.	2382708.	137.6200	287746.0
Minimum	716.2000	204.3000	2223.000	2704.200	131061.8	4.144413	387.0000
Std. Dev.	960412.4	285637.8	361301.9	441769.8	735401.6	39.83761	54087.55
Skewness	2.243599	1.569881	1.778099	1.712075	1.292012	0.999843	2.916570
Kurtosis	7.361015	4.029830	4.877080	4.905654	2.989258	2.806803	12.51775
Jarque-Bera	76.67540	21.38236	31.66621	30.07280	13.07637	7.903968	244.0341
Probability	0.000000	0.000023	0.000000	0.000000	0.001447	0.019217	0.000000
Observations	47	47	47	47	47	47	47

*Source: Source: Economic Survey Report, 2022, Ministry of Finance, Government of Nepal and Quarterly Economic Bulletin, mid-July (2022)*

The results on summary statistics show that mean value of PSC, REMIT, GCF, TRADE, RGDP, NCPI and FA were Rs. 527906.7 million, Rs. 173648.2 million, Rs. 231508.4 million, Rs. 308883.1 million, Rs. 692667.3 million, 43.2 percent and Rs. 33952.3 million respectively. The higher values of standard deviations for the variables under the study indicated that they were volatile. The positive value of skewness indicated that variables were positively skewed. The values of kurtosis suggested that there were more variables had peaked ness, a few has not and JB statistics and respective probability showed that all variables were normal.

### **Relation between Dependent and Explanatory Variables**

Basically, partial correlation displays association between dependent and independent variables. The paper applied level form of data for correlation analysis. Table 1.2 demonstrates the results below.

**Table 1.2***Correlation between the Variables*

Correlation	LNPS	LNREMIT	LNGCF	LNTT	LNRGDP	LNNCPI	LNFA
LNPS	1.000000	-	-	-	-	-	-
LNREMIT	0.987540	1.000000	-	-	-	-	-
LNGCF	0.997012	0.982628	1.000000	-	-	-	-
LNTT	0.996863	0.977846	0.995835	1.000000	-	-	-
LNRGDP	0.951198	0.950758	0.960998	0.938579	1.000000	-	-
LNNCPI	0.997502	0.979885	0.996903	0.998801	0.943239	1.000000	-
LNFA	0.985300	0.956278	0.987492	0.986825	0.933113	0.987935	1.0000

Source: Table 1.1

The results indicated that the dependent variable is highly correlated positive degree with independent variables. As the size of coefficients are greater than 0.80, it indicated that variables are positively and strongly associated with each other. High degree of correlation between the independent variables might create suspicion that there might be multicollinearity among the independent which is tested under multicollinearity heading. However, VIF test ruled out that there is no multicollinearity among the explanatory variables.

### Unit Root Test Results

Individual time series data might be either non-stationary or stationary. To find out stationary and non-stationary nature of data applied in this paper, ADF test was conducted. The ADF results identified the non-stationary and stationary nature of annual time series data. Hence, to determine the order of integration of the variables both at level and first difference (intercept and intercept and trend) with natural log level form of data, unit root test of ADF was conducted. The results are presented below in Table 1.3.



**Table 1.3*****ADF Unit Root Results at Log Level Form***

Variables	Intercept		Intercept and Trend	
	$\tau$ - statistics	p-value	$\tau$ - statistics	p-value
LNPSK	-0.116944	0.9324	-2.685790	0.2332
LNREMIT	-0.128182	0.9288	-2.216631	0.4541
LNGCF	-0.589525	0.8506	-2.231584	0.4357
LNTRADE	-0.944270	0.7716	-1.224592	0.8589
LNRGDP	0.304412	0.9466	-1.930087	0.6780
LNNCPI	-1.916025	0.3078	-1.140512	0.9022
LNFA	-1.802656	0.3847	-2.871653	0.1640

Source: Table 1.1

The results indicated that the variables under the inspection were spurious, i.e. there was unit root problem with the variables both at level both at intercept and intercept and trend form. The probability values of the variables indicated that log level form of data for each of the variables was non-stationary. Thus, to detect the unit root free data, first difference form of data of all the variables again examined with ADF unit root process. The results from first difference data were reported in Table 1.4 below.

**Table 1.4*****ADF Unit Root Results at First Difference***

Variables	Intercept		Intercept and Trend		Order of Integration
	$\tau$ - statistics	p-value	$\tau$ - statistics	p-value	
DLNM2	-5.638325	(0.0000)*	-5.749630	(0.0000)*	I(1)
DLNREMIT	-7.748249	(0.0000)*	-7.558654	(0.0001)*	I(1)
DLNGCF	-6.841295	(0.0000)*	-6.043508	(0.0000)*	I(1)
DLNTRADE	-6.274611	(0.0000)*	-6.258608	(0.0001)*	I(1)
DLNRGDP	-6.631706	(0.0000)*	-6.739628	(0.0000)*	I(1)
DLNNCPI	-4.864379	(0.0002)*	-5.246790	(0.0004)*	I(1)
DLNFA	-6.149357	(0.0000)*	-6.273306	(0.0000)*	I(1)

Note: An asterisk (\*) symbolizes significant level is within 5 percent.

Source: Table 1.1

The results based on probability of the variables confirmed that the data at first difference was completely unit root free both at intercept and intercept and trend form, i.e. the annual time series of the variables examined under the study were stationary. The series were integrated of orders 1. So, in empirical model, first difference form of time series data on natural log form were applied.

### **Results from Cointegration Test**

Cointegration tests identify scenarios where two or more non-stationary time series are integrated together in a way that they cannot deviate from equilibrium in the long term. The tests are used to identify the degree of sensitivity of two variables or more variables. The study applied Johansen cointegration test to find out either the variables meet equilibrium in the long run with log level of form of non-difference data. The test results are depicted in Table 1.5 below.

**Table 1.5****Results from Cointegration Test**

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	Prob.
No. of CE(s)	Eigenvalue	Statistic	Critical Value	
None *	0.672672	143.1474	125.6154	0.0027
At most 1	0.548412	92.89165	95.75366	0.0774
At most 2	0.390406	57.11732	69.81889	0.3344
At most 3	0.285061	34.84401	47.85613	0.4563
At most 4	0.196006	19.74388	29.79707	0.4403
At most 5	0.156329	9.926533	15.49471	0.2864
At most 6	0.049338	2.276846	3.841466	0.1313

*Max-eigenvalue test indicates 1 cointegrating equations at the 0.05 level*

\*

*denotes rejection of the hypothesis at the 0.05 level*

Source: Table 1.1

The results based on the max Eigen value and the corresponding p-value indicated that the variables could be in equilibrium in the long run because there was at least one cointegration equation. It confirmed that in the long run the private sector and overall explanatory variables move together and equilibrate in any one point of time in the future, i.e. variables would not divert from the equilibrium point forever. Consequently, there was long run relationship among the dependent and independent variables.

### **Empirical Results from Regression Equation**

The empirical results from regression equation that shows the impact of remittances on private sector credit with other control variables are displayed in Table 1.6.

**Table 1.6****Regression Results DLNPSC as Dependent Variable**

Variable	Coefficients	Standard Error	t-Statistics	Prob.
DLNREMIT	0.257213	0.036682	7.011933	(0.0000)*
DLNGCF	0.134521	0.212342	0.633510	0.5301
DLNTT	0.560015	0.190357	2.941916	(0.0041)*
DLNRGDP	0.148655	0.100150	1.484323	0.1458
DLNNCPI	0.464777	0.381818	1.217275	0.2308
DLNFA	0.250091	0.086666	2.885686	(0.0033)
C	-2.128956	1.272322	-1.673285	0.1023
$R^2 = 0.81$ Adjusted $R^2 = 0.79$		D-W = 1.95    N = 46 after one lag F= 3850.2 P value of F = (0.000)*		

Note: An asterisk (\*) denotes significant within 5 percent level.

Source: Table 1.1

The variables DLNREMIT, DLNTT and DLNFA are statistically significant below the 5 percent level whereas the constant term, DLNGCF, DLNRGDP, and DLNNCPI appeared insignificant. The results from coefficient of determination and adjusted coefficient of determination confirmed that independent variables explain the dependent variable by 81.0 percent and 79.0 percent respectively. The results confirmed that the model has best goodness of fit. The probability value of F statistics indicated that overall fitness of the model statistically is also well.

The coefficient of the independent variable DLNREMIT is 0.26 which is significant at 1 percent level. The significant coefficient confirmed that 1.0 percent rise in the growth rate of remittances upsurges private sector credit by 0.26 percent. Being the

positive and significant coefficient, it indicated that increase in remittances inflows also have increasing impact on private sector credit in Nepal.

The coefficient of the independent variable DLNTT is 0.56 which is significant at 1 percent level. The significant coefficient confirmed that 1.0 percent rise in the growth rate of total trade upsurges private sector credit by 0.56 percent. Being the positive and significant coefficient, it indicated that increase in imports or exports or both also have increasing impact on private sector credit in Nepal.

The coefficient of the independent variable DLNNA is 0.25 which is significant at 1 percent level. The significant coefficient confirmed that 1.0 percent rise in the growth rate of foreign official assistance upsurges private sector credit by 0.25 percent. Being the positive and significant coefficient, it indicated that increase in foreign official assistance also have increasing impact on private sector credit in Nepal.

### Autocorrelation Test

If the value of DW statistics appeared 2 or near 2, then it infers that there is no first order autocorrelation. Here, the value of the DW statistics is 1.95 which is almost near to 2. It indicates that the equation might be free from first order autocorrelation. However, it does not tell other orders of autocorrelation. Therefore, Breusch Pagan-Godfrey Serial Correlation LM Test is conducted. The BPG autocorrelation results are presented in Table 1.7 below.

**Table 1.7**

#### *Breusch Pagan-Godfrey Serial Correlation LM Test for OLS Regression*

Lags	Chi2 value	Df	Prob> Chi2
1	8.62	1	0.416
2	10.3	1	0.626

Source: Table 1.1

The BPG autocorrelation test results are interpreted on the observed R-squared statistics at lag 1 and 2. The statistics at lag 1 and 2 are 8.62 and 10.3. The respective probability of statics for lag 1 and 2 are above 5.0 percent level, i.e. the probability at lag 1 is 41.6 percent and at lag 2 is 62.6 percent respectively. Hence, the BPG LM results confirmed that there was no autocorrelation in the error term of the estimated equation.

Further, Breusch-Pagan-Godfrey test of heteroscedasticity of the variance of error terms from the estimated equation indicated that there was no heteroscedasticity among the error term of the estimated equation. The observed R squared statics is 7.73 with the probability of 29.5 percent. Hence, the variance of error terms of the calculated model is constant over the study period.

The Jarque-Bera (J-B) statistics showed either the distribution of error terms are normally distributed or not. The value of J-B is 7.482 and its probability value of in percent is 33.02. Being the probability more than 5.0 percent, the error terms of the estimated equation are normally distributed.

Statisticians suggest that if the value of VIF is below 10, the independent variables are no highly similar. Here, the coefficients of Variance Inflation Factor (VIF) is 5 of the estimated equation. Thus, there is no multicollinearity among explanatory variables taken under the model.

### **Conclusion**

The empirical results tested on econometric diagnostic tools suggested that remittance is on of the vibrant macroeconomic variable in Nepalese economy. It has different socio-economic impacts at micro level. At macro level, it has significant role in financial sector, particularly private sector credit. Basically, private sector credit is provided by banking and financial sectors to the firms and households via credit or loan provision. Financial institutions need large amount of deposits to meet such loans. The paper found that remitting households deposit their remitted income in the financial institutions that enlarges the volume of bank deposits and such bulk of deposit channel to private sector credit. It is evident that there is positive and significant influence of remittances on private sector credit.

The positive effect of the remittances on private sector credit could be due to reasons like, remittance receiving households' monetary balances increases, their purchasing power is increased due to increase in remitted monetary incomes. Such income might be kept in different types of deposits. Such deposits might be used by banks to provide loan to its customers. Further, remitted households themselves take loan from banks that would be returned from remitted income in the future. This amplifies the size of private sector credit. This process increases loan amount. Hence, remittances stimulate private sector credit.

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