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Original Research Article

Relationship between Bank Credit and Economic Growth: Evidence from Nepal

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Abstract
Bank credit serves as the lifeblood of economic activities. The paper aims to investigate how bank credit contributes to economic growth by employing the ARDL model, spanning the period 1975 to 2023 in Nepal. The observed empirical analysis shows a positive short-run and long-run association between bank credit and the growth in the economy. The findings of the study suggested that policymakers should focus on increasing credit by the banking and financial sectors to boost economic growth in the long run.

Introduction
Macroeconomic policies aim to achieve sustained economic growth along with full employment, price stability, financial stability, and so on. Economic growth is defined by several economists from various perspectives (Timsina, 2014). Todaro and Smith (2006) stated that economic growth is a continuous process that enhances the economy's productive capacity, leading to rising levels of real national output.

Bank credit serves as the lifeblood of economic activities. It is considered a catalyst for private investment and an engine for economic activity (Luca and Spatafora, 2012). It involves extending loans and microcredit to entrepreneurs in need of financial resources for business operations. It is a component of corporate finance, providing the basis for increased production efficiency and specialization (Onnioduokit and O'Neill, 2023). Schumpeter (1911) emphasizes the role of credit through indicators such as credit to the private sector, commercial bank loans to SMEs, bank branch deposits, and interest rates on business loans. Developing economies close the resource gap and satisfy the need for resources for economic growth by utilizing internal credit. Extending financial resources to businesses can boost production, leading to job creation, optimal resource utilization, and overall economic growth and expansion. Hence, the credit options offered by banks and financial institutions can serve as a vital tool for boosting economic development and advancement. In underdeveloped countries, particularly when there is a shortage of funds for starting business ventures, loans from banks can be crucial in encouraging entrepreneurial activities (Jhingan, 2016).

Bank credit can help a nation's economy grow by forming capital, promoting innovative entrepreneurship, making the economy more liquid, impacting economic activities through interest rate changes, implementing

monetary policies, boosting trade and industry, supporting specific sectors, and aiding in regional and agricultural development. Thus, through bank credit, the banks can increase the supply of purchasing power and hence aggregate demand. This in turn increases investment, production, and trade in the economy (Paul, 2015).

In Nepal, bank lending has been a significant source of funding for the advancement of businesses and entrepreneurs. As Nepal Rastra Bank (NRB) has increased the money supply, there has been a growth in domestic credit as well. The monetary policy's credit channel is highly valued and successful in Nepal. Monetary policy is anticipated to impact real variables through bank balance sheets and credit availability in the credit channel (Timsina, 2014).

Even with the continuous provision of resources from the banking system in the form of domestic credit and private sector credit, Nepal's economic state still struggles, making it one of the world's poorest countries. It is essential to empirically study how bank credit impacts Nepal's economic growth to determine the significance of bank credit and evaluate policy effectiveness. Following the economic liberalization in the 1990s, Nepal's government initiated extensive financial reforms that promoted competition and aimed to create a more efficient market-oriented monetary and credit system. Therefore, Nepal has been steadily increasing the quantity of banks and financial institutions across the country. An increase in domestic credit by banks and financial institutions is a sign of improved financial access. Through structured growth and an increase in banking services, combined with improved financial accessibility, there has been a noticeable expansion in the provision of bank loans. Nepal Rastra Bank has also recommended that commercial banks provide loans and advances to key sectors like agriculture, energy, tourism, and industry. The primary objective of this mechanism is to promote the economic growth and development of the nation. The following graph shows the domestic credit by banks and financial institutions in Nepal.

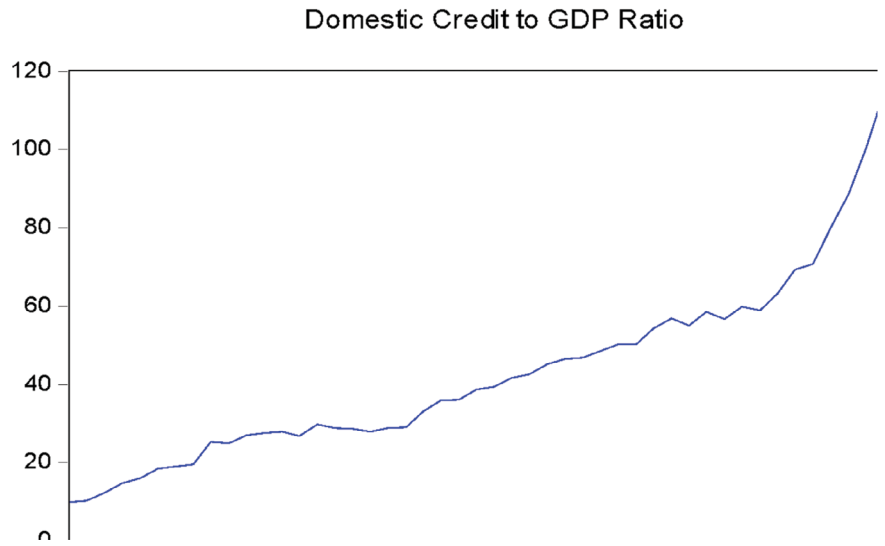


Figure 1: *The trend of domestic credit Flow*

The above diagram shows the growing credit flow, which has reached more than the size of GDP. Despite the growing credit flow from banks, Nepal remains among the poorest nations.

The influence of bank credit on economic growth has been a widely debated issue in economic literature over the last decades. Financial development provides the opportunity for a large level of investment with higher productivity, which has predictive power for future growth (King and Levine, 1993). Various studies by Gurley and Shaw (1967), Goldsmith (1969), and Mckinnon (1973) stated that economic growth can be fostered by creating well-developed financial markets. Financial systems positively impact real economic performance by accelerating the composition and growth of savings (Greenwood and Jovanovic, 1990). Bernanke (1983), Beck and Levine (2001), Aleiro et al. (2013), Okyo (2012), Marshall et al. (2015) Mahara (2020) and Poudel and Acharya (2020) found that economic growth is positively influenced by bank credit, whereas Koivu (2002),

Sanchez and Yu (2011), Gerard and Tomo (2022), and Amadou et al. (2023) showed that bank credit adversely affects economic growth. This controversial economic issue is still seen as a crucial policy debate among nations and also a research gap in the Nepalese context.

The choices of theories for review set the theoretical underpinnings and empirical studies for the investigation, emphasizing the need for a nuanced understanding of the dynamics between bank credit and economic growth. This study thus aims to contribute to this discourse, providing insights into how the expansion of bank credit influences economic growth in the Nepalese context using the Autoregressive Distributive Lag model, spanning the period 1975 to 2023. The findings of the study also contribute to formulating effective macroeconomic policies to improve the economic performance of the country.

The study is organized as follows: The review section makes a systematic review of theoretical underpinnings and empirical literature. The third section presents the data and methodology. Section 4 displays the results and discussion. The final section concludes and offers practical implications.

Review of Literature

Theoretical Underpinning

A well-developed financial sector can foster economic growth by increasing savings, improving the allocative efficiency of loanable funds, and promoting capital formation. Schumpeter (1911) highlighted the crucial role of the banking industry in funding new ideas and startup companies. Schumpeter stated that banks provide financial support for entrepreneurial activities that lead to economic growth by introducing new products, processes, and markets.

McKinnon (1973) and Shaw (1973) contended that financial repression, characterized by capping interest rates and imposing high reserve requirements, hinders economic growth by diminishing the motivation to save and restricting access to credit for productive investments. By opening up financial systems and permitting interest rates to be determined by the market, credit allocation can be enhanced, increasing economic growth. Levine (1997) concluded that an efficiently developed financial sector helps to achieve economic growth through capital formation and technological innovation.

Endogenous growth theory (Solow, 1956) identified that the growth of human capital through education and skill development, technological progress driven by innovation, efficiency fostered by knowledge accumulation, positive feedback loops amplifying investments, and the benefits of the positive externalities are the key pillars of sustained economic growth. Loans from banks support the development of human capital through funding for education, training, and skill enhancement for both businesses and individuals. Accessibility to credit enables individuals and businesses to invest in human capital, enhancing labor productivity and supporting sustainable economic development. Lucas (1988) emphasized human capital as a core factor of economic growth in his model. Credit facilitates investments in human capital by financing educational institutions and training programs, enabling workers to enhance their skills and contribute to economic expansion. Pagano (1993) revealed that financial intermediaries can affect economic growth by mobilizing and channeling savings to productive investment.

Romer (1990) argued that bank credit facilitates R&D by lowering the cost of financing, encouraging firms to invest in technological advancements. By improving access to capital, credit promotes innovation, which is critical for sustaining long-term growth. Barro and Sala-i-Martin (2004) elaborate on how financial development, particularly through the availability of bank credit, enhances capital accumulation and supports growth. Credit allows firms to purchase capital goods and expand operations, increasing their productivity over time.

Levine (1997) highlighted that financial institutions, including banks, contribute to economic growth by improving resource allocation, providing risk management services, and mobilizing savings for productive investment. Policies that strengthen the banking system, improve access to credit, and encourage lending to innovative firms can promote sustained growth.

Lucas (1988) highlighted human capital as a fundamental element contributing to economic growth. The credit helps fund education and training programs, allowing workers to improve their skills and boost economic

growth. Romer (1990) claimed that bank loans make it easier for businesses to fund R&D, thus motivating them to invest in technological progress by reducing financing costs. Enhancing capital accessibility drives innovation, which is crucial for maintaining sustainable long-term growth. Barro and Sala-i-Martin (2004) explain how financial development, specifically the presence of bank credit, boosts capital formation and sustains economic growth. Credit enables companies to buy machinery and grow businesses, ultimately boosting their efficiency in the long run.

Empirical Review

King and Levine (1993) provided evidence that the financial sector, proxied by the ratio of bank credit given to the private sector to GDP, affects economic growth positively both through the improvement of investment productivity and through higher investment levels.

Okyo (2012) examined the effect of bank credit to the private sector on economic growth in Nigeria and found that bank credit to the private sector has a statistically strong positive relationship with GDP.

Gyanwaly (2014) examined the relationship between financial development and economic growth in Nepal by using the data for the period 1975 to 2014. The study found financial development, real stock of capital, real per capita capital, labor force, real exports, and government expenditure have a significant positive relationship with economic growth, while inflation and trade openness have a significant negative relationship with economic growth.

Kaushal and Ghosh (2016) examined the long-run relationship between the development of financial institutions and economic growth in the Indian economy. The development of banking institutions plays an important role in stimulating financial development and thereby the growth of the economy in any country. The study also confirmed that the causal effect of these financial institutions cannot be generalized as the development of the financial institutions is quite different in nature and scale in different countries.

Paudel and Acharya (2020) studied the role of financial development and economic growth in Nepal employing the autoregressive distributed lag (ARDL) approach of cointegration using time series data for the period from 1965 to 2018. The study considered domestic credit along with other variables as a proxy of financial development and found that there is a strong positive long-run relationship between domestic credit and economic growth over the study period.

Mahara (2020) analyzed the effect of financial development on economic growth in Nepal by constructing a financial development index, and domestic credit has been considered as one of the proxies of financial development. The study found that there is a significant and positive long-term effect of domestic credit on the real economic growth of Nepal.

Omar and Khalid (2022) examined the relationship between economic growth and financial development in African economies by analyzing panel data from 40 countries in Africa from 1980 to 2019. The findings indicated that in African economies bank credit does not matter for economic growth.

Gerard and Tomo (2022) investigated how financial development institutional reforms in the Central African Economic and Monetary Community (CEMAC) impact economic growth. The research using the Generalized Moment Method on a cylindrical panel indicates that private-sector credit has not played a role in economic growth.

Amadou et. al. (2023) examined the effects of access to bank credit on economic growth in the Malian economy by using the ARDL approach and found that access to bank credit has a negative short-term and positive long-term effect on economic growth in Mali.

Research Methodology

Data sources and variables

The study uses quantitative annual time-series data, collected from Nepal Rastra Bank and Ministry of Finance, spanning from 1975 to 2023. The nominal form of the variables is converted into the real term by dividing the value of the GDP deflator at constant prices of the base year 2010/11. The study uses the real gross domestic

product as the proxy for economic growth.

Gross domestic product (GDP) is the most important measure to count a country's economic performance of the country (Bernanke, 1993). Real gross domestic product is an inflation-adjusted measure that reflects the value of all goods and services produced by an economy each year and is often referred to as constant price or inflation-corrected GDP (Dwibedi, 2004). Similarly, the term domestic credit implies credit that banks and financial institutions (BFIs) of a country make available to borrowers within the same country. A significant portion of total domestic credit in Nepal is provided by banks, as well as other financial institutions like savings and credit cooperative societies, finance companies, development banks, and microfinance institutions, which contribute a large portion of the total domestic credit in Nepal (Beck and Levine, 2001; Timsina, 2014).

Model Specification

The model presents a well-designed functional relationship between explained and explanatory variables. The study considers the log of real gross domestic product (LRGDP) as a dependent variable and the log of domestic credit (LDC) as an explanatory variable. Based on the theoretical literature, the functional form can be stated as

$$RGDP=f(DC) \quad (1)$$

The explicit form of equation (1) shows the linear relationship between the dependent and explanatory variables as shown in equation (2).

$$LRGDP=\beta_0+\beta_1 LDC+\varepsilon_t \quad (2)$$

Here β_0 is the intercept; β_1 the respective coefficients are to be estimated and ε_t is the error term, and t stands for the time. The coefficient is supposed to have a positive sign indicating an increase in the values of domestic credit leading to an increase in the real gross domestic product.

Unit Root Test

The stationarity test is an indispensable test for time series data. Time-series data is said to be stationary if it has a time-invariant mean and variance. This test will scrutinize the order of integration of data. The non-stationary data set is that which has a unit root in its characteristic equation, and they must be transformed into stationary by differencing (Gujarati et al., 2012). Thus, the study conducts the unit root tests employing augmented Dickey-Fuller tests. The null hypothesis in the test procedure is that there is a presence of a unit root (non-stationary variable), and a variable that has no unit root (stationary variable) is an alternative hypothesis. If the null hypothesis is not rejected, then the variable is considered non-stationary or has a unit root. In such a process, first, the value in level and then the first difference, including the intercept and time trend to make tests more flexible, are determined.

ARDL Approach to Cointegration

The ARDL model developed by Pesaran and Shin (1999) and Pesaran et al. (2001) is a widely used approach to examine the causal relationship between the underlying variables regardless of whether the variables are integrated of order zero (I0), one (I), or mutually integrated.

The ARDL version of equation (2) is expressed as below.

$$\Delta LRGDP_t = \alpha_0 + \sum_{j=1}^{p} b_j \, \Delta RGDP_{t-j} + \sum_{j=0}^{q} c_j \, \Delta LDC_{t-j} + \gamma_1 LRGDP_{t-1} + \gamma_2 LDC_{t-1} + U_t \quad (3)$$

Where 'Δ' stands for the first difference operator. b_j, and c_j, signify the short-run parameters, whereas, γ_1,and γ_2 represent the long-run parameters. Similarly, U_t represents the residual in the model. To test whether the long-run equilibrium relationship exists between chosen variables, the bounds test for cointegration is carried out as proposed by Pesaran and Shin (1999). The hypotheses to test the long-run relationship are.

Null Hypothesis (H_0):$\gamma_1=\gamma_2=0$; No cointegration exists.

Alternative Hypothesis: Cointegration exists.

If the bound test indicates cointegration, it means that there exists a long-term or lasting association between the variables. To find this, the F-statistics is compared to the critical values given by Pesaran Shin and Smith (2001). If the calculated F-statistics exceeds the upper bound of critical values, the null hypothesis of no cointegration is rejected; if it falls below the lower bound, the null hypothesis cannot be rejected; and if it falls between the lower and upper bounds, the result is inconclusive.

Results and Discussion

This section shows the empirical results of the estimated model.

Unit Root Test Results

Tables 1 and 2 show that both the variables log of real gross domestic product (LRGDP) and log of real domestic credit by banks and financial institutions (LDC) used in the models are stationary at the first difference. Since both variables are I (1), which enables the application of the ARDL model for the analysis of relationships between bank credit and economic growth in Nepal.

Table-1: *Unit Root Test Results at Level*

Variables	Test with Constant	Test with Constant and Trend
LRGDP	0.144394	-3.487123
LDC	-1.103659	-2.638388

Source: Author's calculation;
*Note: *** significance at 10%; ** significant at 5%; and * significant at 1% level of significance.*

Table-2: *Unit Root Test Results at First Difference*

Variables	Test with Constant	Test with Constant and Trend
RGDPG	-7.089349*	-6.986035*
DC	-7.471751*	-7.540758*

Source: Author's calculation
*Note: *** significance at 10%; ** significant at 5%; and * significant at 1% level of significance.*

Lag Length Selection

Choosing the appropriate lag order for the ARDL model is essential for identifying the cointegrating link between the variables. Table 3 presents the optimal time lags identified by different criteria through the VAR lag selection approach.

Table-3: *Lag Length Selection*

Lag	LogL	LR	FPE	AIC	SC	HQ
0	72.32632	NA	0.000151	-3.125614	-3.045318	-3.095681
1	241.9249	316.5839	9.58e-08	-10.48555	-10.24466*	-10.39575
2	244.5684	4.699600	1.02e-07	-10.42526	-10.02378	-10.27559
3	252.8686	14.01810	8.45e-08	-10.61638	-10.05431	-10.40685
4	262.3774	15.21417*	6.65e-08*	-10.86122*	-10.13855	-10.59182*

*Note: * indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike Information Criterion; SC: Schwarz information criteria; HQ: Hannan-Quinn information criteria; Source: Author's Calculation*

Cointegration Result

The bound test result for the cointegration relationship between an explanatory variable and economic growth is shown in Table 4. The bound test result presented in Table 5 approves that the calculated F-statistics lie outside the upper bound critical value of 5.58 at a 1 percent level of significance. This confirms the rejection of the

null hypothesis of no cointegration. So, there is a long-term relationship between domestic credit and real gross domestic product in Nepal.

Table-4: *Cointegration Results*

Test Statistics	Value	Significance	I (0)	I (1)
F-Stat	43.18804	10%	3.02	3.51
		5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58

Source: Author's Calculation

ARDL Regression Results and Interpretation

With the existence of the long-term relationship between underlying variables, the long-run and short-run coefficients for equation (3) were estimated using the ARDL model. The following tables show the long-run and short-run relationships among variables with the help of the ARDL model based on the SC criterion.

Long-Run Estimation of the Model

Table 5 shows the long-run coefficients from the selected ARDL model. The coefficient of the explanatory variables is positive and significant as expected. The coefficient of the log of domestic credit is 0.522, which implies that a one percent increase in domestic credit leads to an increase in real gross domestic product on average of 0.522 percent. Therefore, in the long run, domestic credit matters for economic growth in Nepal. This validates the effectiveness of monetary policy in Nepal.

Table-5: *Estimation of the Long Run Coefficients*

Dependent Variable: LRGDP; ARDL (1, 1)				
Regressor	Coefficient	Std. Error	t-Statistic	Prob.
LRGDP	0.522839*	0.032795	15.94273	0.0000
C	3.245463*	0.192027	16.90103	0.0000
R-square: 0.9989; adjusted R-square: 0.9984; DW stat: 2.40; F-stat: 15264.56 (0.0000)				

Source: Author's calculation

*Note: * indicates significant at the 1% level of significance.*

Short Run Dynamics

The short-run dynamics of the model are presented in Table 6. Table 6 shows the short-run dynamics of the model. The coefficient of log of domestic credit is positive and statistically significant showing that there is application of credit supply channel even in the short run in the case of Nepal. Thus, this study claimed that there is a positive and significant relationship between the expansion of domestic credit and economic growth in Nepal, both in the short run and long run. The negative and highly significant value of the error correction term also confirms that there is a strong long-term relationship between variables and the model is convergent towards equilibrium. Moreover, it also shows the speed of adjustment toward the previous year's disequilibrium to the current year. The coefficient of ECM is -0.091. Here ECM coefficient -0.091 means that the speed of readjustment for any disequilibrium in the short-run towards long-run equilibrium takes 9.1 percent per annum.

Table-6: *Short Run Coefficients*

Dependent Variable: ΔRGDPG; ARDL (1, 1)				
Regressors	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
ΔLDC	0.047888*	0.024488	1.955547	0.0567
ECM (-1)	-0.091592*	0.007358	-12.44869	0.0000

Source: Author's calculation

*Note: * significant at 1% level of significance*

Diagnostic Test Results

Further examination of the ARDL model's reliability involves conducting diagnostic tests such as the regression specification error test, serial correlation test, heteroscedasticity test, normality test, and stability test. Below are the presented results of these tests.

Regression specification error test result

The Ramsey RESET test is used to check the accuracy of the given functional form, and the results are given in Table 7. Both the F-statistics and t-statistics have probability values of 0.2775, which exceeds the 0.05 threshold, leading to the rejection of the null hypothesis that the model is incorrectly specified. This suggests that the model displays no indication of misrepresentation.

Table-7: *Ramsey RESET Test Result*

Omitted Variables: Squares of fitted values			
	Value	df	Probability
t-statistic	1.099551	44	0.2775
F-statistic	1.209013	(1, 44)	0.2775

Source: Author's calculation

Serial Correlation Test

Table 8 shows that the hypothesis of no serial correlation, known as the null hypothesis, is upheld since the P-value of 0.1176 for the table data surpasses the threshold of 0.05. This suggests that there is no serial correlation present in the variables under investigation.

Table-8: *Serial Correlation Test Results*

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	2.547943	Prob. F (1,44)	0.1176
Obs*R-squared	2.627426	Prob. Chi-Square (1)	0.1050

Source: Author's calculation

Heteroskedasticity Test Result

Heteroscedasticity arises when the variability of the errors is not uniform across various levels of the predictor variable. Uneven dispersion of residuals is caused by heteroskedasticity in regression analysis. The results of the heteroscedasticity test for the model are shown below.

As shown by Table 9, the null hypothesis cannot be rejected since the P value is 0.6687, as indicated by the result. Since the LM stat p-values are above 5%, the study does not reject the null hypothesis, suggesting no heteroskedasticity exists between the variables in the model under examination.

Table-9: *Heteroskedasticity Test Result*

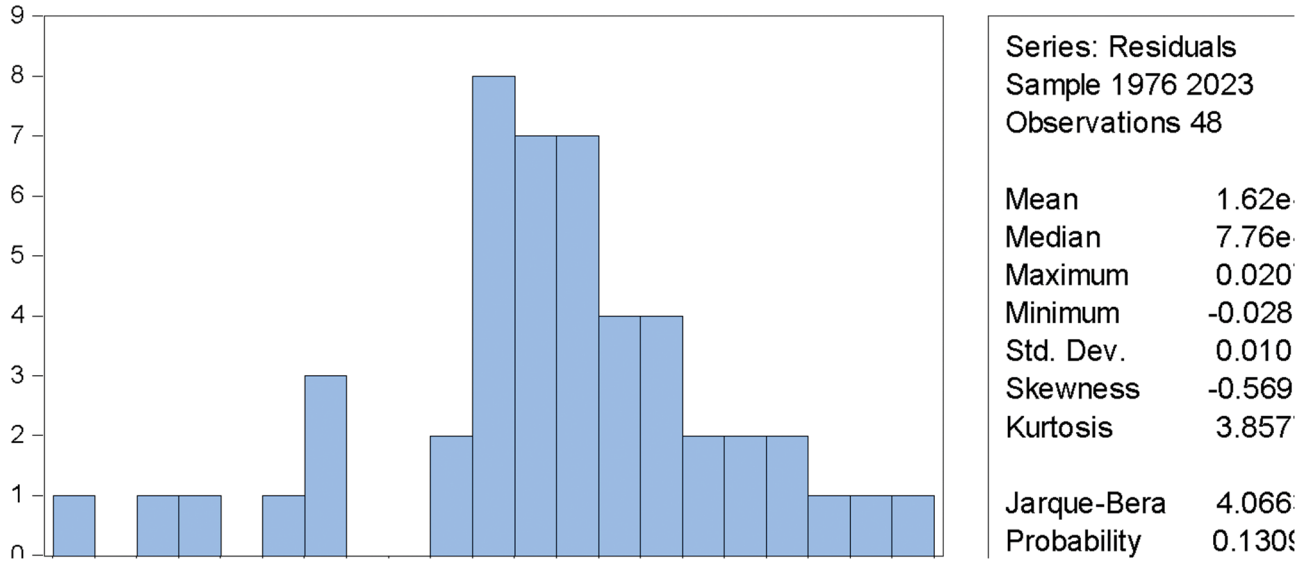
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.406048	Prob. F (2,45)	0.6687
Obs*R-squared	0.850880	Prob. Chi-Square (2)	0.6535
Scaled explained SS	1.068581	Prob. Chi-Square (2)	0.5861

Source: Author's calculation

Normality Test Result

The research has utilized visual and statistical approaches to conduct the normality test. The Jarque-Bera test is used to check for normality in the model. The outcome showed that the p-value of the JB test for the model is greater than 0.05, leading to the study being unable to reject the null hypothesis. Therefore, it can be inferred that

the data collected for the research are normal.



Source: Author's calculation

Stability Test Result

The consistency of the estimated model's parameters is evaluated using the stability test. The structural stability of the model has been assessed using the cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ) statistics. The consistency of the coefficient is the null hypothesis for the stability test. The sequence's value falling outside of an expected range, according to the null hypothesis, points to a gradual structural change in the model. CUSUM measures a systematic change in the parameter, whereas CUSUMSQ measures a sudden change in the parameter.

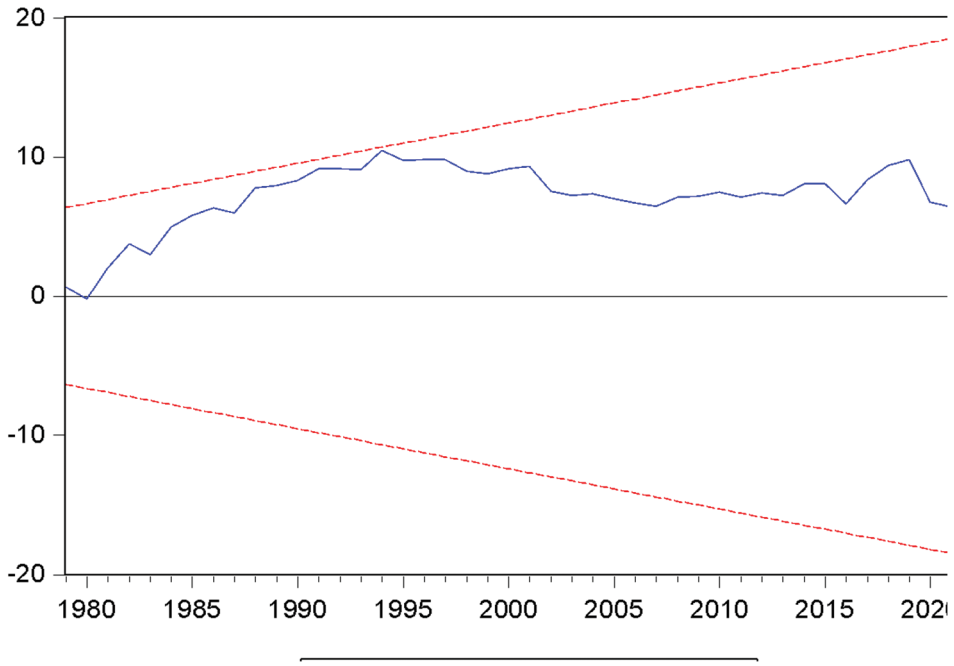


Figure 2: *Plot of CUSUM Test*

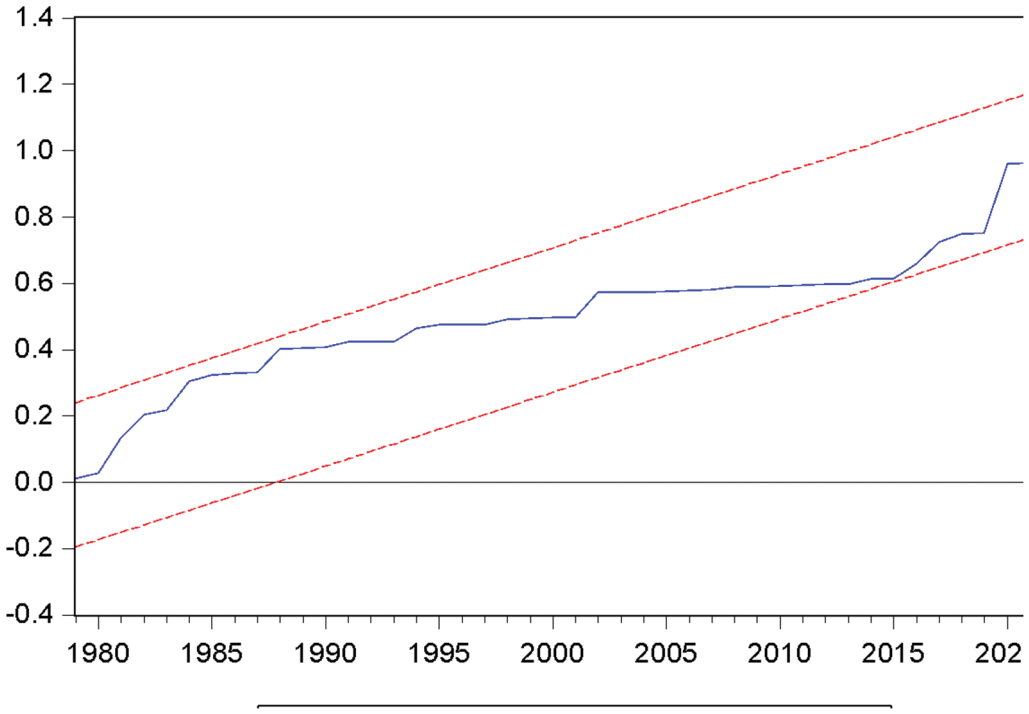


Figure-3: *Plot of CUSUMSQ Test*

In the graph above, the dashed red line represents the critical region at the 5 percent significance level, while the blue line represents the cumulative sum. The cumulative sum and cumulative sum of the square of the coefficient line fall within the critical region of red lines, showing that the model fails to reject the null hypothesis. Therefore, the coefficients remain consistent in the regression model.

Conclusion and implications

Bank credit serves as the lifeblood of economic activities. The impact of bank lending on economic growth is a widely debatable issue in both theoretical underpinnings and empirical literature over a period. The study aims to examine the causal relationship between domestic credit and real gross domestic product in Nepal by using the ARDL cointegration approach, using the time series data from 1975 to 2023. The empirical findings show that there is the existence of a short-term as well as long-term relationship between domestic credit by banks and financial institutions and gross domestic product. This finding reveals that the credit flow of BFIs in Nepal can be associated with economic progress; thus, policies directing and creating an environment for efficient use of the expansion of credit supply channels matter for economic growth. The findings of the study suggest that policymakers should focus on increasing credit supply by the banking and financial sectors to boost growth in the long run. The increased domestic credit can generate new and innovative opportunities, utilize idle resources, create employment opportunities, induce private investment, and ultimately increase the GDP of Nepal. The policies related to the expansion of credit, capital formation, and control of unproductive use of credit are needed to facilitate regulatory authorities to accomplish higher and longer-lasting growth. The study has used only domestic credit disbursed by the banks and financial institutions as a proxy of banks' credit; thus, the further scope of the study could be sectoral credit flow and its effect on the economic growth of Nepal.

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