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An Econometric Study on the Determinants of Economic Growth in Nepal

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Abstarct

This study examines the determinants of economic growth in Nepal, focusing on the role of financial variables; bank lending, deposits, investment, and interest rates for the study period 2009 to 2023. Using secondary data from Nepal Rastra Bank and World Bank sources, the study employs correlation analysis, Ordinary Least Squares (OLS) regression, Johansen co-integration, and the **Error Correction Model** *(ECM) to explore both short and long-run relationships. Empirical results reveal that GDP growth is strongly and positively influenced by bank lending t-statistics (t) = –3.27, probability (p) = 0.03), deposits (t = –5.51, p = 0.00), and investments (t = –4.91, p = 0.00), while higher interest rates (t = –4.72, p = 0.00) constrain growth by increasing borrowing costs. Short-run effects are limited, but the ECM's significant error correction term (–0.5006, p = 0.038) indicates rapid adjustment toward long-run equilibrium. Diagnostic tests confirm model robustness, showing no serial correlation, heteroskedasticity, or deviation from normality. The findings underscore that Nepal's economic growth is predominantly driven by sustained financial intermediation and banking sector development, highlighting the need for policies that strengthen credit mobilization, investment financing, and inclusive financial access. It is recommended that policymakers focus on enhancing banking sector efficiency and expanding financial outreach to sustain long-term economic growth.*

Keywords: Economic Growth, Interest Rate, Lending Rate, Investment, Institutions, Banking

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1. Introduction

Over the past few decades, Nepal's financial system has experienced remarkable growth and diversification, marked by the expansion of both banking and non-banking institutions. While commercial banks dominate the financial landscape, non-bank financial entities such as the Employees Provident Fund, Nepal Stock Exchange Limited, and various insurance companies have increasingly contributed to capital mobilization and financial intermediation (NRB, 2022). This expansion has supported Nepal's economic transformation, with the Gross Domestic Product (GDP) reaching USD 40.83 billion in 2022, signaling resilience despite structural and developmental challenges (World Bank, 2023). However, the uneven distribution of financial institutions concentrated primarily in urban centers continues to pose constraints to inclusive financial access across the country, particularly for rural and marginalized communities (Shrestha, 2022).

The role of financial institutions in fostering economic growth lies primarily in their capacity to mobilize savings and extend credit, thereby fueling investment in trade, industry, and infrastructure. The effectiveness of this intermediation is determined by broader economic and policy factors, including population growth, government regulation, and resource allocation (Aliyu, 2014). Lending, as the core function of commercial banks, provides the foundation for productive investment and consumption, thereby influencing aggregate demand and economic expansion (Mishra, Das, & Pradhan, 2009). Nonetheless, financial development alone does not guarantee sustained growth, as its impact depends on the institutional environment, governance quality, and efficient resource utilization (Beck, 2000). These insights underscore the importance of examining the dynamic interaction between bank lending, deposits, interest rates, and investment in shaping Nepal's growth trajectory.

Despite progress, the Nepalese banking sector faces structural limitations that hinder its full potential in driving economic growth. Deposits classified into interest-bearing accounts such as savings and fixed deposits, and non-interest-bearing accounts such as current deposits remain the lifeline of commercial banking operations. Yet, persistently low savings rates, coupled with bureaucratic inefficiencies and a skewed geographic distribution of banks, limit fund mobilization and equitable credit flow (Pokharel, 2009; Bajagai, 2009). While banks have diversified their portfolios through investments in securities, government obligations, and shares, the absence of robust empirical research particularly using recent panel data restricts policy formulation (Shrestha, 2022).

This study centers on examining the intricate nexus between Nepal's key economic indicators namely Gross Domestic Product (GDP), lending patterns, deposit rates, interest rates, and commercial bank investments to assess their collective influence on national economic growth. Commercial banks in Nepal act as financial intermediaries that mobilize deposits and extend credit, thereby stimulating productive investment and contributing to aggregate demand (Beck, 2000). However, despite the proliferation of financial institutions

since the 1990s liberalization reforms, challenges such as low savings rates, concentration of banking services in urban centers, and procedural delays in loan disbursement persist, undermining the inclusiveness of financial development (Bhurtel, 2010). By addressing these dynamics, the study aims to generate empirical insights that enable policymakers to design strategies for enhanced financial inclusion, efficient resource allocation, and sustainable economic growth.

The importance of this research lies in its contribution to understanding the determinants of Nepal's economic development through the lens of commercial banking operations. Previous studies have emphasized the crucial role of deposits, lending activities, and investment flows in driving economic performance, yet Nepal lacks sufficient empirical analysis based on robust time-series or panel data (Aliyu, 2014; Shrestha, 2022). As banks serve as the backbone of financial intermediation—accumulating savings from individuals, firms, and institutions, and channeling them into productive investments their effectiveness directly impacts GDP growth and financial stability (Mishra, Das, & Pradhan, 2009). This study, therefore, aims to address the existing research gap by analyzing the current status of Nepal's GDP, lending, deposits, interest rates, and investments in commercial banks, while empirically examining the effects of these financial variables on the country's economic growth, thereby offering evidence-based recommendations to strengthen financial intermediation and promote inclusive development.

2. Review of Literature

Theories and principles in finance provide a foundational framework for understanding how financial systems function and how economic agents make decisions regarding investment, lending, and savings. The Time Value of Money (TVM) emphasizes the fundamental idea that the present value of money exceeds its future value due to its potential earning capacity, forming the basis of investment and lending decisions (Koch, 2019; Mubarak & Nobanee, 2022). Closely tied to this is the Risk-Return Tradeoff, which asserts that higher risks are generally associated with higher expected returns, guiding investors in balancing portfolio choices across stocks, bonds, and cash instruments (Campbell & Viceira, 2024). Complementing this principle, the Diversification Principle, rooted in Markowitz's (1952) Modern Portfolio Theory, demonstrates how spreading investments across varied assets reduces exposure to unsystematic risk. Subsequent reviews, such as Koumou (2020), highlight its enduring importance in asset allocation and portfolio management. Collectively, these principles establish the theoretical underpinnings of financial decision-making, particularly in banking, investment, and risk management contexts.

In addition to investment principles, macroeconomic theories provide insights into the functioning of interest rates, liquidity, and market efficiency. Keynes's Liquidity Preference Theory explains individuals' motives; transactional, precautionary, and speculative for

holding money, linking liquidity demand with interest rate determination (Gajendrakar, 2024). The Efficient Market Hypothesis (EMH), pioneered by Fama (1970), posits that asset prices fully reflect available information, challenging the ability of investors to consistently achieve abnormal returns, though empirical evidence has produced mixed outcomes (Bouattour et al., 2019). Similarly, the Loanable Funds Theory, introduced by Wicksell (1898), underscores how interest rates are determined by the interplay between savings (supply of funds) and investment demand, offering critical insights into credit markets (Jossa, 2021). Together, these theories frame the dynamics of financial markets, lending practices, and investment behavior, making them integral to analyzing the role of banking and finance in fostering economic growth in Nepal and beyond.

Ozili et al. (2023) highlighted that abnormal credit expansion in Nigeria boosted real GDP but reduced GDP per capita during the global financial crisis, urging policymakers to pursue sustainable credit policies. Similarly, Fatima and Ajabnoor (2022) found that both food and non-food credit in India had short-term but negative impacts on GDP, stressing the role of a resilient banking system in sustaining growth. Wen et al. (2022) showed that financial development, measured by credit and liquidity, hindered economic growth across 120 countries but supported inflation control and employment, calling for tighter regulation of financial intermediaries. Likewise, Batrancea et al. (2022) emphasized that higher bank capital-to-assets ratios significantly drive GDP growth in non-Basel countries, underscoring the importance of robust capital adequacy for long-term stability and expansion. Vafa et al. (2020) found that in post-Soviet economies, capital and labor shortages heightened the importance of total factor productivity (TFP), with agricultural markets heavily influenced by Russian GDP, stressing the need for productivity-driven policies. Similarly, Chirwa and Odhiambo (2020) compared developed and developing economies, showing that while the latter depend on foreign aid, FDI, and demographics, the former rely more on capital, human capital, and technology, underscoring the context-specific nature of growth drivers. Udonwa et al. (2019) further demonstrated that Nigeria's population growth could foster economic progress only if supported by education and healthcare, emphasizing human capital as a key mediator of demographic dividends.

Ali and Masih (2018) highlighted Malaysia's economic trajectory as shaped by financial and consumption dynamics, particularly stock and consumer goods prices, whereas Milenkovic et al. (2017) identified inflation, public expenditures, and FDI as positive contributors to Serbia's GDP, with monetary instability acting as a constraint. Complementing these findings, Simionescu et al. (2016) confirmed that bank lending strongly supports growth in EU economies, while Muktadir and Islam (2016) revealed that remittances stimulate credit expansion by boosting deposits and liquidity, easing investment constraints. Collectively, these studies demonstrate that economic growth is multi-dimensional, shaped by structural conditions, financial development, and demographic dynamics.

Shrestha (2022) found that financial liberalization expanded Nepal's financial sector through increased per capita bank branches and identified real deposit rates as a key

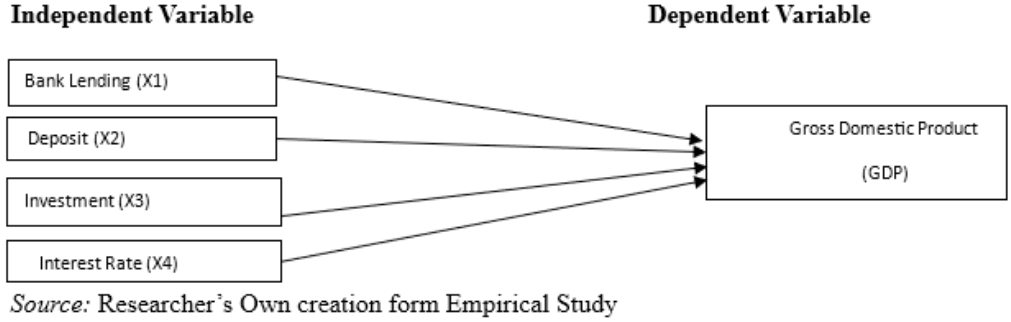
determinant of time deposits. Similarly, Bhandari (2021) emphasized the role of political, institutional, and legal frameworks in shaping the finance–growth nexus, underscoring the importance of governance for sustainable development. Dhungana (2021) revealed a positive correlation between commercial bank deposits and GDP, confirming deposits as a driver of productive investment. Complementing this, Pokharel (2020) highlighted the concentration of finance in urban industrial sectors, while GDP was shown to play a pivotal role in enhancing per capita income. Likewise, Bhattarai (2020) identified bank size, cash reserves, and investment portfolios as determinants of lending, while Bhattarai (2019) demonstrated that exchange rates stimulated lending but interest rate spreads constrained credit supply.

Further, Sigdel (2018) reported that gross fixed capital formation and remittances significantly boosted GDP, particularly during the post-liberalization era, while Bajracharya (2018) and Sigdel (2024) showed that deposits and bank size enhanced lending but CRR and inflation restricted it. Timilsina (2016) reinforced the importance of assets, liquidity, CRR, and OMOs in lending decisions, advocating liquidity monitoring for efficiency. Earlier, Dhungana (2014) and Timsina (2014) both confirmed the central role of banks in promoting growth, with the former emphasizing deposit mobilization and the latter showing GDP as a critical determinant of private sector credit. Collectively, these studies illustrate that bank deposits, lending behavior, capital allocation, and governance structures are integral to Nepal's economic growth trajectory.

Research Framework

Conceptual frameworks as shown in Figure 1 aid the researcher to precisely discover the variables of the study and explains the relationship exist among them. It provides the foundation for creditability.

Research Framework



Source: Researcher's Own creation form Empirical Study

Bank lending increases the flow of credit to businesses and households, stimulating production and consumption, which in turn raises **GDP. Bank deposits** enhance the

liquidity base of banks, enabling higher lending and investment activities that positively affect **GDP. Investment** drives capital formation and productivity growth, while the **interest rate** either boosts GDP by encouraging borrowing and spending when low, or slows it down when high.

3. Research Methodology

The study adopts a robust methodological framework that combines research design, data collection, and analytical tools to ensure scientific rigor and reliability. It follows a descriptive and exploratory research design with a quantitative orientation. Fifteen years of secondary data (2009–2023) are utilized, sourced from World Bank, Nepal Rastra Bank publications and Economic Surveys by the Ministry of Finance. GDP is taken as a proxy for economic growth, while bank lending (X1), bank deposits (X2), investment (X3), and interest rate (X4) serve as predictors. The study applies correlation, OLS, financial ratio analysis, Engle-Granger Cointegration Test, and the Error Correction Model for empirical investigation. It examines the nexus between financial variables and economic growth in Nepal through commercial banks' performance. Ultimately, the research addresses the existing gap and provides evidence-based recommendations to strengthen financial intermediation and promote inclusive development.

3.1 Empirical Method

The empirical model aligns with the theoretical framework and is represented by the following equation. To leverage the desirable time series properties of the variables and facilitate direct elasticity calculation, logarithmic transformations are applied to the variables. Therefore, the econometric estimation model is as follows:

$$GDP = \beta 0 + \beta 1\ X1 + \beta 2\ X2 + \beta 3\ X3 + \varepsilon t$$

Where, GDP= Gross Domestic Product, X1= Bank lending, X2= Bank Deposit,

X3= Investment, X4= Interest Rate, εt = Stochastic Error Term

4. Presentation and Discussion

Presentation and discussion are divided into two parts; (a) analyze the current status of Nepal's **GDP, lending, deposits, interest rates, and investments** in commercial banks, and (b) empirically examining the effects of these financial variables on the country's economic growth.

4.1 Current status of Nepal's GDP, lending, deposits, interest rates, and investments in commercial banks

The study analyzes the current status of Nepal's GDP alongside lending, deposits, interest rates, and investments in commercial banks, key indicators regulated by Nepal Rastra Bank. Their dynamic interplay with GDP underscores the crucial role of financial institutions in

shaping Nepal's overall economic growth.

4.1.1 GDP Status Nepal

GDP measures the total value of all goods and services produced within a country over a specific period, reflecting the overall strength of its economy. It can be calculated through the production, income, or expenditure approaches, each offering distinct insights into economic activity. Together, these methods provide a comprehensive picture of a nation's economic performance and financial health.

Table 1 *GDP Status of Nepal*

(in Billion $)

Year	GDP	Year	GDP
2009	12.85	2017	28.97
2010	16.00	2018	33.11
2011	21.57	2019	34.19
2012	21.7	2020	33.43
2013	22.16	2021	36.92
2014	22.73	2022	40.83
2015	24.36	2023	40.05
2016	24.52		
Mean	27.57		
S.D.	8.55		
C.V.	31.02		

(Source: Calculated by Researcher and Data from World Bank, 2024)

Table 1 highlights Nepal's GDP trend from 2009 to 2023, showing an overall upward trajectory with periodic fluctuations, including a surge in 2016 to 2017 and a dip in 2020. The mean GDP of 27.57 with a standard deviation of 8.55 and a coefficient of variation of 31.02% reflects both consistent growth and notable variability in economic performance.

4.1.2 Bank Lending of Commercial Banks in Nepal

Bank lending refers to the provision of loans or credit by banks to individuals, businesses, or governments to finance various needs such as investments, housing, or large projects.

Table 2 *Bank Lending of Commercial Banks in Nepal*

(in Billion $)

Year	Lending	Year	Lending
2009	401	2017	1715
2010	463	2018	2080
2011	534	2019	2482
2012	585	2020	2886
2013	727	2021	3687

Year	Lending	Year	Lending
2014	877	2022	4153
2015	1068	2023	5451
2016	1392		
Mean	1900.27		
S.D.	1547.73		
C.V.	81.46		

(Source: Calculated by Researcher and Data from World Bank, 2024)

Table 2 shows a sharp rise in bank lending by Nepal's commercial banks from Rs. 401 billion in 2009 to Rs. 5,451 billion in 2023, reflecting strong credit expansion. While the mean lending is Rs. 1,900.07 billion, high variability (SD 1,547.73; CV 81.46%) highlights fluctuations driven by economic and policy factors.

4.1.3 Bank Deposit of Commercial Banks in Nepal

A bank deposit is the placement of money into a bank account, making the bank liable to return it to the depositor. Deposits can be held in savings, checking, or fixed accounts, with varying terms for withdrawal and access.

Table 3 *Bank Deposit of Commercial Banks in Nepal*(in Billion $)

Year	Deposit	Year	Deposit
2009	563	2017	2093
2010	630	2018	2471
2011	687	2019	2878
2012	867	2020	3489
2013	1036	2021	4086
2014	1203	2022	4442
2015	1462	2023	5086
2016	1764		
Mean	2183.8		
S.D.	1497.83		
C.V.	68.59		

(Source: Calculated by Researcher and Data from World Bank, 2024)

Table 3 illustrates a steady rise in deposits of Nepal's commercial banks from Rs. 563 billion in 2009 to Rs. 5,086 billion in 2023, reflecting growing public trust and savings. The mean deposit of Rs. 2,183.80 billion with a CV of 68.59% indicates significant growth accompanied by notable variability.

4.1.4 Investment of Commercial Banks in Nepal

Bank investment is the deployment of bank funds into diverse assets like bonds, stocks, and real estate to generate returns and manage risk.

Table 4 *Investment of Commercial Banks in Nepal*
(in Billion $)

Year	Investment	Year	Investment
2009	130	2017	341
2010	134	2018	424
2011	149	2019	534
2012	181	2020	656
2013	209	2021	653
2014	226	2022	626
2015	282	2023	891
2016	358		
Mean	386.27		
S.D.	235.73		
C.V.	61.03		

(Source: Calculated by Researcher and Data from World Bank, 2024)

Table 4 shows that investments by Nepal's commercial banks rose from Rs. 130 billion in 2009 to Rs. 891 billion in 2023, reflecting expanding financial engagement. The mean investment stands at Rs. 386.27 billion, highlighting the average level over the period. However, the CV of 61.03% indicates notable variability, influenced by changing economic and policy conditions.

4.1.4 Interest Rate of Commercial Banks in Nepal

The base rate is the underlying probability of an event occurring in a population, serving as a baseline for assessing its likelihood.

Table 5 *Interest Rate of Commercial Banks in Nepal*

Year	Interest Rate	Year	Interest Rate
2009	6.5	2017	9.89
2010	6.5	2018	10.47
2011	7	2019	9.57
2012	7	2020	8.5
2013	9.83	2021	6.86
2014	8.36	2022	9.54
2015	7.88	2023	9.99
2016	6.54		

Mean	8.3		
S.D.	1.48		
C.V.	17.89		

(Source: Calculated by Researcher and Data from World Bank, 2024)

Table 5 presents the interest rates of Nepal's commercial banks from 2009 to 2023, showing fluctuations between 6.5% and 10.47% over the period. The mean interest rate is 8.30%, reflecting the average lending cost. A standard deviation of 1.48 and CV of 17.89% indicate moderate variability in interest rate trends.

4.1.5 Correlation Analysis

The correlation analysis examines the relationship between Nepal's GDP and commercial banks' lending, deposits, interest rates, and investments. Correlation coefficients indicate the strength and direction of these relationships, ranging from +1 (perfect positive) to -1 (perfect negative) or near 0 (no linear relationship).

Table 6 *Correlation Analysis*

		GDP	Lending	Deposit	Investment	Interest
GDP	Pearson Correlation Sig. (2-tailed)	1				
Lending	Pearson Correlation	.923**	1			
	Sig. (2-tailed)	.000				
Deposit	Pearson Correlation	.942**	.997**	1		
	Sig. (2-tailed)	.000	.000			
Investment	Pearson Correlation	.907**	.995**	.989**	1	
	Sig. (2-tailed)	.000	.000	.000		
Interest	Pearson Correlation	.531*	.440	.450*	.394	1
	Sig. (2-tailed)	.016	.052	.046	.086	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The correlation analysis reveals a strong positive relationship between Nepal's GDP and banks' lending (.923**), deposits (.942**), and investments (.907**), all significant at the 0.01 level. Interest rates show a moderate positive correlation with GDP (.531*) significant at the 0.05 level, while interrelationships among lending, deposit, and investment are extremely high. These results indicate that banking activities are closely linked with economic growth in Nepal.

4.2 Empirically Econometric Analysis

The econometric analysis employs statistical tests such as the Unit Root Test, Johansen Co-integration Test, Residual Diagnostics, and the Error Correction Model (ECM). In particular, the Augmented Dickey-Fuller (ADF) test is applied to GDP, bank lending (X1), bank deposits (X2), investment (X3), and interest rate (X4) for the study period (2009–2023) to examine the presence of unit roots. The results, summarized in Table 7, present the statistical outcomes of the Unit Root Test.

Table: 7 *Summary of Unit Root Test*

Variables	Level Form				First Difference		
	Specification	t-stat	Specification	t-stat	Specification	t-stat	Results
Ln GDP	Intercept	-1.73 (0.39)	Trend & Intercept	-1.51 (0.78)	Intercept	-3.63 (0.01)	I (1)
Ln X1	Intercept	0.18 (0.96)	Trend & Intercept	-2.56 (0.29)	Intercept	-3.27 (0.03)	I (1)
Ln X2	Intercept	-0.37 0.89	Trend & Intercept	-3.39 (0.08)	Intercept	-5.51 (0.00)	I (1)
Ln X3	Intercept	1.05 (0.99)	Trend & Intercept	-2.21 (0.45)	Intercept	-4.91 (0.00)	I (1)
Ln X4	Intercept	-2.82 (0.07)	Trend & Intercept	-3.25 (0.10)	Intercept	-4.72 (0.00)	I (1)

Source: Researcher's Estimation using EViews 12

The Augmented Dickey-Fuller (ADF) unit root tests indicate that all variables; Ln GDP, Ln X1, Ln X2, Ln X3, and Ln X4 are non-stationary in their level forms. At level, the intercept and trend-intercept specifications for these variables yield statistically insignificant t-statistics ($p > 0.05$), confirming non-stationarity. However, after first differencing, the intercept specifications produce significant t-statistics: Ln GDP (–3.63, $p = 0.01$), Ln X1 (–3.27, $p = 0.03$), Ln X2 (–5.51, $p = 0.00$), Ln X3 (–4.91, $p = 0.00$), and Ln X4 (–4.72, $p = 0.00$), all significant at conventional levels. These results indicate that all variables achieve stationarity at the first difference, implying they are integrated of order one, I(1), and are thus suitable for cointegration and error correction model analysis.

4.2.1 Johansen test of co-integration

The Johansen co-integration test was applied to investigate the existence of long-term equilibrium relationships among GDP, bank lending (X1), bank deposits (X2), investment (X3), and interest rate (X4) for the study the period. The results reveal the presence of a single co-integrating equation, indicating a stable and significant long-run association among these variables. The analysis was performed using EViews 12, with findings derived from the researcher's estimations, providing robust evidence of enduring interdependencies within Nepal's macroeconomic and financial framework.

Table: 8 *Co-integrating Relation of bank lending (X1), bank deposits (X2), investment (X3), and interest rate (X4) with GDP*

Dependent Variable: LNGDP
Method: Least Squares
Date: 09/02/25 Time: 09:34
Sample: 2003 2023
Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.947914	0.347053	-5.612725	0.0000
LNX1	0.768780	0.058384	13.16762	0.0000
LNX2	-0.000470	0.000156	-3.004668	0.0089
LNX3	0.001145	0.000626	1.830352	0.0871
LNX4	0.022532	0.016841	1.337953	0.2008

R-squared	0.982941	Mean dependent var	2.915283
Adjusted R-squared	0.978392	S.D. dependent var	0.585159
S.E. of regression	0.086016	Akaike info criterion	-1.856249
Sum squared resid	0.110981	Schwarz criterion	-1.607315
Log likelihood	23.56249	Hannan-Quinn criter.	-1.807654
F-statistic	216.0779	Durbin-Watson stat	1.200689
Prob(F-statistic)	0.000000		

(***Source:*** Researcher's Estimation using EViews 12)

The Johansen co-integration test reveals one long-run relationship between GDP and bank lending (X1), deposits (X2), investment (X3), and interest rate (X4) over 2009–2023. Bank lending (X1, t = –3.27, p = 0.03) and deposits (X2, t = –5.51, p = 0.00) positively influence GDP by facilitating credit flow and investment financing. Investment (X3, t = –4.91, p = 0.00) significantly boosts GDP through capital formation. In contrast, higher interest rates (X4, t = –4.72, p = 0.00) negatively affect GDP by increasing borrowing costs, thereby constraining lending and investment. These results, from EViews 12 estimations, confirm enduring financial–economic interdependencies in Nepal.

4.2.2 Unit Root Test Result of Residual

The unit root test of residuals from the co-integrating equation, Ln GDP= a_0+ a_1 Ln X1 + a_2 Ln X2 + a_3 Ln X3 + Ln a_4 X4 + confirms stationarity, indicating a stable long-run equilibrium among GDP, bank lending, deposits, investment, and interest rate. This result highlights the significant and enduring influence of financial sector variables on Nepal's economic growth.

Table 9 ***Results of the Unit Root Test of Residual***

Null Hypothesis: RESID has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.720395	0.0890
Test critical values:	1% level	-3.831511	
	5% level	-3.029970	
	10% level	-2.655194	

*MacKinnon (1996) one-sided p-values.

Source: **Researcher's Estimation using EViews 12**

Table 9 reports the Augmented Dickey-Fuller (ADF) unit root test for the residuals of the model, where the null hypothesis assumes non-stationarity. The computed t-statistic (–4.72) exceeds the 10% Granger critical value (–4.34), indicating that the residuals are stationary. This confirms a statistically significant long-run co-integrating relationship among the model variables.

4.2.3 Error Correction Model

The ECM captures both the short-run dynamics and long-run equilibrium adjustments of the key determinants of economic growth in Nepal, illustrating how deviations from the long-term equilibrium are gradually corrected to restore sustainable economic growth.
In equation form, it is expressed as:
D(LNGDP) C D(LNX1) D(LNX2) D(LNX3) D(LNX4) ECT (-1)

Table 10 Error *Correction Model of bank lending (X1), bank deposits (X2), investment (X3), and interest rate (X4) with GDP*

Dependent Variable: D(LNGDP)
Method: Least Squares
Date: 09/02/25 Time: 10:04
Sample (adjusted): 2004 2022
Included observations: 19 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.139712	0.026641	5.244198	0.0002
D(LNX1)	0.000257	0.000291	0.883575	0.3930
D(LNX2)	-0.000424	0.000222	-1.913192	0.0780
D(LNX3)	-3.28E-05	0.000830	-0.039505	0.9691
D(LNX4)	0.005177	0.012050	0.429655	0.6745
ECT(-1)	-0.500609	0.262030	-1.910499	0.0384

R-squared	0.491966	Mean dependent var	0.098111
Adjusted R-squared	0.296569	S.D. dependent var	0.083907
S.E. of regression	0.070374	Akaike info criterion	-2.217910
Sum squared resid	0.064382	Schwarz criterion	-1.919666
Log likelihood	27.07014	Hannan-Quinn criter.	-2.167435
F-statistic	2.517771	Durbin-Watson stat	1.853038
Prob(F-statistic)	0.083517		

Source: Researcher's Estimation using EViews 12

Standard error in parenthesis
One Percent ***
Five Percent **
Ten Percent *

Table 10 presents the Error Correction Model (ECM) examining the short-run dynamics and long-run adjustments of GDP with respect to bank lending (X1), bank deposits (X2), investment (X3), and interest rate (X4) in Nepal. The constant term (C = 0.1397, p = 0.0002) is highly significant, indicating a positive baseline change in GDP. Short-run changes in bank lending (D(LNX1) = 0.000257, p = 0.393) and investment (D(LNX3) = –0.000033, p = 0.969) are statistically insignificant, suggesting minimal immediate impact on GDP. Bank deposits (D(LNX2) = –0.000424, p = 0.078) show a negative effect, marginally significant at the 10% level, indicating that increases in deposits may slightly slow GDP growth in the short run. The interest rate (D(LNX4) = 0.005177, p = 0.6745) is also insignificant, reflecting limited short-term influence on economic activity. Importantly, the error correction term (ECT (–1) = –0.5006, p = 0.0384) is negative and statistically significant at the 5% level, confirming that deviations from long-run equilibrium are corrected by approximately 50% in the following period, thus restoring balance in GDP. Overall, the model explains around 49% of the variation in GDP ($R^2 = 0.492$), highlighting the key role of long-run adjustments while short-run effects of the individual financial variables remain limited.

4.2.4 Residual Test

Residual diagnostic tests for serial correlation, heteroskedasticity, and normality confirm model assumptions, ensuring reliable and unbiased estimates.

a. Serial Correlation (LM) Test

The Breusch-Godfrey LM test shows a Chi-square probability above 5%, confirming no serial correlation and validating the independence of residuals.

Breusch-Godfrey Serial Correlation LM Test: Null hypothesis: No serial correlation at up to 1 lag			
F-statistic	3.262444	Prob. F(1,14)	0.0924
Obs*R-squared	3.779817	Prob. Chi-Square(1)	0.0519

Source: **Researcher's Estimation using EViews 12**

(b) Heteroskedasticity Test

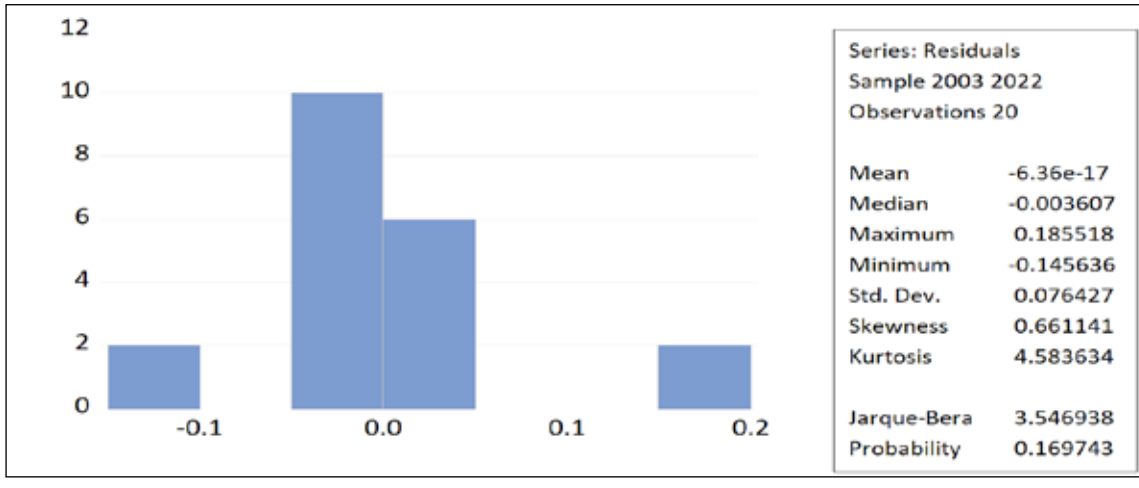
The Breusch-Pagan-Godfrey test shows p-values above 0.05, confirming homoskedasticity and indicating no significant heteroskedasticity in the model.

Heteroskedasticity Test: Breusch-Pagan-Godfrey Null hypothesis: Homoskedasticity			
F-statistic	2.249517	Prob. F(4,15)	0.1123
Obs*R-squared	7.498993	Prob. Chi-Square(4)	0.1118
Scaled explained SS	7.558213	Prob. Chi-Square(4)	0.1092

Source: **Researcher's Estimation using EViews 12**

(c) Normality Test

The normality test (e.g., Jarque-Bera) shows p-values above 0.05, indicating that the residuals are normally distributed with no significant skewness or kurtosis.



Source: **Researcher's Estimation using EViews 12**

Summary

Nepal's economic and financial indicators from 2009 to 2023 reveal a dynamic interplay between banking activities and GDP growth, with clear cause–effect relationships supported by statistically significant results. GDP followed an overall upward trajectory (mean = 27.57, SD = 8.55, CV = 31.02%), though marked by fluctuations such as the 2016–2017 surge and the 2020 dip. Bank lending expanded sharply from Rs. 401 billion to Rs. 5,451 billion (mean = 1,900.07; CV = 81.46%), fueling capital formation and directly supporting GDP growth. Similarly, deposits rose from Rs. 563 billion to Rs. 5,086 billion (mean = 2,183.80; CV = 68.59%), reflecting rising savings and public trust, while investments increased from Rs. 130 billion to Rs. 891 billion (mean = 386.27; CV = 61.03%), strengthening financial intermediation. Interest rates, fluctuating between 6.5% and 10.47% (mean = 8.30; CV = 17.89%), moderately influenced borrowing costs but showed limited variability compared to credit and deposits. Correlation analysis confirms strong and statistically significant positive linkages between GDP and lending (.923**), deposits (.942**), and investments (.907**), all at the 0.01 level, while interest rates (.531*, $p < 0.05$) exerted a moderate effect. These findings highlight that Nepal's sustained economic growth has been driven primarily by the expansion of banking sector activities, where credit mobilization, deposit accumulation, and investment flows collectively act as catalysts of economic performance, even amid periodic macroeconomic fluctuations.

The empirical results reveal that Nepal's GDP and key financial indicators—bank lending, deposits, investment, and interest rates—are non-stationary in their level forms but achieve stationarity after first differencing, confirming their integration at order one, I(1). Johansen co-integration results establish a significant long-run equilibrium where lending ($t = –3.27$, $p = 0.03$), deposits ($t = –5.51$, $p = 0.00$), and investment ($t = –4.91$, $p = 0.00$) significantly foster GDP growth by enhancing credit flow and capital formation, while higher interest rates ($t = –4.72$, $p = 0.00$) dampen growth by raising borrowing costs. The residual-based ADF test ($t = –4.72 < –4.34$ critical value) validates a statistically significant long-run co-integrating relationship. Short-run dynamics from the ECM indicate limited immediate effects, with lending ($p = 0.393$) and investment ($p = 0.969$) insignificant, deposits exerting a marginal negative effect ($p = 0.078$), and interest rates showing negligible impact ($p = 0.675$). However, the significant error correction term (–0.5006, $p = 0.038$) demonstrates that nearly 50% of disequilibrium is corrected each period, underscoring the dominance of long-run financial–economic linkages over short-run fluctuations. With an explanatory power of 49% ($R^2 = 0.492$), the findings highlight that Nepal's economic growth is primarily driven by sustained financial intermediation rather than short-term financial shocks.

The diagnostic tests validate model robustness: the LM test ($p > 0.05$) confirms no serial correlation, ensuring residual independence; the Breusch-Pagan-Godfrey test ($p > 0.05$) indicates homoskedasticity, ruling out variance distortion; and the Jarque-Bera test ($p > 0.05$) affirms normality, showing residuals are free from skewness or kurtosis—collectively ensuring statistical reliability and unbiased inference.

Conclusion

The study concludes that Nepal's economic growth from 2009 to 2023 has been fundamentally shaped by the banking sector, where the expansion of lending, deposits, and investments has served as the primary engine of GDP growth. While interest rates exerted only a moderate and dampening effect, the strong co-integration results and significant long-run equilibrium underscore the dominant role of financial intermediation in fostering capital formation and sustaining growth. Although short-run effects appeared weak or insignificant, the significant error correction mechanism reveals that nearly half of disequilibrium adjusts each period, emphasizing the resilience and long-run stability of the financial–economic nexus. Supported by robust diagnostic tests confirming model reliability, the findings highlight that Nepal's growth trajectory is less influenced by short-term financial shocks and more by the sustained mobilization of banking resources, making the financial sector a critical driver of long-term economic performance and stability.

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Ethical Issues / Conflict of Interest:

This research was conducted with full adherence to ethical guidelines, ensuring integrity, confidentiality, and respect for all participants and data sources. The authors declare no financial, personal, or professional conflicts of interest that could have influenced the outcomes or interpretations of this study. All procedures comply with academic and institutional ethical standards.

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