Quest Journal of Management and Social Sciences
Volume 4 Issue 2: 236-248
ISSN Print: 2705-4527
ISSN Online: 2705-4535
Web: https://www.quest.edu.np

The Impact of Bank-Specific Factors on the Banking Sector Development in Nepal

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Received: February 27, 2022
Revised: June 4, 2022
Accepted: November 20, 2022
Published: December 21, 2022

How to cite this paper:

Gwachha K.P. (2022). The Impact of Bank-Specific Factors on the Banking Sector Development in Nepal. *Quest Journal of Management and Social Sciences, 4*(2), 236-248

Abstract

Background: The concept of the banking sector development is multi-dimensional, and it is difficult to establish a single description for it because it is an interconnected process that encompasses increases in the number and quality of banking services.

Objective: The major purpose of the study is to examine the impact of bank-specific factors on the banking sector development in Nepal

Method: The study applied the vector error correction model (VECM) technique with economic time series data ranging from 1995 to 2020. The study was based on co-integration analysis to determine the long-run equilibrium relationship between the model's variables. Banking sector development is measured by the arithmetic average of the normalized values of banking depth, banking efficiency, and banking stability.

Result: The study reveals that banking trade has a positive and significant influence on the banking sector's development in line with theoretical predictions. Electronic banking and liquidity have a positive and statistically significant role to explain banking sector development in Nepal. In addition, it demonstrates that non-performing loans has a negatively and significantly influenced banking sector development whilst branch network has a marginally negative but insignificant impact on banking sector development.

Conclusion: The major conclusion of the study is that there is a long-term equilibrium relationship between bank-specific variables and banking sector development. The dynamic causality of VECM reveals that banking trade, non-performing loans, electronic banking, and liquidity are statistically significant which indicates strong explanatory power to explain banking sector development in Nepal.

Recommendation: This study recommends for policymakers as it sheds light on the importance of raising deposits and lending policies and focused on electronic banking. The financial institution authorities should be implied to build systems and skills in liquidity management, assets and liability management, and branch networking management to enhance the banking sector development.

Paper Types: Research Paper

Keywords: Banking sector development; bank-specific factors; VECM approach

JEL Classification Code: C58, G21, G28

Introduction

The concept of banking sector development is multi-dimensional. It is difficult to establish a single description for it because it is an interconnected process encompassing increases in the number and quality of banking services. Macroeconomic policy, savings mobilization, institutional quality, loan issuance, and risk management are some of these dimensions. Thus, a country's capacity to deliver these activities efficiently indicates its financial system's progress. Policymakers must understand the long-run and causal relationship between the banking system, economic growth, and financial development (Perotti &Volpin, 2007) to comprehend the role of institutional policy and banking sector development. The significance of this study stems from the banking sector's vital role in the economic development process and its role in providing the necessary finance for investments, necessitating research into the drivers that influence the banking sector's development in Nepal.

According to a growing body of theoretical and empirical evidence, developing institutions and financial markets is critical to economic growth (Levine et al. 2005). Economists have long questioned the relationship between financial development and economic growth. The importance of paying more attention to institutional development has been highlighted in theoretical and empirical studies, as institutions play a crucial role in the growth of the banking sector. According to Kaur et al. (2013), the expansion of the banking sector development accelerates the rate at which a host nation benefits from foreign direct investment and remittance inflows by providing services such as loans and efficient capital allocation. It is clear from the literature that the positive role that the development of the banking sector plays in the promotion of economic growth is no longer an unsettled issue. What is yet unknown is what factors influence the banking sector development in Nepal. Hence, the current study was undertaken to fill in that void.

These studies have dealt with several aspects of the relations between bank-specific factors and banking sector development at theoretical and empirical levels. These factors might be a precondition for achieving sustainable banking sector development. Financial intermediaries channel the savings into productive investments. However, Nepal is lagging in adequate capital accumulation on the one hand and productive investment on the other. In such a scenario, we cannot overlook the role of financial intermediaries, and financial markets cannot. An efficient financial system accelerates capital accumulation and, in turn, determines a country's long-term banking sector development. Therefore, this study contributes to banking sector development by examining the bank-specific factors in the context of Nepal. Finally, the study addresses the issues of all concerned parties such as policymakers, government, depositors, investors, and other concerned stakeholders.

This study analyzes the impact of bank-specific factors on banking sector development in Nepal. It also explains the relationship between banking sector development and financial structure, non-performing loans, bank network, banking trade, electronic banking, and liquidity employed as proxy bank-specific indicators. This study hypothesizes that bank-specific characteristics and banking sector development co-integrative relationships. We explore the long-term link of co-integration between bank-specific factors and banking sector development using the vector error correction model (VECM) bounds testing model.

From an empirical literature review viewpoint, Section 2 addresses the bank-specific factors of banking sector development. Section 3 carries out a methodology that describes data and variables description, correlation, descriptive statistics, and model specification. Section 4 explains the VECM approach results in discussion and interpretation. Lastly, the study concludes the research.

Review of literature

Commercial bank characteristics that influence the banking sector's development are known as bank-specific or internal factors. Internal decisions by top management and the board of directors largely

affect these elements. The term "financial structure" refers to a bank's capital or net value. It protects customers' deposits, increases the soundness of banks, offers a stable resource to absorb losses, and promotes the stability and efficiency of global financial systems by minimizing the danger of bankruptcy. Rajan and Zingales (1998) found that financial structure was highly significant and positively related to banking sector development. A high level of financial structure promotes banking sector development, whilst a low level of financial structure limits banking sector development (Law & Habibullah, 2009). According to Pranowo et al. (2010), the financial structure has a favorable and considerable impact on the banking sector's development. Financial structure and banking sector development in developing countries has a positive and significant association (Lee & Hsieh, 2013).

Non-performing loans are one of the most important internal variables affecting a bank's performance. It was calculated by dividing the overall value of the loan portfolio by the value of non-performing loans (including non-performing loans before the deduction of specific loan-loss provisions). Levine (2002) found a negative and significant role in explaining banking sector development. Aluko and Michael (2018), Huang (2010), and Hartwell (2013) also found that non-performing loans have a negative and significant influence on banking sector development. Ozili (2017) concluded that bank efficiency, loan loss coverage, banking competition, and banking system stability are inversely related to NPLs.

The branch network is measured by the total number of commercial bank branches associated with banking sector development (Adelowotan & Oshadare, 2017; Mark & Mitchener, 2005; and Spieker, 2008). The Branch network has been boosting financial access in rural areas through initiatives that result in a more significant number of branches. While the increased number of bank branches is promising, most banking services are still limited to urban regions. Adelowotan and Oshadare (2017) found a systematic relationship between branch network activities and banking depth and efficiency. According to Iqbal and Sami (2017), the number of bank branches and the credit deposit ratio has a favorable and considerable influence on the financial development in Nepal.

Internet banking is e-banking that allows customers to conduct financial transactions electronically over the internet using their personal computers, laptops, or mobile phones at any time convenient for them, rather than being limited to the hours the bank is open (Salehi & Alipour, 2010). Banking communication is getting effective and allowing customers to perform as per their will (Parajuli et al., 2020). According to Salamah (2017), electronic banking has a good and significant impact on Nepal's banking sector development. These studies also indicated that customers' security is a big concern for using e-banking services. Satisfaction has covertly influenced a customer's inclination towards electronic banking, which has positively influenced the banking sector development in Nepal (Banstola, 2008).

The banking trade consists of money placed into banking institutions for safekeeping and lending to risk-return projects. Cherif & Dreger (2016) found a significant positive relationship between bank credits and banking sector development. The studies have suggested that implicit borrowing may provide one such source and use of funds. Saedi (2019) found that industries with higher dependence on trade size financing (measured by the ratio of deposits plus loans to GDP) exhibited higher rates of development in the banking industry. Elisha and Luca (2007) revealed that there is a significant association relationship between deposit and loan indicators and the banking sector development in Turkey.

The ability of a bank to satisfy maturity liabilities and consumer demand for cash is referred to as liquidity. As a result, a bank with a high level of liquidity is likely to be less lucrative than one with a lower level of liquidity. Nabeel and Hussain (2017) found that liquidity positively affects banking depth and efficiency in developing countries. Milic and Solesa (2017) revealed a significant association between liquidity and banking performance. Mishra and Pradhan (2009) observed a significant positive association between the banking system and liquidity in the selected commercial banks in India.

Research methods

Data description and variables

The study was based on secondary data extracted from Nepal Rastra Bank from 1995 to 2020 with all commercial banks of Nepal with Quarterly Economic Bulletin (2021). This study used three aspects of banking sector development that were taken for the index construction banking depth (credit to the private sector), banking efficiency (net interest margin), and banking stability (capital adequacy ratio) as a dependent variable using world development indicators. The overall banking sector development (BSD) was obtained by the arithmetic average of the normalized values of banking depth, efficiency, and stability. The literature identified several determinants from both a theoretical and empirical perspective, which affect banking sector development. The study used financial structure, non-performing loans, branch networks, electronic banking, banking trade, and liquidity as explanatory variables.

Table 1 Symbols, variables, and their proxies

Symbols	Variables	Proxies
BSD	Banking depth	Credit to private sector/GDP
	Banking stability	Total capital funds/Risk-weighted assets
	Banking efficiency	Net interest margin
Explanatory variables		
FS	Financial Structure	Equity/Total assets
NPL	NPLs ratio	Non-performing loans/Total loans
BN	Branch Network	No. of branches of Commercial banks
BT	Banking Trade	[Deposit + Equity]/GDP
EB	Electronic Banking	Average of internet banking, card services, and mobile banking
LIQ	Liquidity ratio	Liquid assets/Total deposits

Pre-estimation diagnostics

We used descriptive statistics to define the features of the banking sector's development and bank-specific factors during the study period. The mean, median, minimum, maximum, standard deviation, skewness, and kurtosis values connected with the variables under examination were employed as descriptive statistics in the study. Table 3.2 shows the descriptive statistics for bank-specific variables considered in this analysis from 1995 to 2020, as well as the economic time series data.

Table 2 Descriptive statistics with BSD and bank-specific variables, 1995-2020

	BSD	FS	NPL	BN	BT	EB	LIQ
Mean	27.791	6.738	13.143	1168.4	90.141	1358742	35.833
Median	26.080	6.495	10.485	553.5	82.690	150068	40.150
Maximum	40.660	12.040	25.780	4436	153.080	6059884	45.000
Minimum	17.040	2.880	2.040	375	49.260	6338	9.600
Std. Dev.	7.166	3.411	8.409	1093.2	28.592	1820193	10.925
Skewness	0.421	0.252	0.219	1.620	0.759	1.330	-1.716
Kurtosis	2.029	1.529	1.485	4.838	2.713	3.751	4.314

Sources: EViews 10 output result outcomes

Table 2 shows the descriptive statistics of bank-specific variables from 1995 to 2020. The table shows that the difference between the minimum and maximum values is large across the variables under study, indicating the presence of extreme values. The data for all the variables are positively skewed except liquidity. The kurtosis values for all the variables are not around three and are not normally distributed, proving the data for the variables used is not normally distributed. In order to ensure that the quality and reliability of the final results are not compromised, the issue of data not normally distributed and abnormal and extreme values was addressed by transforming all the data sets into natural logarithms and making stationarity before using them for the main data analysis.

Table 3 Correlation analysis with dependent and independent variables, 1995-2020

	lnBSD	lnFS	lnNPL	lnBN	lnBT	lnEB	lnLIQ
lnBDS	1						
lnFS	0.3145	1					
lnNPL	-0.4038	-0.1283	1				
lnBN	-0.0514	0.5316	-0.2542	1			
lnBT	0.5729	0.4007	-0.3104	0.3809	1		
lnEB	0.4752	0.6094	-0.0988	0.4861	0.3825	1	
lnLIQ	0.3371	-0.3421	0.1467	-0.2169	-0.2384	-0.4705	1
VIF	2.374	4.281	1.982	3.816	2.075	2.521	3.749

Source: Eviews 10 output result outcome

Table 3 presents the correlation matrix for bank-specific variables with banking sector development. Correlation analysis has been adopted to identify the direction and magnitude of the relationship between different pairs of variables. It depicts the relationship between two variables as well as the degree of correlation between them. The association between the two variables is explained using the bivariate Pearson correlation coefficient. The results of the association between the explanatory variables are shown in the table.

Similarly, Table 3 shows the bank-specific variables' correlation using the variance inflation factor (VIF). The VIF results indicate no concern with multicollinearity among the independent variables. The VIF values are all less than six, indicating no multicollinearity amongst the independent variables in this study.

Model specification

The study examines the co-integrating link between bank-specific determinants and banking sector development by using the dynamic VAR/VEC model and Granger causality approach over the time spanning from 1995 to 22020. The annual time series data is derived from the Nepal Rastra Bank, which has been exposed to a pre-test of stationarity before the estimate method. However, given that VAR/VEC regards all variables in both dynamic and static models as a priori endogenous and hence controls for interactions between endogenous and exogenous factors, the argument for using the VAR/VEC model is subject to the co-integration test result. In some cases, we might add exogenous variables to the VAR/VEC model. Long- and short-term equilibrium connections, as well as co-integration variables, are widely investigated using the VECM model. If the variables in this research are cointegrated, the VECM equation is as follows:

$$\Delta lnBSD_t = \alpha_0 + \sum_{i=0}^{q} b_i \Delta lnBSD_{t-i} + \sum_{i=0}^{q} c_i \Delta lnFS_{t-i} + \sum_{i=0}^{q} d_i \Delta lnNPL_{t-i} + \sum_{i=0}^{q} e_i \Delta lnBN_{t-i} + \sum_{i=0}^{q} f_i \Delta lnBT_{t-i} + \sum_{i=0}^{q} g_i \Delta lnEB_{t-i} + \sum_{i=0}^{q} h_i \Delta lnLIQ_{t-i} + \mu_1 lnBSD_{t-1} + \mu_2 lnFS_{t-1} + \mu_3 lnNPL_{t-1} + \mu_4 lnBN_{t-1} + \mu_5 lnBT_{t-1} + \mu_6 lnEB_{t-1} + +\mu_7 lnLIQ_{t-1} + \varepsilon_t \dots\dots\dots (1)$$

Here, all variables are as defined previously: m1, m2, m3, m4, m5, m6 and m7 are long-run coefficients, whereas bj, cj, dj, ej, fj, gj, and hj are short-run dynamics, and ε represent a random disturbance term.

This study uses the Johansen co-integration test and a vector error correction model (VECM) to explore the long-term equilibrium and short-term dynamic link between banks' specific variables and banking sector development in Nepal. Finally, the Error Correction Model of Equation 2 was used to evaluate the short-run link between bank-specific variables and banking sector development and speed of adjustment.

$$\Delta lnBSD_t = \alpha_0 + \sum_{i=0}^{q} \delta_1 \Delta lnBSD_{t-i} + \sum_{i=0}^{q} \delta_2 \Delta lnFS_{t-i} + \sum_{i=0}^{q} \delta_3 \Delta lnNPL_{t-i} + \sum_{i=0}^{q} \delta_4 \Delta lnBT_{t-i} + \sum_{i=0}^{q} \delta_5 \Delta lnBN_{t-i} + \sum_{i=0}^{q} \delta_6 \Delta lnEB_{t-i} + \sum_{i=0}^{q} \delta_7 \Delta lnLIQ_{t-i} + \delta_8 EMC_{vt} \dots\dots\dots (2)$$

We do the estimation of dynamic error correction with the help of equations (2). The short-run dynamics of the model are represented by the coefficients δ1, δ2, δ3, δ4, δ5, δ6, and δ7, while the coefficient δ8 represents the divergence or convergence towards the long-run equilibrium. Divergence is shown by a positive coefficient, while a negative coefficient indicates convergence.

Data analysis and results

The stationarity tests

Before executing any test in time series analysis, we have to check variables for stationarity. This study established the order of integration of all variables using unit root tests. We used the PP and ADF tests for this purpose. The results of the Phillips and Perron test and ADF at the level and first difference are shown in Table 4.

Table 4 Unit root test for the level and first difference in time-series data

This table shows all variables are stationary or non-stationary in levels and first difference, respectively, at 1 and 5 per cent levels of significance in time series data from 1995 to 2020.

Variables	Level		First difference		Order of integration
	Augmented Dickey-Fuller	Philips-Person	Augmented Dickey-Fuller	Philips-Person	
ln_BSD	-3.2388	-3.2172	-6.0241 *	-6.1319*	I(1)
ln_FS	-2.8070	-2.2169	-4.0612*	-4.0528*	I(1)
ln_NPL	-2.9712	-2.9712	-5.4580 *	-5.4580*	I(1)
ln_BN	-1.8496	-2.0369	-5.9187*	-5.9819*	I(1)
ln_BT	-2.3405	-2.5405	-5.7025*	-5.7806*	I(1)
ln_EB	-2.3768	-2.4768	-4.8164*	-4.8237*	I(1)
ln_LIQ	-1.3786	-1.2494	-4.8411*	-4.8555*	I(1)

Note: * indicates rejection of the null hypothesis of non-stationary at 1 per cent.

Source: Eviews 10 output result outcome

Table 4 shows the results of the ADF and PP tests. Bank-specific variables and banking sector development variables are not steady in their level data, as shown. However, at a 1% level of significance, all variables are the stationery in the first difference. Thus, Table 4.1 demonstrates that no variable has a unit root problem and is stationary at the first level difference, i.e. all variables are stationary at I(1).

Lags selection and determinations

The analysis follows the work of Kaleem et al. (2009), who advocated the lowest Schwarz information criterion (SC)/AIC value as the major issue in selecting the suitable lag order selection criteria. The reasoning for selecting the best lag will go a long way toward eliminating the multicollinearity problem. Table 5 shows the lag order selection statistics/criteria, with Lag 1 being the best lag based on the AIC and SC values.

Table 5 Optimal lag length test

Lag length	Akaike Information Criteria (AIC)	Schwarz information Criterion (SC)	Hannan-Quinn information criterion (HQ)
0	-2.752661	-2.406405	-2.704917
1	-11.94462*	-9.174572*	-11.56267*
2	-10.380801	-9.035791	-10.457817

Source: Eviews 10 (VECM approach) output result outcome

Co-integration test

The co-integration test will assess whether or not the variables in the model have long-run relationships. On that basis, this test follows Johansen's technique when analyzing the level of cointegrating vectors. The Johanson co-integration test uses two likelihood estimators for the co-integration rank: a maximum Eigenvalue test and a trace test. Table 6 shows the results of the Johansen approach's co-integration test.

Table 6 Results of Johansen's co-integration test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.658580	49.39641	29.79707	0.0001
At most 1 *	0.584359	24.67965	15.49471	0.0016
At most 2	0.177243	4.748165	7.964106	0.1791

Trace test indicates Two cointegrating eqn(s) at the 0.05 level.

* denotes rejection of the hypothesis at the 0.05 level

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.908241	54.93763	27.58434	0.0000
At most 1 *	0.658580	24.71676	19.13162	0.0150
At most 2	0.177243	4.748165	7.964106	0.1791

Max-eigenvalue test indicates two cointegrating eqn(s) at the 0.05 level.

* denotes rejection of the hypothesis at the 0.05 level

Table 6 displays the results of the Johanson co-integration test, which uses both the Trace statistic and Eigenvalue to determine the number of cointegrating equations with a critical value of 5% (0.05). However, the result shows that there are two cointegrating equations under the Trace statistic and two cointegrating equations under Eigenvalue at a 5% level of significance. Because the null hypothesis is rejected at a 5% level of significance, the cointegrating equations exist at most, revealing the presence of long-run correlations among the variables in the system.

Dynamic Causality Analysis Using a VECM

After identifying the co-integration connection between variables, a Granger causality test is used to design relevant bank-specific parameters for banking sector growth. The study employed the vector error correction model (VECM) framework, as explained in the preceding section, to achieve the goal since the variables are cointegrated. If the variables are integrated at I(1), the vector error correction method (VECM) is better suited for examining the causality between the series. Therefore, the study used Engle and Granger's VECM Granger causality test to investigate the direction of causality between bank-specific factors and banking sector development.

The Short-run causality test using the Vector Error Correction Model (VECM)

The dynamic causality test is used in this study to investigate the causality linkages among the variables resulting from using VECM. Table 7 shows the findings of dividing the direction of causality into short-term and long-term causal links.

Table 7 Estimated short-run coefficients by using the Vector Error Correction Model (VECM)

The estimated short-run coefficients by using the VECM. The coefficients for the short-run relationship of bank-specific variables on banking sector development from 1995 to 2020.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECT(t-1)	-0.26473	0.217455	-10.2744	0.0000
Δ lnFS(-1)	0.046070	0.033180	1.388487	0.2373
Δ lnNPL(-1)	-0.005565	0.014591	-0.381398	0.7223
Δ lnBN(-1)	-0.167805	0.022497	-7.458952	0.0017
Δ lnBT(-1)	0.623498	0.049026	12.71763	0.0002
Δ lnEB(-1)	0.040342	0.007318	5.512745	0.0053
Δ lnLIQ(-1)	0.055103	0.014728	3.741499	0.0201
Constant	-2.524964	0.810765	--3.098325	0.0332
R^2 = 0.573446,	Adj. R^2 = 0.527043,		F-statistic = 15.8313 [0.000]	

Source: Eviews 10 (VECM approach) output result outcome

Table 7 shows the short-run causality of VECM. The error correction term, ECT (t-1), has a value of -0.2647, which is significant at 1 per cent and implies that in the long run, the short-run disequilibrium is rectified at a rate of 26.47 per cent each year. This suggests that divergence from the long-run stability of banking sector development within one year has been rectified by the bank-specific factors under consideration by 26.47 per cent the following year. The difference in outcomes in the short-run and long-run stability explains the fragility of Nepal's financial system. The system is unable to swiftly react to shocks in the short term, owing to the banking sector's dominance, which is liquid, and the system's information efficiency. Furthermore, the coefficient of banking trade, electronic banking, and liquidity has a significant positive influence on BSD, which is analogous to the outcome of a long-term romance on banking sector development. However, the coefficient of non-performing loans and branch network has a negative but insignificant result in the banking sector development.

The long-term causality test using the Vector Error Correction Model (VECM)

After verifying that the variables are co-integrated, the VECM model's long-run coefficients should be determined to evaluate the long-term influence of bank-specific factors on banking sector development. Thus, the long-run coefficients of the variables in the VECM approach were computed in this study. Table 8 presents the outcome of the long-run link between bank-specific variables and banking sector development in Nepal.

Table 8 Estimated Long- run coefficients by using the VECM

The estimated long-run coefficient by using the VECM. The coefficients for the long-run relationship of bank-specific variables and banking sector development from 1995 to 2020.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
dln_FS(-1)	0.183546	0.099902	1.837262	0.1400
dln_NPL(-1)	-0.160812	0.054323	-2.960316	0.0415
dln_BN(-1)	-0.167805	0.101815	-1.648143	0.1747
dln_BT(-1)	0.894903	0.179335	4.990132	0.0075
dln_EB(-1)	0.195390	0.247542	4.425064	0.0115
dln_LIQ(-1)	0.110960	0.038525	2.880222	0.0450
Constant	-2.499948	0.848077	-2.947783	0.0421
$R^2 = 0.770681$,	Adj. $R^2 = 0.722036$,	F-statistic = 12.1187 [0.001],		D/W stat = 2.1304

Source: Eviews 10 (VECM approach) output result outcome

Table 8 indicates the long-run causality of VECM. The VECM results show that banking trade has a positive and statistically significant impact on banking sector development at a 1 per cent level. The long-run causality reveals that a 1% rise in banking trade results in a 0.894 per cent increase in banking sector development. Similarly, a 1% increase in electronic banking will increase BSD by 0.195 per cent. The findings also show that boosting liquidity management by 1% results in a 0.110 per cent rise in banking sector development. However, due to a 1% increase in non-performing loans held by commercial banks will lead to a decline in banking sector development by 0.161 per cent. This positive and significant impact is coherent with the findings by Mishra and Pradhan (2009), Cherif & Dreger (2016), Salamah (2017), and Aluko & Michael (2018). This, therefore, means there is a long-run relationship between bank-specific variables and banking sector development. However, the branch network had a negative but insignificant result in banking sector development. In addition, the D/W value of 2.1304 indicates no issue with autocorrelation. The adjusted R2 0.7220 and F-statistics of 12.118 (p=0.000) are shown in Table 4 indicating that at the 5% level of significance. Therefore, the overall model of this study is the best-fitted model. Finally, the dynamic causality of VECM reveals that banking trade, non-performing loans, electronic banking, and liquidity are statistically significant, indicating strong explanatory power to explain banking sector development in Nepal.

Diagnostic tests for Vector Error Correction Model (VECM)

Serial correlation, heteroscedasticity, normality, and model stability are among the diagnostic tests used in this work to assess the reliability of the estimated VECM approach. The Breusch-Godfrey (BG) serial correlation LM test, Breusch-Pagan-Godfrey (BPG) heteroscedasticity test, normality test, and recursive CUSUM test were used to examine serial correlation, heteroscedasticity, normalcy, and stability of the derived Vector Error Correction Model (VECM). Table 9 shows the results of heteroscedasticity and serial correlation, while Figures 1, 2, and 3 show the results of normality, CUSUM test, and model stability, respectively.

Table 9 Diagnostic tests for Vector Error Correction Model (VECM)

	F-version		Breusch-Godfrey LM-version	
	Statistics	P-Value	Statistics	P-Value.
A: Serial Correlation	F (1,18) = 0.7271	0.4057	χ^2 (1) = 1.025	0.3112
B: Functional Form	F (1,20) = 0.572	0.455	χ^2 (1) = 0.677	0.411
C: Normality	N/A		χ^2 (2) = 4.424	0.109
D: Heteroscedasticity	F (2,18) = 1.0682	0.4169	χ^2 (2) = 6.5646	0.3630

Source: Eviews 10 (VECM approach) output result outcome

Table 9 shows that the p-value of F-statistics and Chi-Square for the LM test concluded that both are greater than 0.05, indicating that the estimated vector error correction model (VECM) approach is free of serial correlation and heteroskedasticity. Similarly, the Jarque-Bera statistics are used to determine the normality of the residual terms in the approach.

Figure 1 Normality test

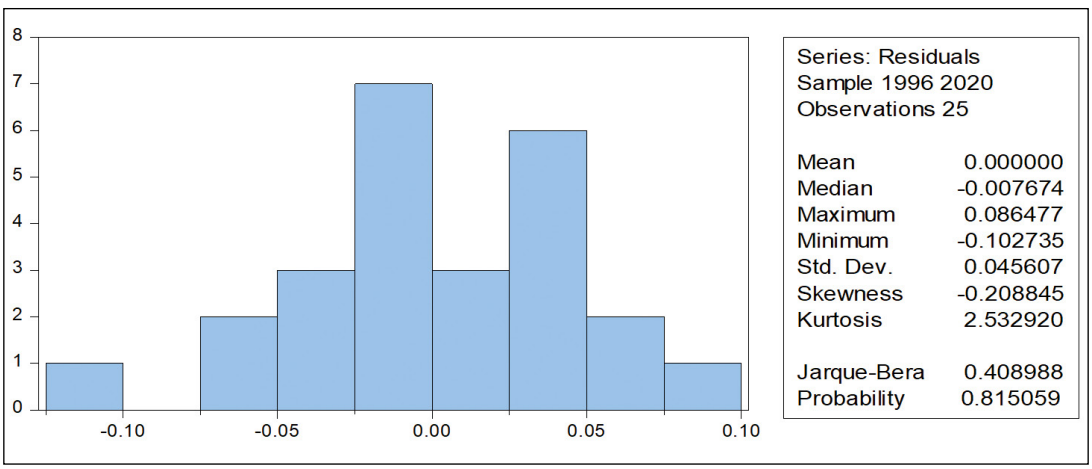


Figure 2 CUSUM test

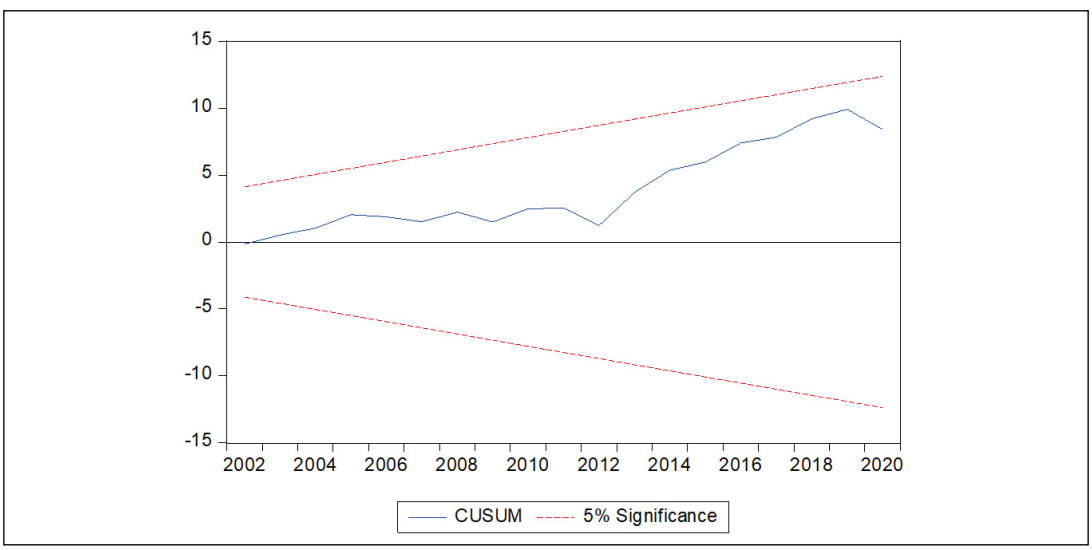
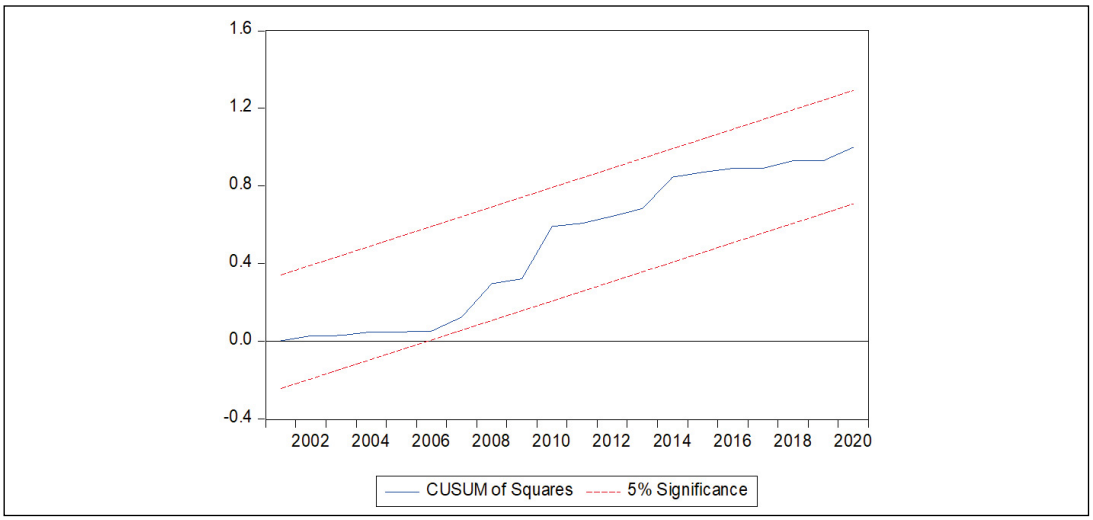


Figure 3: CUSUM square stability test



The Jarque-Bera (JB) test statistic of 0.4089 (p=0.8150>0.05) is shown in Figure 1. The study concluded that the residual series from the model is normally distributed. Therefore, the normality of the calculated VECM has been validated. Finally, the CUSUM test and CUSUM square stability test are employed to ensure the model's long-term stability. At a 5% level of significance, Figure 2 and 3 demonstrates the CUSUM test and CUSUM of the square test together with the line of critical boundaries. The plots of the CUSUM test and CUSUM of the square test are inside the critical boundaries, as shown in Figures 2 and 3. As a result, the calculated model has been confirmed to be stable across the study period. This indicates that the model is stable, allowing it to be applied for causality and long-run associations.

Conclusions

This study explored the impact of bank-specific factors on banking sector development in Nepal using the vector error correction model (VECM) estimation technique with economic time series data ranging from 1995 to 2020. The study concludes that bank-specific variables and banking sector development have a long-term equilibrium relationship. It also concludes that banking trade, electronic banking, and liquidity have a positive and significant impact on the banking sector development in Nepal. It implies that the higher the banking trade, the higher the banking sector's development. Therefore, financial institution managers should endeavor to raise deposits and lending to enhance the development of the banking sector. Moreover, the study observed that electronic banking has a positive and significant impact on banking sector development. It implies that the higher users of electronic banking, the higher would be of banking sector development. Hence, attention should be focused on electronic banking to achieve higher banking development.

Similarly, the study discovered that liquidity has a significant and positive impact on the development of the banking sector. It indicates that the authorities of financial institutions should be required to develop systems and abilities in liquidity management, asset and liability management, and foreign exchange management. Non-performing loans, on the other hand, have a significant negative impact the banking sector's development. Therefore, the study recommends that internal policymakers work to cut operational costs because this reduces their profit margin, resulting in poor financial performance. We can accomplish this by establishing suitable accountability structures and mechanisms and utilizing technology. Further research on the determinants of banking sector development, particularly those relating to macroeconomic, political, and legislative issues and those relevant to banking sector characteristics, is recommended by the study.

Funding

The author states that this paper is a part of his PhD research which was funded by the fellowship and Research Support of the University Grants Commission Nepal in the fiscal year 2018/19 (Award number: PhD -75/76-Mgmt-9).

Conflict of Interest

The author declares having no conflict of interest in the research work.

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