Bank-Specific as Basis of Banking Sector Development: An ARDL Approach

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ABSTRACT

This study aims to examine the bank-specific factors and banking sector development in Nepal by using the ARDL approach technique with economic time series data ranging from 1995 to 2020. The study employed the Autoregressive Distributed Lag (ARDL) model to avoid the spurious regression problem in the construction of contemporary time series econometrics. The study depends on the co-integration analysis to find out the long-run equilibrium relationship among the variables of the model. Banking sector development is measured by the arithmetic average of the normalized values of banking depth, banking efficiency, and banking stability. This study reveals that banking trade has positive and significant influenced the banking sector 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. This study reveals implications for policymakers as it sheds light on the importance of raising deposits and lending policies and focused on electronic banking. The authorities of a financial institution should be implied to build systems and skills in liquidity management, assets and liability management, and branch networking management to enhance the banking sector's development.

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

I. INTRODUCTION

The concept of 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. 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 is a good indicator of its financial system's progress. To comprehend the role of institutional policy and banking sector development, policymakers must understand the long run and causal relationship between the banking system, economic growth, and financial development (Perotti and Volpin, 2007). The significance of this study stems from the banking sector's vital role in the economic development process, as well as its role in providing the necessary finance for investments, necessitating research into the drivers that influence the banking sector's development in Nepal.

The development of institutions and financial markets is critical to economic growth, according to a growing body of theoretical and empirical evidence (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 both 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 both 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 behind adequate capital accumulation on one hand and productive investment on the other. In such a scenario, the role of financial intermediaries and financial markets cannot be overlooked. An efficient financial system accelerates capital accumulation and in turn, determines the long-term banking sector development of a country. Therefore, this study is expected to contribute by examining the bank-specific factors in the context of Nepal on banking sector development. Finally, the study is expected to be fruitful for 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. The study explains the relationship between banking sector devel-

opment and financial structure, non-performing loans, bank networks, banking trade, electronic banking, and liquidity were employed as proxy bank-specific indicators in the study. This study hypothesizes that bank-specific characteristics and banking sector development have a co-integrating relationship. The long-term link of co-integration between bank-specific factors and banking sector development is explored by using the Autoregressive Distributed Lag (ARDL) bounds testing model. The last five portions of the paper have been separated. From an empirical literature review viewpoint, Section 2 addresses the bank-specific factors of banking sector development. Section 3 carries out a methodology that shows data and variables description, correlation, descriptive statistics, and model specification are described in this section. Section 4 explains the ARDL approach results in discussion and interpretation. Lastly, the study concluded the research.

II. REVIEW OF LITERATURE

Commercial bank characteristics that influence the banking sector development are known as bank-specific or internal factors. Internal decisions made by top management and the board of directors largely affect these elements. The following are the internal factors that were identified and examined in this study. The term "financial structure" refers to a bank's capital or net value. It is used to protect customers' deposits, increase the soundness of banks, offer a stable resource to absorb losses, and promote the stability and efficiency of global financial systems by minimizing the danger of banks going bankrupt. 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 and 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 nonperforming loans before the deduction of specific loan-loss provisions). Levine (2002) found a negative and significant role to explain 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 branches of commercial banks that were 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 greater number of branches. While the increased number of bank branches is promising, the majority of banking services are still limited to urban regions. Adelowotan and Oshadare (2017) found that there is 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 a type of e-banking that allows bank customers to conduct financial transactions electronically over the internet using their personal computer, laptop, or mobile phone at any time that is convenient for them, rather than being limited to the hours that the bank is open (Salehi and Alipour, 2010). 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 however a big concern for the use of 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 that there is 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 has a positive relation with banking depth and efficiency in developing countries. Milic and Solesa (2017) revealed that there is a significant association between liquidity and banking performance. Mishra and Pradhan (2009) observed that there is a positive significant association between the banking system and liquidity in the selected commercial banks in India.

In the Nepalese context, the causality issue has received considerable attention in recent years between institutional policy and banking sector development. Nepal has gone through banking sector reform and structural adjustment programs since the early 2000s. Despite the efforts made to strengthen the banking sector in Nepal, the real sector growth at the level expected is yet to realize. This particularly suggests the need for empirical studies on the Nepalese banking sector. Few research has been conducted to analyze macroeconomic factors that affect financial development in Nepal to date.

Therefore, it needs rapid and continuous assessment for the speed of functioning for bank-specific determinants that affect banking sector development.

III. RESEARCH METHODOLOGY

3.1 Data description and variables

The study was based on secondary data, which was extracted from Nepal Rastra Bank from 1995 to 2020 with data from all Nepalese commercial banks and bank-specific characteristic time series by Quarterly Economic Bulletin, 2021. Using world development indicators, this study used three aspects of banking sector development that were taken for the index construction banking depth (credit to private sector), banking efficiency (net interest margin), and banking stability (capital adequacy ratio) as a dependent variable. 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 the internet banking, card services, and mobile banking
LIQ	Liquidity ratio	Liquid assets/Total deposits

Note: From World Bank indicator and literature review

3.2 Pre-estimation diagnostics

Descriptive statistics were utilized 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 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

Note: From EViews 10 output result outcomes, (NRB Quarterly Economic Bulletin, 2021)

Table 2 shows the descriptive statistics of bank-specific variables from 1995 to 2020. The table shows the difference between the minimum and maximum values is large across the variables under study, a sign of 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. This is proof that 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

Note: From EViews 10 output result outcomes, (NRB Quarterly Economic Bulletin, 2021)

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 by using the bivariate Pearson correlation coefficient. The results of the association between the explanatory variables are shown in the table.

Similarly, Table 3 utilises the variance inflation factor (VIF) to display the association between the macroeconomic variables. The VIF results show that multicollinearity among the explanatory variables is not a problem. According to Stead (1996), the VIF values are less than six, which shows that the independent variables in this study are not multicollinearity.

3.3 ARDL model specification

The study examines the co-integrating link between bank-specific determinants and banking sector development, by using the Autoregressive Distributed Lag (ARDL) bounds testing method due to the small number of observations from 1995 to 2020. The study employed the Autoregressive Distributed Lag (ARDL) model to avoid the spurious regression problem in the construction of contemporary in small observations time series econometrics. In the ARDL technique, the stationarity of the variables is tested using the Phillips-Perron (PP) and Augmented Dickey-Fuller (ADF) tests. The lags of the ARDL approach are automatically selected using Eviews software based on SBC and AIC. Similarly, the ARDL bound test is used to examine the co-integrating relationship between bank-specific factors and banking sector development. Moreover, the long-run and short-run models have been calculated when variables are found to be co-integrated in the next stage. Finally, for diagnostic tests, normality, serial correlation, and heteroscedasticity are assessed, and model stability is guaranteed using CUSUM statistics. Banking sector development is the dependent variable in this study, with bank-specific factors such as financial structure (FS), non-performing loans (NPL), branch network (BN), banking trade (BT), electronic banking (EB), and liquidity (LIQ) serving as explanatory variables.

The ARDL model has revealed a co-integrating relationship between bank-specific variables and banking sector development. To begin, Error Correction Model (ECM) in Equation 1 derives from the ARDL bounds test.

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

Here, all variables are as defined previously: μ_1, μ_2, μ_3, μ_4, μ_5, μ_6, and μ_7 are long-run coefficients, whereas bj, cj, dj, ej, fj, gj, and hj are short-run dynamics, and ε represent a random disturbance term. The order of the lags in the ARDL approach

is determined by either the Schwarz Bayesian Criterion (SBC) or Akaike Information Criterion (AIC). In the majority of the studies, however, the SBC criterion is used in lag selection since ARDL-SBC estimators perform somewhat better than ARDL-AIC estimators (Pesaran and Shin, 1999).

The long-run association between bank-specific variables and banking sector development has been estimated after detecting the co-integrating relationship between bank-specific variables and banking sector development using the ARDL bounds test. 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.

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

The estimation of dynamic error correction will be done 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 divergence or convergence towards the long-run equilibrium is represented by the coefficient 8. Divergence is shown by a positive coefficient, while convergence is indicated by a negative coefficient.

IV. DATA ANALYSIS AND DISCUSSION

4.1. The stationarity tests

Before executing any test in time series analysis, variables must be checked for stationarity. Furthermore, the Autoregressive Distributed Lag (ARDL) approach further requires that variables have no unit root issue and that only one of the variables' integration orders is I(0) or I(1). Using unit root tests, this study was able to establish the order of integration of all variables. The research study has used the PP and ADF tests for this purpose. The results of the Phillips and Perron test at the level and first difference are shown in Table 4.

Table 4

Unit root test for stationarity at time-series data in level and first difference

Variables	Level		First difference		Order of integration
	Augmented Dickey-Fuller	Philips-Person	Augmented Dickey-Fuller	Philips-Person	
ln_BSD	-2.2388	-2.2172	-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	-7.7025*	-7.7806*	I(1)
ln_EB	-2.3768	-2.4768	-4.8164*	-4.8237*	I(1)
ln_LIQ	-2.7086	-2.7494	-5.8411*	-5.8555*	I(1)

Note: Based on the EViews 10 output result, (NRB Quarterly Economic Bulletin, 2021).

The outcomes of the ADF and PP tests are displayed in Table 4. The macroeconomic indicators and the development of the banking industry are not consistent in their level statistics. However, all variables are the stationery in the first difference at a 1% level of significance. Therefore, all variables are stationary at I (1). Table 4 shows that no variable has a unit root problem and is stationary at the first level difference.

4.2 Lags selection and determinations

The analysis follows the work of Pesaran et. al., (2001), who advocated the lowest Schwarz information criterion SC/HQ/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, Heteroskedasticity, serial correlation, and normality problem. As a result, all of these variables were addressed in this study, and the optimal lag length was determined.

Table 5

Optimal lag length test

Lag length	Akaike Information Criteria (AIC)	Schwarz Bayesian Criterion (SBC)	Hannan-Quinn information criterion (HQ)
0	-2.752661	-2.406405	-2.704917
1	-11.94462*	-9.174572*	-11.56267*
2	-10.380801	-9.036791	-10.457817

Note: Based on the EViews 10 output result, (NRB Quarterly Economic Bulletin, 2021).

The AIC, HQ, and SBC results of these experiments are shown in Table 5. The lag length with the minimum critical value for all criteria must be chosen when using the AIC, HQ, and SBC to determine the ideal lag length. The table shows that for

bank-specific variables, lag 1 has the least AIC, HQ, and BIC criteria. With the lag duration now known, the bound test technique may be used to determine if the variables are co-integrated.

4.3 Johansen's cointegration test

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

Table 6

Results of Johansen's cointegration 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				

Note: Based on the EViews 10 output result, (NRB Quarterly Economic Bulletin, 2021).

Table 6 displays the results of the Johanson cointegration 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.

4.4 Bound Testing for Co-integration Analysis Using the ARDL Model

After determining the cointegration relationship between variables, a Granger causality test is utilized to establish pertinent macroeconomic factors for the growth of the banking sector. The autoregressive distributed lag (ARDL) model is better suited for investigating the causality between the series if the variables are integrated at I(1) and there are data (Narayan, 2004). The results of the co-integration test show that the variables exhibit a persistent association. The obtained F-statistics is 7.214 which was more than the table Narayan (2004) upper bound critical values, which are 4.154, 5.018, and 7.063 at 10%, 5%, and 1%, respectively. As a consequence, the study argues that there is a close relationship between the development of the banking sector and macroeconomic issues.

The long-term causality test using the ARDL Model

After verifying that the variables are co-integrated, the ARDL 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 ARDL 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 7

Estimated Long- run coefficients by using the ARDL Approach

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
R2 = 0.80924, Adj. R2 = 0.76826, F-statistic = 13.8313 [0.000], D/W statistic = 1.9405,				

Note: From EViews 10 output result outcomes, (NRB Quarterly Economic Bulletin, 2021)

Table 7 demonstrates the estimated long-run coefficient of bank-specific variables. The findings suggest that the 1-period lag has a long-term significant influence. The long-run analysis reveals that there is a positive and significant relationship between banking trade and banking sector development. Similarly, electronic banking and liquidity have a positive and significant on banking sector development. However, non-performing loans has a negative and significant of the banking sector development. 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 1.9405 indicates that there is no issue with autocorrelation. Finally, the adjusted R2 0.7682 and F-statistics of 87.8313 (p=0.000) are shown in Table 4 indicating that the explanatory variables explain 76.82 percent of the banking sector development in the short run, and the F-statistics value of 87.8313 at the 1% level of significance. Therefore, the overall model of this study is the best-fitted model.

Finally, the banking trade and liquidity are found to be positive beta coefficients. It indicates that banking trade and liquidity have a positive impact on the banking sector development. It means that the banking sector is likely to develop more when there is an increase in banking trade and liquidity management. The beta coefficients for electronic banking and financial structure are noticed to be positive which shows that electronic banking and financial structure have a positive impact on banking sector development. It implies that with the increase in electronic banking and financial structure, the banking sector is likely to develop more. However, credit risk management (non-performing loans) was revealed to be a negative beta coefficient. It indicates that non-performing loan has a negative and significant impact on banking sector development. It implies that with the decrease in non-performing loans, the banking sector is likely to develop more.

The Short-run causality test using the ARDL model

After establishing the long-run correlation between bank-specific variables and banking sector development, an error correction model (ECM) was used to identify the short-run association and check the reliability of the long-run coefficient. Table 8 shows the outcome of the ECM.

Table 8

Estimated short-run coefficients by using the ARDL Approach

Variable	Coefficient	Std. Error	t-Statistic	Prob.
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
ECM(-1)	-0.280731	0.18515	-10.2744	0.000
R2 = 0.76924, Adj. R2 = 0.72826, F-statistic = 13.8313 [0.000], D/W statistic = 1.9405,				

Note: From EViews 10 output result outcomes, (NRB Quarterly Economic Bulletin, 2021)

Table 7 shows that The error correction term i.e. ECM(-1) is -0.2807 which is significant at 1 percent and implies that in the long run, the short-run disequilibrium is rectified at a rate of 28.07 percent each year. The negative and significant value of ECM(-1) indicates that the disequilibrium in the short run is corrected at the speed of adjustment of 28.07 percent per year in the long run. 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 28.07 percent the following year. The fragility of Nepal's financial system is explained by the difference in outcomes in the short-run and long-run stability. The system is unable to swiftly react to shocks in the short term, owing to the banking sector's dominance, which is excessively 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

4.5. Diagnostic tests for the ARDL approach

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

Table 9

Diagnostic tests on ARDL Approach

	F-version		LM-version	
	Statistics	P-Value	Statistics	P-Value.
A: Serial Correlation	F (1,18) = 1.167	0.289	χ^2 (1) = 1.354	0.429
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) = 0.874	0.787	χ^2 (2) = 0.197	0.218

Note: From EViews 10 output result outcomes, (NRB Quarterly Economic Bulletin, 2021)

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 Autoregressive Distributed Lag (ARDL) 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.

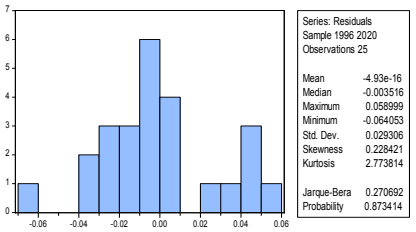

Figure 1: Normality test

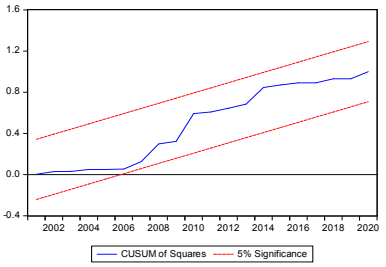

Figure 2: CUSUM square stability test

The JB test statistic of 0.2706 (p=0.8734>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 ARDL model has been validated. Finally, the CUSUM square stability test is employed to ensure the model's long-term stability. At a 5% level of significance, Figure 2 demonstrates the CUSUM of the square test together with the line of critical boundaries. At a 5% level of significance, the plots of the CUSUM of the square test are inside the critical boundaries, as shown in Figure 2. 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, bound tests, and long-run associations.

V. CONCLUSIONS

This study explored the impact of bank-specific factors on banking sector development in Nepal using the ARDL estimation technique with economic time series data ranging from 1995 to 2020. The study's major conclusion is that there is a long-term equilibrium relationship between bank-specific variables and banking sector development. This study reveals that banking trade, electronic banking, and liquidity have a positive and significant impact on banking sector development in Nepal. It implies that the higher the banking trade, the higher would be banking sector development. Therefore, financial institution managers should endeavor to raise deposits and lending if they wish to enhance banking sector development. 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, to achieve higher banking sector development, attention should be focused on electronic banking.

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 on 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. This can be accomplished through establishing suitable accountability structures and mechanisms, as well as utilizing technology. Further re-

search on the determinants of banking sector development, particularly those relating to macroeconomic, political, and legislative issues, as well as those relevant to banking sector characteristics, is recommended by the study.

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Conflict of interest

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

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