

Macroeconomic Determinants and Development of Banking Industry in Nepal

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Abstract

This study aims to examine the macroeconomic determinants that have influenced the development of the banking sector in Nepal by using the ARDL approach technique with economic time series data over the period 1995 to 2020. The research study applied the ARDL approach for a small number of observations to avoid the spurious regression issue that plagues the creation of modern time series data. The research study used bound test co-integration analysis to determine the long-run equilibrium association between the macroeconomic determinants and the development of banking sector industry. The arithmetic average of the normalised values for banking efficiency, banking depth, and banking stability is used to measure the development of the banking industry. The research study found that per capita GDP and remittances have a positive and significant impact on the development of the banking industry. Additionally, the development of the banking industry was explained by government expenditure and stock market capitalisation. However, the research study reveals that the development of the banking industry is negatively impacted by trade openness and inflation in Nepal.

INTRODUCTION AND STUDY OBJECTIVES

The banking industry is one of the key economic foundations in any nation, which contributes significantly towards

the growth, promotion, and development of financial and economic activities in the country. The development and performance of the banking industry are influenced by several factors, including profitability, growth, and lending

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behaviour (Tsauroi, 2018). According to Mhadhbi et al. (2020), the concept of the development of the banking sector is multifaceted, and it is difficult to establish a single description of this process since it is a connected process that incorporates enhancements to the quantity and quality of banking services. Macroeconomic policy, the mobilisation of savings, the extension of credit, and risk management are a few of these dimensions. Therefore, the effectiveness with which a country's financial system performs these tasks serves as a gauge of the system's level of growth. The legislator must know the long-term and causal link between the macroeconomic policy, financial system, and economic growth to understand the function of monetary/fiscal policy and banking system (Touny, 2014). The importance of this study arises from the banking industry's crucial contribution to economic growth and its role in supplying the capital required for investments, which made it important to conduct research into the factors influencing the development of the banking industry in Nepal.

A substantial number of theoretical and empirical research suggest that the development of banking institutions and markets is crucial for economic growth (Levine & Zerovs, 1998). The causal link between banking innovation and economic growth has long been questioned by economists. Given that macroeconomic policy is a key variable in the development of the banking industry, both theoretical and empirical studies have emphasised the significance of paying more attention to

the development of the banking industry. Aluko and Ajayi (2018) claim that through offering services like loans and effective capital allocation, the pace at which a host nation gains from FDI and remittance inflows accelerates with the expansion of the banking sector. The literature makes it abundantly evident that the beneficial part that the development of the banking industry plays in boosting economic growth is no longer a contentious matter. What macroeconomic factors influence the development of the banking industry in Nepal is still unknown. Therefore, the current study attempts to address this gap in the literature in the context of Nepal.

Studies have dealt with several aspects of the relations between macroeconomic variables and development of the banking industry at both theoretical and empirical levels. These factors might be a precondition for achieving sustainable development of the banking industry. Financial intermediaries channel the savings into productive investments (Dogga et al., 2017). However, Nepal is lagging behind in adequate capital accumulation on the 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 development of the banking industry of the country. Therefore, this study is expected to contribute by examining the macroeconomic determinants that influenced the development of the banking industry

in the context of Nepal. Finally, the study is expected to be fruitful for all concerned parties such as policymakers, government, depositors, investors, and other concerned stakeholders.

The main objective of this study is to analyse the impact of macroeconomic variables on the development of the banking industry in Nepal. The research study seeks to explain the association of the development of the banking industry with the per capita GDP, inflation, remittances, trade openness, government expenditure, and stock market capitalisation employed as proxy macroeconomic indicators. The analysis is based on the supposition that macroeconomic variables and the development of the banking industry are co-integration intertwined. The Autoregressive Distributed Lag model bound testing technique is used to investigate the long-term relationship of co-integration between macroeconomic determinants and the development of the banking industry.

REVIEW OF LITERATURE

According to the structure conduct performance (SCP) paradigm, market structure determines business behaviour, which in turn determines performance. The qualities of the industry in which a firm works define the range of possibilities and restrictions that it faces. In some industries with more rivalry, businesses have few options and are subject to several restraints. The institutional approach focuses on the banking structure's deeper and

more durable components. Instead of efficiency or effectiveness as the fundamental organisational goal, this method is based on the concept of legitimacy (Pagano, 1993). Financial markets and institutions emerge because of the expenses of getting information and conducting transactions. According to Levine and Zervos (1998) and Rodrik (1999), in a state-contingent claim framework without information or transaction costs, there is no need for a financial system that invests resources in project research, manager scrutiny, or arrangement design.

Total production produced by various economic sectors is measured in terms of per capita GDP. It is estimated without considering the deterioration and depletion of natural resources or deductions for the depreciation of fabricated assets. This is most frequently used as a proxy for economic growth. Yu and Gan (2010); Dogga et al. (2019), and Tsauroi (2018) concluded that GDP per capita is a positive and significant determinant of the financial development in emerging countries. Remittances are monies sent from one country to another via financial institutions, allowing recipients to demand or have access to alternative financial services and goods (Bhattacharya et al., 2018). According to Herger et al. (2008), remittances help countries with underdeveloped banking sectors flourish by giving alternatives for financing investment and reducing liquidity restrictions. In emerging economies, remittances enhance the number of deposits and credit which have a positive and significant influence

on the development of the banking industry in developing countries (Raza et al., 2014). According to Nazir et al. (2018), findings are consistent across nations and indicate the need to improve institutional setups to increase remittance inflows, which will improve financial development.

The market value of a publicly traded company's shares outstanding at a certain point in time is known as stock market capitalisation. The stock market capitalisation metric is the GDP divided by the value of domestic equities that are listed on domestic exchanges. It shows marketability and liquidity by facilitating securities transactions. Rehman (2018) supported market capitalisation as indicator of financial development. Stock market capitalisation promotes the development of the banking industry in developing countries as documented (i.e., Elsherif, 2015; Filippidis & Katrakilidis, 2014). Ayunku and Etale (2014) and Levine and Zervos (1998) concluded that market capitalisation has a positive and significant impact on financial development. Inflation refers to the overall rise in the cost of goods and services in the economy. The inclusion of inflation as a conditional variable may be especially important during the early stages of economic change when inflation is typically substantial. Fu et al. (2020) confirmed that there is significant impact on the development of the banking industry in the USA, whereas Law et al. (2012) and Le et al. (2016) also concluded that there is negative significant relationship between inflation

rate and development of banking industry with 20 causations running in both directions.

The degree to which country's economy permits trade and capital to flow across its boundaries is known as trade openness. This metric measures how to open a country to foreign trade and is computed as the ratio of imports to exports as percentage of GDP. The results of studies on the relationship between trade openness and the development of the banking industry are varied. Fu et al. (2020) and Khalfaoui (2015) observed that trade openness has a negative and significant impact on financial development and is a leading indicator of finance development. Luciano and Regis (2007) concluded that trade openness and financial development have positive, significant, and bidirectional causal relationships. Public consumption, public investment, and transfer payments made up of income transfers (pension, social benefits) and capital transfers are all included in what is referred to as government expenditure (NRB, 2019). The government consumption, investment, and transfer payments are included in government expenditure. Milic and Solesa (2017) found that government expenditure has a significant impact on the development of the banking industry in developed and developing countries. Dogga et al. (2017); Yu and Gan (2010), and Zheng et al. (2019) also found that government expenditure has a significant impact on development of banking industry and stock market development in emerging economies. Fu

et al. (2020) observed that government expenditure has a significant long-run effect on the growth of the banking industry in developing countries except for lower-income countries.

In the Nepalese context, the causality issue has received considerable attention in recent years between macroeconomic policy and development of banking. Nepal has gone through banking sector reform and structural adjustment programs since the early 2000s. Despite the efforts made to strengthen the banking industry in Nepal, the real sector growth at the level expected is yet to be realised. This particularly suggests the need for empirical studies on the Nepalese banking sector. Few research has been conducted to analyse macroeconomic factors that affect financial development in Nepal to date. Therefore, it needs rapid and continuous assessment for the speed of functioning for macroeconomic

determinants that affect development of the banking industry.

RESEARCH METHODS

Description of Data and Variables

The study was based on secondary data that collected from Nepal Rastra Bank from 1995 to 2020 with data from Nepalese commercial banks and macroeconomic time series with Quarterly Economic Bulletin (2021). The secondary sources of data have been employed to understand the form of observed relationships, and to analyse the predictive power of macroeconomic factors in explaining the development of the banking industry in Nepal. For the formulation of the index, this study examined three factors of the growth of the banking sector: banking efficiency, banking depth, and banking stability were used to calculate the overall development of the banking industry

Table 1
Study Variables, their Proxies, and Symbols

Study variables	Proxies	Symbols
Banking efficiency	Net interest margin	
Banking depth	Credit to private sector to nominal GDP	
banking stability	Total capital funds to risk-weighted assets	DBI
Macroeconomic determinants		
Economic growth	Per capita GDP (USD)	PCG
Inflation	Annual Inflation Rate (Consumer Price Index, CPI)	INF
Remittance	Sum of currency transfers by migrant workers/GDP	REM
Stock market capitalisation	Share price times the number of shares outstanding in Nepal/GDP	SMC
Government policy	Government expenditure/GDP	GEP
Trade Openness	Trade (import plus export)/GDP	TOP

Note. From World Bank indicator and literature review

(DBI). From both a theoretical and an empirical approach, the literature identified a few variables that influence the growth of the banking industry. Per capita GDP, inflation, remittances, market capitalisation, government spending, and trade openness were included in the research as explanatory factors.

Descriptive Statistics for Pre-Estimation Diagnostics

The characteristics of the development of the banking industry and macroeconomic factors over the research period were defined using descriptive statistics. As descriptive statistics, the study used the mean, median, standard deviation, skewness, kurtosis minimum, and maximum values associated with variables under investigation. Table 2 displays the time series data from 1995 to 2020 together with descriptive statistics for macroeconomic variables and development of the banking industry taken into consideration in this research.

The descriptive statistics of macroeconomic variables are shown in Table 2

for the period 1995 to 2020. The table demonstrates that there are extreme values present throughout the variables under consideration because of the wide disparity between the minimum and maximum values. All variables' data are favourably skewed, except for inflation. None of the variables' kurtosis values are around three and none of them have a normally distributed distribution. This demonstrates that the data for the relevant variables are not normally distributed. Every data set was converted into natural logarithms and made stationary before being used for the main data analysis, which ensured that the issue of data not being normally distributed as well as anomalous and extreme values was addressed.

Table 3 presents the correlation matrix for macroeconomic factors with the development of the banking industry. The direction and strength of the association between various pairs of variables have been determined using correlation analysis. It shows the

Table 2
Descriptive Statistics of Macroeconomic Variables and DBI, 1995-2020

	DBI (in %)	PCG (in USD)	INF (in %)	REM (% of GDP)	TOP (% of GDP)	GEP (% of GDP)	SMC (% of GDP)
Mean	27.40	495.83	6.89	17.53	37.64	18.34	26.99
Median	25.81	410.07	7.45	14.94	37.10	18.36	23.66
Std. Dev.	7.30	268.91	2.75	7.34	2.98	8.51	22.63
Skewness	0.557	0.58	-0.23	0.422	0.67	0.66	0.92
Kurtosis	-0.67	-1.00	-1.19	-1.49	-0.56	-0.32	0.04
Minimum	17.04	216.94	2.48	9.09	33.59	8.68	4.53
Maximum	40.66	1038.87	11.24	29.52	43.82	36.81	83.89

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

Table 3

Correlation Analysis for Explanatory Variables on DBI, 1995-2020

	lnDBI	lnPCG	lnINF	lnREM	lnTOP	lnGEP	lnLSMC
lnDBI	1						
lnPCG	0.928*	1					
lnINF	-0.171	-0.128	1				
lnREM	0.899*	0.631*	0.254	1			
lnTOP	-0.483**	-0.407**	-0.310	-0.389	1		
lnGEP	0.955*	0.609*	-0.109	-0.486**	-0.382	1	
lnSMC	0.573*	0.516*	-0.034	0.623*	-0.428**	0.648*	1
VIF	4.407	4.914	2.805	4.445	3.971	5.117	4.007

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

correlation between the two variables as well as their interrelation. The bivariate Pearson correlation coefficient is used to describe relationships between two variables. Per capita GDP, remittance, government expenditure, and market capitalisation have a positive relationship with development of the banking industry in Nepal. However, inflation and trade openness has a negative association with the development of the banking industry.

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 explanatory variables in this study are not multicollinearity.

Model Specification

Using the dynamic Autoregressive Distributed Lag (ARDL) approach,

the study explores the co-integrating relationship between macroeconomic variables and development of the banking industry throughout from 1995 to 2020. The annual time series data is derived from the Nepal Rastra Bank (Quarterly Economic Bulletin, 2021) which has been exposed to a pre-test of stationarity before the estimate method. A co-integrating link between macroeconomic factors and the growth of the banking industry has been found through the ARDL model. After applying the ARDL bounds test to identify co-integrating association between macroeconomic variables and development of banking industry, the long-run causal link between macroeconomic variables and development of banking industry has been determined. Long- and short-term equilibrium connections, as well as co-integration variables, are widely investigated using the ARDL approach. If the variables in this research are cointegrated ARDL bounds test equation is as follows:

$$\begin{aligned} \ln BSD_t = & \alpha_0 + \sum_{i=0}^q b_i \Delta \ln DBI_{t-i} + \sum_{i=0}^q c_i \Delta \ln PCG_{t-i} + \sum_{i=0}^q d_i \Delta \ln INF_{t-i} + \sum_{i=0}^q e_i \Delta \ln TOP_{t-i} \\ & + \sum_{i=0}^q f_i \Delta \ln REM_{t-i} + \sum_{i=0}^q g_i \Delta \ln GEP_{t-i} + \sum_{i=0}^q h_i \Delta \ln SMC_{t-i} + \mu_1 \ln DBI_{t-1} \\ & + \mu_2 \ln PCG_{t-1} + \mu_3 \ln INF_{t-1} + \mu_4 \ln TOP_{t-1} + \mu_5 \ln REM_{t-1} + \mu_6 \ln GEP_{t-1} \\ & + \mu_7 \ln SMC_{t-1} + \varepsilon_t \dots \dots (1) \end{aligned}$$

$$\begin{aligned} \ln DBI_t = & \alpha_0 + \sum_{i=0}^q \delta_1 \Delta \ln DBI_{t-i} + \sum_{i=0}^q \delta_2 \Delta \ln PCG_{t-i} + \sum_{i=0}^q \delta_3 \Delta \ln INF_{t-i} + \sum_{i=0}^q \delta_4 \Delta \ln TOP_{t-i} \\ & + \sum_{i=0}^q \delta_5 \Delta \ln REM_{t-i} + \sum_{i=0}^q \delta_6 \Delta \ln GEP_{t-i} \\ & + \sum_{i=0}^q \delta_7 \Delta \ln SMC_{t-i} + \delta_8 ECM_{vt} \dots \dots (2) \end{aligned}$$

Here, the dependent variable in this study is development of banking industry (DBI), while explanatory variables are per capita GDP (PCG), inflation (INF), trade openness (TOP), remittances (REM), government spending (GEP), and market capitalisation (SMC). All variables are also specified as before: the long-run coefficients are $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6,$ and β_7 the short-run coefficient dynamics are $\beta_j, c_j, d_j, e_j, f_j, g_j,$ and h_j and ε represented by the random disturbance term.

This research study uses cointegration test and an error correction model (ECM) to explore long-term equilibrium and short-term causal links between macroeconomic variables and the development of banking industry in Nepal. Lastly, the short-run relationship between macroeconomic variables and development of the banking industry and speed of adjustment was assessed by using ECM of Equation 2.

Equations (2) were utilised to estimate the dynamic error correction (ECM).

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	
lnDBI	-2.3341	-2.4637	-4.2339**	-4.2155**	I (1)
lnPCG	-2.6070	-2.5169	-4.1612**	-4.0528**	I (1)
lnINF	-2.7712	-2.6712	-6.7641**	-7.8143**	I (1)
lnTOP	-1.9496	-2.1369	-6.9819**	-5.9187**	I (1)
lnREM	-2.4405	-2.3405	-5.8025**	-5.8806**	I (1)
lnGEP	-2.0768	-2.3768	-4.7164**	-4.7237**	I (1)
lnSMC	-1.30786	-1.2494	-4.7411**	-4.7555**	I (1)

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

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

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

The coefficients δ_1 , δ_2 , δ_3 , δ_4 , δ_5 , δ_6 , and δ_7 , indicate the model's short-run dynamics, whereas the coefficient δ_8 depicts the divergence or convergence towards long-run equilibrium. A positive coefficient indicates divergence, whereas a negative value denotes convergence.

DATA ANALYSIS AND DISCUSSION

This section presents data analysis and discusses the results.

The Stationarity Tests

Variable stationarity must be verified before running any test in time series analysis. The sequence of integration of all variables was determined in this study using unit root tests. For this study, the PP and ADF tests were employed in the research investigation. Table 4 displays the results of the ADF at the level and first difference as well as the Phillips and Person test.

The results 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, every factor is the stationary in the first difference at

a 1per cent level of significance. Table 4 shows at first level of difference, no variable has unit root issues and is stationary. Therefore, every variable is 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/HQ 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 selected as the best lag based on the AIC, SC, and HQ values.

Table 5 displays the outcomes of these studies in terms of AIC, HQ, and SBC. When choosing the optimal lag length using the AIC, HQ, and SBC, the lag length with lowest critical value for each criterion must be taken into consideration. The table demonstrates that lag 1 has the least AIC, HQ, and BIC criteria for macroeconomic variables. The bound test method may be used to ascertain if variables are co-integrated now that the lag length has been established.

Co-integration Test

The cointegration test will assess whether the variables in the model have long-run relationships, or not. In this approach, this test applies Johansen's method while analysing the level of cointegrating vectors. For the cointegration rank, the Johansson 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 displays the results of Johanson cointegration test, which uses both Trace statistic and Eigenvalue to determine the number of cointegrating equations with a critical value of 5 per cent (0.05). However, the outcome reveals that there are two cointegrating equations at a 5 per cent level of significance under the Eigenvalue and Trace statistics, respectively. The cointegrating equations exist at most because the null hypothesis

is rejected at a 5 per cent level of significance, indicating the existence of long-run correlations among the system's variables.

Bound Testing for Co-integration Analysis Using the ARDL Model

A dynamic causality test is used to design relevant macroeconomic parameters for development of the banking industry after identifying the cointegration connection between variables. If the variables are integrated at I(1), and a small number of observations, the ARDL approach is better suited for examining causality between the series (Narayan, 2004). The variables demonstrate a sustained relationship, according to the findings of the co-integration test. The calculated F-statistics is 8.031, which was more than the upper bound critical values from the table Narayan (2004), which are 4.154, 5.018, and 7.063 at 10 per cent, 5 per cent, and 1 per cent

Table 6
Results of Johansen's Cointegration Test

Trace statistics on Unrestricted Cointegration Rank Test

Hypothesised 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

Max-Eigen statistics on Unrestricted Cointegration Rank Test

Hypothesised 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

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

Table 7

Estimated Long- Run Coefficients by using the ARDL Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
dln_PCG(-1)	0.070605	0.021811	3.237177	0.0318
dln_INF(-1)	-0.167805	0.101815	-1.648143	0.1747
dln_TOP	-0.040342	0.029145	-1.384199	0.2385
dln_REM	0.623498	0.148122	4.209363	0.0136
dln_GEP(-1)	0.166377	0.041347	4.023948	0.0158
dln_SMC(-1)	0.499948	0.848077	2.947783	0.0421
Constant	0.894903	0.179335	4.990132	0.0075
R ² = 0.79184, Adj. R ² = 0.76803, D-statistic = 2.1208, F-statistic = 108.9755 [0.00019]				

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

correspondingly. As a result, the study contends that the growth of the banking industry and macroeconomic factors are co-integrated. Therefore, the study used Pesaran et al. (1999, 2001) ARDL model or bound testing techniques to investigate the direction of causality between macroeconomic factors and development of the banking industry.

Long-term Causality Test Using the ARDL Approach

To assess the long-term impact of macroeconomic variables on the growth of the banking industry, the long-run coefficients of the ARDL techniques should be established after confirming that variables are co-integrated. As a result, long-run coefficients of the variables in the ARDL technique were determined. Table 8 demonstrates the results of the long-term relationship between macroeconomic factors and development of the banking industry.

Table 7 indicates the long-run causality of ARDL approach. The results of ARDL techniques demonstrate that per

capita GDP, remittances, government expenditure, and market capitalisation have significant and positive effects on development of the banking industry in Nepal. The result demonstrates that the 1-period lag has beneficial and significant long-term effects. It means that the banking industry is anticipated to continue to expand with the rise in per capita GDP, remittances, public spending, and market capitalisation. The long-run analysis industry by 0.070 per cent. In addition, a 1 per cent increase in remittance triggers an increase in development of the banking industry by 0.623 per cent. Thus, policymakers must ensure that remittances are channelled through formal channels. In addition, the results indicate that increasing stock market capitalisation by 1 per cent leads to an increase in development of the banking industry by 0.499 per cent. The development of the banking industry went up by 0.166 per cent in response to a 1 per cent increase in government expenditure. It also indicated that when the real worth of money rises, banking growth grows, which can only

Table 8

Estimated Short-run Coefficients by using the ARDL Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$\Delta \ln PCG$	0.623498	0.049026	12.71763	0.0002
$\Delta \ln INF$	-0.040342	0.007318	-5.512745	0.0053
$\Delta \ln TOP$	-0.005565	0.014591	-0.381398	0.7223
$\Delta \ln REM$	0.167805	0.022497	7.458952	0.0017
$\Delta \ln GEP$	0.155103	0.014728	3.741499	0.0201
$\Delta \ln SMC$	0.092565	0.014591	3.381398	0.0223
ECM(-1)	-0.516972	0.047131	-17.33395	0.0001
R ² = 0.86951,		Adj. R ² = 0.83934,	D-statistic = 2.20805	

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

be achieved by increasing government expenditures. Likewise, the beta coefficients for inflation and trade openness are observed to be negative, which shows that inflation rate and trade openness have a negative and insignificant impact on development of the banking industry. Therefore, there is a long-run relationship between macroeconomic factors and the development of the banking industry.

In addition, the D/W value of 2.1208 indicates that there is no issue with autocorrelation. The adjusted R² is 0.76803 and F-statistics of 108.9755 (p=0.000) are shown in Table 8 indicating that at the 5 per cent level of significance. Therefore, the overall technique is the best-fitted approach. Finally, the dynamic causality of the ARDL model reveals that per capita GDP, remittances, government expenditure, and stock market capitalisation are statistically significant which indicates strong explanatory power to explain the development of banking industry in Nepal.

The Short-run Causality Test Using the ARDL Approach

After determining long-run association between macroeconomic determinants and development of banking industry, ECM was utilised to ascertain short-run causal link and evaluate the accuracy of long-run coefficient. The dynamic causality test is used in this study to investigate the causality linkages among the variables resulting from the use of the ARDL model. Table 8 shows the findings of dividing the direction of causality into short-run causality links on development of the banking industry.

Table 8 shows the ARDL model's short-run causality coefficient with the error correction model. According to the error correction model, ECM (-1), has a value of -0.51697, and the p-value is 0.0001 which is significant at 1 percent. The short-run disequilibrium is corrected at a rate of 51.69 percent per year in the long run, this means that the macroeconomic factors considered corrected the development of the banking industry's

deviation from long-term stability by 51.69 percent the following year. The disparity in results between short-run stability and long-run stability helps to explain the instability of Nepal's financial system.

In short run, per capita GDP has a positive and significant influence on the development of the banking industry as shown in regression table 8. As a result, per capita GDP can improve economic activity and, as a consequence, the banking growth. Furthermore, remittances have a positive and significant impact on the development of the banking industry, therefore leveraging development of the banking industry to raise remittances would help finance the economy. The short-run analysis reveals that a 1 percent rise in remittances causes a 0.1678 percent boost in the development of the banking industry, while a 1 percent increase in government expenditure causes a 0.1551 percent increase in the development of the banking system. Similarly, a 1 percent increase in market capitalisation leads to a 0.0925 percent increase in development of the banking industry, according to the statistics.

However, a one percent rise in inflation results in a 0.0403 percent decrease in the development of the banking system.

Diagnostic Tests for ARDL Approach

The diagnostic tests employed in this study to evaluate the accuracy of the estimated ARDL technique include model stability, serial correlation, normality, and heteroscedasticity. The resultant Autoregressive Distributed Lag (ARDL) model was examined for serial correlation, heteroscedasticity, normalcy, and stability using the Breusch-Godfrey (BG) serial correlation LM test, Breusch-Pagan-Godfrey (BPG) heteroscedasticity test, normality test, and recursive CUSUM test. The findings of heteroscedasticity and serial correlation are shown in Table 9, while the results of normality, the CUSUM test, and model stability are shown in Figures 1, 2, and 3, respectively.

Table 9 demonstrates that the estimated autoregressive distributed lag (ARDL) approach is devoid of serial correlation and heteroskedasticity since the p-value of F-statistics and Chi Square for the LM test revealed that both are larger than 0.05. The Jarque-Bera statistics are also

Table 9

Diagnostic Tests for Autoregressive Distributed Lag (ARDL) Model

	F-version		Breusch-Godfrey LM-version	
	Statistics	P-Value	Statistics	P-Value.
A: Serial Correlation	F (1,18) = 1.232	0.2887	$\chi^2(1) = 1.305$	0.217
B: Functional Form	F (1,18) = 0.371	0.6225	$\chi^2(1) = 0.434$	0.561
C: Normality	N/A		$\chi^2(2) = 5089$	0.647
D: Heteroscedasticity	F (4,18) = 2.0671	0.5446	$\chi^2(4) = 3.8146$	0.975

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

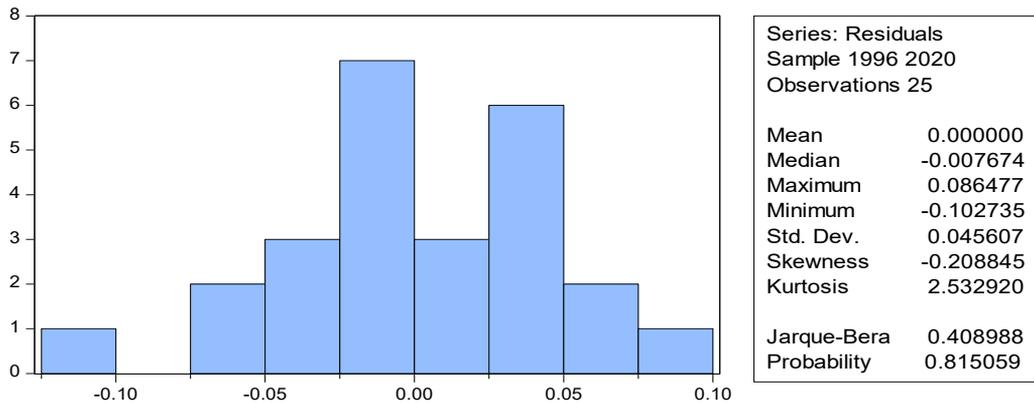


Figure 1. Normality Test

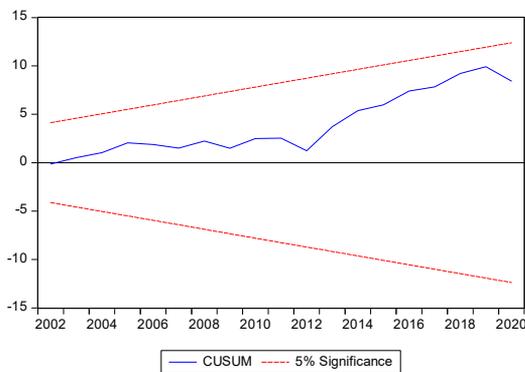


Figure 2. CUSUM test

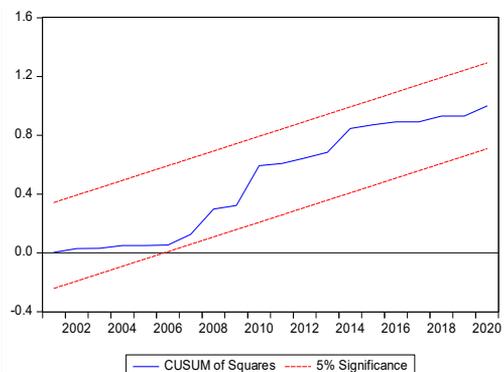


Figure 3. CUSUM square stability test

used to assess the approach's residual terms' normality.

Figure 1 depicts the Jarque-Bera (JB) test statistic of 0.4089 ($p=0.8150>0.05$). According to the study's findings, the model's residual series is normally distributed. So, the estimated ARDL model's normality has been verified. Finally, the model's long-term stability is verified using the CUSUM test and CUSUM square stability test. The CUSUM test, CUSUM of square test, and line of critical boundaries are shown in Figures 2 and 3 at a 5per cent level of significance. As demonstrated

in Figures 2 and 3, the plots of the CUSUM test and CUSUM of the square test are within the critical bounds. Therefore, it has been established that the estimated model remained constant during the research. This demonstrates the model's stability and enables its use for causality and long-term relationships.

CONCLUSIONS AND IMPLICATIONS

The research concluded a long-term equilibrium relationship between macroeconomic factors and the development of the banking industry. With a line of theory and literature, this study demonstrates

that per capita GDP has a positive and significant impact on the development of the banking industry. It indicates that per capita GDP grows, and increased demand for financial services induces growth in the banking industry. Therefore, policymakers design and implement policies that increase the higher income of the country and promote economic growth. Similarly, the beta coefficient of remittance has a positive and significant impact on the development of the banking industry, exploring that remittance inflows are vital not only for economic growth but also for development of the banking industry. This finding is consistent with [Herger et al. \(2008\)](#) and [Nazir et al. \(2018\)](#). The study, therefore, urges the authorities to design and implement policies that directly and indirectly promote the inflow of remittances in Nepal. Moreover, the study also found that government expenditure has played a significant impact on the development of the banking industry. It also indicated that when the real worth of money rises, banking growth grows, which could only be achieved by increasing government expenditures. The study, therefore, suggests that authorities must encourage political and development viewpoints on the impact of fiscal expenditure on the development of the banking industry.

Similarly, this study revealed that development of the banking industry is positively affected by stock market capitalisation which is similar to [Ayunku and Etale \(2014\)](#) and [Rehman \(2018\)](#). The finding indicates that the more credit is extended to the public sector then the more funding will be channelled towards the development of the banking industry. The study, therefore, urges the authorities to design and implement policies that increase the financial activities of the stock market effort to promote development of the banking industry. However, the study also reveals that inflation rate and trade openness have found negative and insignificant impacts on development of the banking industry. It indicates that higher the trade openness and inflation rate lower would be the development of the banking industry. The study, therefore, urges that authorities should implement low trade openness and inflation with target policies to boost development of the banking industry. The study recommends more investigation into the factors influencing development of the banking industry, particularly those pertaining to institutional, political, macroeconomic, and legal challenges, as well as those on banking industry features.

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Conflict of interest

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

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