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Assessing Banks Internal and Macroeconomic Factors as Determinants of Non-Performing Loans: Evidence from Nepalese Commercial Banks

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Abstract

This study has attempted to ascertain the factors affecting to non-performing loans in Nepalese commercial banks using a sample of seven commercial banks for the period of 2006-2018 with 89 observations, a balanced set of panel data. The descriptive and causal comparative research designs have been adopted for the study. The dependent variable was non-performing loans, while independent variables included both bank specific factors; Credit to total deposit, return on assets, weighted interest spread rate, and macro-economic factors; real gross domestic product growth rate, inflation and money supply. The existence of high levels of NPLs would hinder the benefits to the county through inefficient financial intermediation. Hence, there is a national level responsibility towards banks, to manage the NPL ratio at an acceptable level. Consequently, it is important to identify "what causes NPLs and significance of these factors on NPLs". Therefore, this study would help to get an insight on the bank specific and macro-economic factors, which affect NPLs in commercial banks and in which magnitude bank specific or macroeconomic factors contribute to NPLs. The estimated ordinary least square (OLS) regression model reveals that the bank specific: return on asset, weighted interest spread rate and credit to total deposit have significant impact on nonperforming loan in Nepalese commercial banks.

Keywords: Nonperforming loan, return on assets, weighted interest spread rate, credit to total deposit, gross domestic products and annual inflation rate.

1. Introduction

Banking sector plays a vital role in the economic development of a country. Though bank facilities and loans are mutually beneficial, but banks do suffer the risk of loss that some loans may become nonperforming and this discourages them to grant loans to small and medium enterprises (SMEs). The global financial crisis of 2007-2008 was precisely attributed to non-performing loans (NPLs) of banks and mortgage firms; the increased debt burden and over-leveraging was too severe that the fourth-largest investment bank of USA, Lehman Brothers Holdings Inc., got bankrupt in 2008 (Swedberg, 2010) Non-Performing Loan (NPL) has been crucial factor these days in terms of Banking sector sustainability and profitability. The economic development of a nation and stability of banking system are invariably interrelated. International experience shows that if NPA is not managed properly, it will lead to banking failures and National wide financial fragility. Regular monitoring of loan quality is thus essential to ensure a sound financial system and possibly provides an early alarm to regulatory authorities of banking system (Prasanna et al., 2014). In every economy financial institutions has got a major role to play. Among various indicators of financial stability bank's nonperforming loans assume critical importance since it contemplates on the asset quality, credit risk and efficiency in the allocation recourses to the productive sector. A non performing loan is any loan in which interest and principle payments are more than 90 days overdue. (IMF; 2005).As per IMF's Compilation Guide on Financial Soundness Indicators 2004 (Guide): "A loan is nonperforming when payments of interest and/or principal are past due by 90 days or more, or interest payments equal to 90 days or more have been capitalized, refinanced, or delayed by agreement, or payments are less than 90 days overdue, but there are other good reasons to doubt that payments will be made in full".

Similarly, the vector error correction model found a short run relationship among the variables. Ravi Prakash (2013) investigated the macroeconomic determinants of credit risk in Nepalese banking sector by time series modelling using 11 years (2001-2011) data of commercial banks. The study found that credit risk was significantly negatively affected by inflation and foreign exchange fluctuations. However, other macroeconomic variables, such as GDP growth, broad money supply growth, and market interest rate were found to have no influence on credit risk in the Nepalese banking industry. Castro (2013) employed the dynamic panel data approaches on 15-year quarterly data (1997-2011) of a particular group of countries - Greece, Ireland, Portugal, Spain, and Italy (GIPSI) to analyse the link between macroeconomic factors and banking credit risk. The study showed that credit default increases with a decrease in GDP growth, the share and housing prices indices, and rises when the unemployment rate, interest rate, and credit growth rate increase. Akinlo and Emmanuel (2014) used the co-integration analysis to develop a macroeconomic model of non-performing loans for Nigeria. The empirical analysis confirmed that the GDP growth and the stock market index have a negative effect on NPLs, whereas the unemployment rate, the credit to private sectors, and the exchange rate have a positive influence on non-performing loans. Using 75 countries as a sample, Roland, Petr, and Anamaria (2013) assessed the macroeconomic factors affecting non-performing loans through GMM estimation. They found that the real GDPIn this context, the purpose of this study is to analyze the impact of bank specific and macroeconomic variables on the nonperforming loan of

commercial banks of Nepal. Specially, it examines the non performing loan of commercial banks through the internal and environmental variables of size, profitability, capital adequacy ratio, loan to deposit ratio and annual growth of gross domestic product, and inflation. The data were collected from Economic Survey and annual reports of selected banks including their websites .

2. Summary of empirical studies on determinants of Non Performing loan

Author	Determinants of Non Performing Loan	Data collection and analysis	Main Findings
Bishnu Prasad bhattarai(2018)	bank size, return on assets, total loan and advance to total deposit ratio, capital adequacy ratio and macro-economic factors; real gross domestic product growth rate and inflation.	10 commercial bank with 50 observations , secondary for the period of 2013-2017data, ordinary least square regression	Bank managers can control the NPL by boosting the profitability (ROA), diversifying the investment portfolios instead of lending, setting a reasonable credit growth, and restructuring the LTD
Laxmi Koju , Ram Koju , Shouyang Wang(2018)	Interest spread, bank size, inefficiency, return on assets, capital adequacy, credit to loan ratio, loan to asset ratio, inflation rate, remittance, export to import	30 Nepalese commercial bank , secondary data over the period 2003-2015,econometric framework	Low economic growth, low inflation and high trade deficits are associated with the high non-performing loans. For the purpose of financial stability, the regulatory authorities should focus more on risk management systems, managerial performance, and measures to identify banks with possible default loans.
Khan and Ahmad	Earning per Share, Cash to Total Asset, and investment to Total Asset, Capital Adequacy Ratio and Break value per share	State bank of Pakistan. Over the period 2006-2016.Descriptive Statistics, correlation analysis and random effect panel least square regression	The reduced level of nonperforming loans leads to increased banks performance. It was also concluded that Return on Asset, Earning per share, Capital adequacy ratio and Breakup value per share has got a significant impact on nonperforming loan
Visiliki Makri(2017)	Gross domestic product, Public debt, unemployment, loans to deposits ratio, return on assets, return on equity	Eurozone's banking systems from the period 2000-2008, GMM difference	Findings reveal strong correlations between NPL and various macroeconomic (public debt, unemployment, annual percentage growth rate of gross domestic product) and bank-specific capital adequacy ratio, rate of nonperforming loans of the previous year and return on equity factors.
Visiliki Makri(2017)	Gross domestic product, Public debt, unemployment,loans to deposits ratio, return on assets, return on equity	Eurozone's banking systems from the period 2000-2008, GMM difference	Findings reveal strong correlations between NPL and various macroeconomic (public debt, unemployment,

			annual percentage growth rate of gross domestic product) and bank-specific capital adequacy ratio, rate of nonperforming loans of the previous year and return on equity factors.
Ibish Mazreku, Fisnik Morina , Valdrin Misiri, Jonathan V. Spiteri, Simon Grima5(2018)	Gross Domestic Product, Inflation Rate, unemployment rate, export	Data from 2006-2016 using World bank and International Monetary Fund ,Econometric model	Findings show that GDP growth and inflation are both negatively and significantly correlated with the level of NPLs, while unemployment is positively-related to NPLs.
Saikat Ghosh Roy(2014)	Net profit , net interest margin , Operating expense, per capita , Broad money, Debt, Interest rate	5 cross sections of bank groups which are Nationalized Banks, State Bank Group, Old Private Sector Banks, New Private Sector Banks and Foreign Banks. 17 years of time series from FY 1995-96 to FY 2011-12. Panel Unit Root Square	Findings shows the GDP growth, change in exchange rate and global volatility have major effects on the NPA level of Indian banking sector.
Seema (2014)	Interest rate, gross domestic product, unemployment, inflation rate, exchange rate, budget expenditure, borrowers honesty, good mansoon, monitoring evaluation, political environment	10 commercial bank, structured questionnaires, Regression analysis	Banker's perception shows variable like unemployment rate, inflation rate, exchange rate and interest rate are not much important variables to influence non-performing loan of the commercial banks of Nepal. The bankers also perceive that the increase in GDP growth rate decrease the non-performing loan of commercial banks in Nepal
Benedict Anayochukwu Ozurumba(2016)	Provision for loan loss, Deposit Money Banks, Return on Assets and Return on Equity.	4 commercial bank data from 2002-2013, secondary data using ordinary least square method and ratio analysis.	Findings banks should maintain high credit standards while other Bank and other regulatory agencies should maintain high surveillance on banks' credit operations.
Dr. Bishnu Prasad Bhattarai(2018)	Loan Loss Provisions, Total Assets, Nonperforming Loan, Earnings Before Taxes, Provisions, Capital Adequacy Ratio, Loan to Deposit Ratio.	Commercial banks in Nepal using pooled data of ten commercial banks with the 50 observations	Findings reveals that nonperforming loan ratio (NPL) and loan to deposit ratio are significant

		over the period of 2012/13 to 2016/17. The descriptive and causal comparative research designs	positive impact of loan loss provisions. This study concluded that nonperforming loan ratio (NPL) and loan to deposit ratio are the mainly determinants of loan loss provisions of commercial banks in Nepal.

3. Identification of variables

Independent variables

In order to reflect the determinants of nonperforming loan , the variables like credit to deposit ratio, return on asset ,weighted interest spread rate ,inflation rate, gross domestic product and money supply are used in the article.

Return on assets (ROA): The return on assets (ROA) is a popular indicator to measure the profitability of banks. It is calculated as: Return on assets (ROA) = net profit/ total asset .Higher ROA indicates a sound financial performance and a stable financial system. The profitable banks are less constrained to invest in risky loans because of less pressure to generate more revenue.

Interest spread (IS): The difference between lending rate and depositing rate is known as interest spread. A higher lending rate results in higher spreads and higher cost on loans and advances, which seems to reduce the payment capacity of borrowers and increase the default rate. Similarly, narrowing the interest rate spreads assists financial liberalization, which enhances the competition, increases the efficiency and eventually reduces NPLs.

Credit to deposit ratio (CDR): The liquidity is measured by loan to deposit ratio and is calculated as: Credit to deposit ratio (CDR) = credit/total deposit .Higher credit to deposit ratio indicates that deposits are mobilized for generating revenues and increasing profitability. The profitability encourages investing deposits in less risky sectors with high credit standards. This activity prevents bad loans. Similarly, lower loan to deposit ratio indicates inefficiency in resource allocation and low profit.

Real Gross domestic product (RGDP): Real GDP is a measure of value added in the economy in a given year which is adjusted for price changes. Gross Domestic Product (GDP) is the total monetary value of all finished goods and services produced within a country's borders in a specific time period measured in terms of local currency. Since GDP relies upon monetary value of goods and services and is subject to inflation, RGDP is used to capture the overall economic performance of the country.

Inflation rate (INF): It is the rate at which the average price of a given basket of goods and services in an economy increases over a period of time. The inflation rate is generally expressed in percentage and indicates a decline in the purchasing power of a country's currency. For our model, the annualized percentage change in the consumer price index over time is used as a proxy for rate of inflation.

Money Supply (M2): Money supply is the sum total of all forms of money in circulation at a given period of time. In Nepal, there are mainly two types of money supply: narrow money (M1), and broad money (M2). Narrow money refers to the sum of currency held by public (C) and demand deposit (including other deposits of Central bank), while broad money is defined as the sum of narrow money and time deposits (saving, fixed, call and margin deposits). Nepal Rastra Bank publishes these monetary aggregates on a monthly basis.

4. Research Methodology

This study is based on secondary data which has been collected from NRB, banks annual reports and Company Registrar. Among 28 commercial banks 7 banks which have not gone through merger, acquisition or up gradation till now were taken for analysis purpose. Convenience sampling technique has been used to select the banks as sample. Convenience sampling involves choosing respondents or organization as sample at the convenience of the researcher. In view of speedy collection and cost effective, this study has adopted convenience sampling technique in order to select the banks as sample. The reason behind choosing of the latest thirteen year from 2006 to 2018 period is to include afresh data in the analysis. This study has adopted descriptive and causal comparative research design. The selected commercial banks of the study are Nabil Bank, Standard Chartered Bank, Nepal Bank Limited, Agricultural Development Bank, Everest Bank Limited, , Himalayan Bank Limited, SBI Nepal limited.

4.1 The Model

The study uses the following Ordinary Least Square (OLS) regression model to assessing banks internal and macroeconomic factors as determinants of nonperforming loans: Evidence from Nepalese commercial banks.

$$NPL_{it} = \beta 0 + \beta 1 CR/TD_{it} + \beta 2 INF_{it} + \beta 3 IS_{it} + \beta 4\ LGDP_{it} + \beta 5 M2_{it} + \beta 6 ROA_{it} + £_{it}$$

Where:

NPL it	Ratio of non-performing loans to total loans of i^{th} bank for the time period t
CR/TD it	Ratio of total credit to total deposit of i^{th} bank for the time period t
INF it	Inflation Rate for the time period t
IS it	weighted interest spread rate for the period t
LGDP it	Real gross domestic product growth rate for the time period t
M2 it	Money supply for the time period t
ROA it	Ratio of net income to total assets of i^{th} bank for the time period t
β0	The intercept (constant) the slope which represents the degree with which bank loan loss
$£_{it}$	error component

4.1.1 Descriptive statistics

The descriptive statistics used in this study consists of mean, standard deviation, r-squared and adjusted r=squared associated with variables under considerations. The descriptive statistics are summarized below:

Combined PANEL result:

Dependent Variable: NPL/TL
Method: Panel Least Squares
Date: 03/21/20 Time: 16:03
Sample: 2006 /2018
Periods included: 13
Cross-sections included: 7
Total panel (unbalanced) observations: 89

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRTD	0.068447	0.014974	4.570873	0.0000
INF	0.079986	0.113916	0.702144	0.4846
IS	0.923211	0.196884	4.689115	0.0000
LGDP	4.361562	16.17807	0.269597	0.7881
LM2	-2.708039	3.730998	-0.725821	0.4700
ROA	-0.564793	0.324355	-1.741284	0.0854
C	-50.22253	338.2074	-0.148496	0.8823

R-squared	0.485680	Mean dependent var	2.502247
Adjusted R-squared	0.448047	S.D. dependent var	2.682650

The above chart expla0ins the relationship between the dependent and independent variable. The above chart explains the relationship between the dependent and independent variable. The credit to total deposit has positive coefficient (0.068447). This means that 1% increase in cr/td increase NPL by 0.068447%. P < 0.05 (i.e ,0.000<0.05),conforming significant effect of credit to

total deposit. Similarly the coefficient of interest spread rate is positive with p value less than 0.05 which shows positive significant on the NPL. Return on assest has negative significant on NPL.
Generally r^2 of 0.485680 shows the explanatory variables explained 48.5% of variation in the dependent variable of NPTl

INDIVIDUALBANK'SRESULT:

1) Nepal Bank Limited

Dependent Variable: NPLTL1
Method: Least Squares
Date: 03/21/20 Time: 16:07
Sample: 2006 2018
Included observations: 12

Variables	Coefficient	Std. Error	t-Statistic	Prob.
CRTD1	-0.129646	0.048271	-2.685769	0.0435
INF	-0.265880	0.164123	-1.620006	0.1662
IS1	-1.191274	0.221889	-5.368784	0.0030
LGDP	-39.43311	22.52142	-1.750916	0.1404
LM2	7.434247	5.105140	1.456228	0.2051
ROA1	-0.797185	0.487434	-1.635472	0.1629
C	891.9132	474.9023	1.878098	0.1192

R-squared	0.966801	Mean dependent var	5.140000
Adjusted R-squared	0.926963	S.D. dependent var	2.837175

The above result of Nepal Bank Limited shows that at 10% level of significance credit to total deposit, interest spread rate has negative coefficient and highly significant to the non performing loan.

2) Agricultural Development Bank

Dependent Variable: NPLTL2
Method: Least Squares
Date: 03/21/20 Time: 16:09
Sample: 2006 2018
Included observations: 13

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRTD2	0.175582	0.063621	2.759806	0.0329
INF	0.228599	0.181989	1.256116	0.2558
IS2	-0.306073	0.386523	-0.791862	0.4586
LGDP	6.999913	25.68654	0.272513	0.7944
LM2	-2.629376	6.231918	-0.421921	0.6878
ROA2	-0.893631	0.579399	-1.542341	0.1739
C	-126.8062	526.9857	-0.240625	0.8179

R-squared	0.899123	Mean dependent var	6.490000
Adjusted R-squared	0.798246	S.D. dependent var	2.396376

Above result shows at 10% level of significance credit to total deposit has positive significance to the non performing loan.

3) Nabil Bank Limited

Dependent Variable: NPLTL3
Method: Least Squares
Date: 03/21/20 Time: 16:10
Sample (adjusted): 2006 2017
Included observations: 12 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RTD3	-0.038388	0.034304	-1.119068	0.3140
INF	0.152767	0.088527	1.725648	0.1450
IS3	0.978513	0.755811	1.294654	0.2520
GDP	31.67803	18.01964	1.757972	0.1391
M2	-7.173842	4.047839	-1.772265	0.1365
ROA3	0.252772	1.275904	0.198112	0.8508
C	-665.8603	378.9187	-1.757265	0.1392

R-squared	0.808385	Mean dependent var	1.409167
Adjusted R-squared	0.578448	S.D. dependent var	0.634572

Above result shows at 10% level of significance credit to total deposit, inflation, interest spread rate, gross domestic product, return on asset has positive insignificant to the non performing loan. Money supply is negative insignificant to the non performing loan.

4) Everest Bank Limited

Dependent Variable: NPLTL4
Method: Least Squares
Date: 03/21/20 Time: 16:11
Sample: 2006 2018
Included observations: 13

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRTD4	-0.005441	0.025309	-0.214992	0.8369
INF	-0.022876	0.053006	-0.431578	0.6811
IS4	0.472043	0.388079	1.216356	0.2695
LGDP	-0.837313	7.360333	-0.113760	0.9131
LM2	-0.017278	1.735097	-0.009958	0.9924
ROA4	-0.416462	0.663375	-0.627792	0.5533
C	22.94482	154.3472	0.148657	0.8867

R-squared	0.552428	Mean dependent var	0.503077
Adjusted R-squared	0.104856	S.D. dependent var	0.277320

Above data shows that all the independent variables are insignificant to the non performing loan.

5) Standard Chartered bank

Dependent Variable: NPLTL5
Method: Least Squares
Date: 03/21/20 Time: 16:12
Sample: 2006 2018
Included observations: 13

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRTD5	0.042960	0.031759	1.352681	0.2249
INF	0.019790	0.060097	0.329305	0.7531
IS5	0.033610	0.103954	0.323314	0.7574
LGDP	3.372611	8.973134	0.375857	0.7200
LM2	-1.867515	2.394035	-0.780070	0.4650
ROA5	-0.364336	0.486276	-0.749238	0.4820
C	-41.26130	179.6658	-0.229656	0.8260

R-squared	0.782021	Mean dependent var	0.603846
Adjusted R-squared	0.564043	S.D. dependent var	0.446086

Above data shows all the independent variables are insignificant.

6) Himalayan Bank Limited

Dependent Variable: NPLTL6
Method: Least Squares
Date: 03/21/20 Time: 16:20
Sample: 2006 2018
Included observations: 13

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRTD6	-0.026355	0.072327	-0.364384	0.7281
INF	0.335670	0.197019	1.703744	0.1393
IS6	0.900944	0.906840	0.993499	0.3588
LGDP	47.20164	25.57407	1.845683	0.1145
LM2	-12.03268	5.764934	-2.087218	0.0819
ROA6	0.647195	1.550438	0.417427	0.6909
C	-955.3623	539.3913	-1.771186	0.1269

R-squared	0.805198	Mean dependent var	2.335385
Adjusted R-squared	0.610397	S.D. dependent var	1.095899

At 10% level of significant money supply is negatively significant to non performing loan.

7) Nepal SBI Bank

Dependent Variable: NPLTL7
Method: Least Squares
Date: 03/21/20 Time: 16:21
Sample (adjusted): 2006 2017
Included observations: 12 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRTD7	0.021438	0.010908	1.965407	0.1065
INF	-0.021627	0.061672	-0.350685	0.7401

IS7	0.352014	0.573637	0.613653	0.5663
LGDP	-16.82847	7.006702	-2.401768	0.0615
LM2	1.320498	1.428548	0.924364	0.3977
ROA7	0.726420	0.636813	1.140713	0.3057
C	419.1351	151.5995	2.764752	0.0396

R-squared	0.990316	Mean dependent var	1.232500
Adjusted R-squared	0.978695	S.D. dependent var	1.517067

Above data shows at 10%level of significance gross domestic product is significant and others independent variables are insignificant.

5. Results and Conclusion

The major concern of this study was to figure out the impact of bank specific variable and macro variables effects the non performing loan to total loan maintained by the banks of the respective seven banks. In study of overall regression model, NPL has significant and positive relation with credit to total deposit, interest spread rate and return on asset, which reveals that increase in these three leads to increase in NPL. Bank should make provision to control the credit loan and return on loan that directly affect the non performing loan. , there is a national level responsibility towards banks, to manage the NPL ratio at an acceptable level.

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