Report On

Are Non-Performing Loans Sensitive to Macroeconomic Determinants? An Empirical Evidence from Banking Sector of SAARC Countries

By

Saom Shawleen
ID: 17104047

A thesis report submitted to the BRAC Business School in partial fulfillment of the requirements for the degree of
Bachelors of Business Administration

BRAC Business School
BRAC University
September, 2021

Declaration

It is hereby declared that

1. The thesis report submitted is my own original work while completing degree at Brac University.
2. The report does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The report does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. I have acknowledged all main sources of help.

Student's Full Name & Signature:

_____Saom Shawleen, 17104047_____
Student Full Name
Student ID

Supervisor's Full Name & Signature:

_____
Supervisor Full Name
Designation, Department
Institution

Letter of Transmittal

Mr. Jubairul Islam Shaown

Lecturer,

BRAC Business School

BRAC University

66 Mohakhali, Dhaka-1212

Subject: Submission of the project paper on "*Are Non-Performing Loans Sensitive to Macroeconomic Determinants? An Empirical Evidence from Banking Sector of SAARC Countries*"

Dear Sir,

It is a great pleasure and an honor for me to submit this project report on "*Are Non-Performing Loans Sensitive to Macroeconomic Determinants? An Empirical Evidence from Banking Sector of SAARC Countries*". This paper is prepared as the BBA program's partial requirement under the BRAC Business School, BRAC University. I have put my best effort into preparing this report by following thoroughly the guidelines of formal report writing. I have attempted my best to finish the report with the essential data and recommended proposition in a significant compact and comprehensive manner as possible.

I would like to express my heartiest gratitude to you for providing me with precious advice and appropriate guidelines that helped me to prepare this study thoroughly. I sincerely supplicate you to call me if you perceive further study should be conducted on this thesis.

Sincerely yours,

Saom Shawleen

_____

Saom Shawleen

ID 17104047

BRAC Business School

BRAC University

Date: 09-11- 2021

Acknowledgment

First of all, I would like to express my earnest gratitude from the core of my heart to the Merciful, Beneficent, and Almighty Allah for providing me strength and persistence to accomplish this study within the programmed time.

Afterward, I show gratitude to my respected parents. They are one of the main reasons that I am now in BRACU and able to do this kind of project work. They consistently supported me mentally to accomplish the project.

I take the privilege of extending acknowledgment to my respected instructor, Mr. Jubairul Islam Shaown, Lecturer, BRAC Business School, BRAC University; who encouraged me to conduct this rigorous analysis. I would like to express my heartfelt gratitude to him for helping me to accomplish this report with his skillful support, relentless effort, and extraordinary gesture. I have attempted to incorporate his knowledgeable opinions and constructive suggestions in this research paper in the best plausible way to elevate its qualitative worth. Lastly, I am enormously grateful to him for providing me with relevant materials to accomplish this report.

Abstract

The study empirically investigates selected macroeconomic determinants of nonperforming loans (NPLs) for a panel of 8 SAARC countries (Afghanistan, Bangladesh, Bhutan, India, Nepal, Maldives, Pakistan, and Sri-Lanka), using annual data for the period 2008-2019. To examine the association, this study, primarily, conducted OLS model, fixed-effect estimates, and random-effect estimates and, eventually, applied robust fixed effect estimates to resolve the problem of heteroscedasticity. The empirical findings confirmed the previous findings, indicating a significant positive association with the government budget balance and a significant inverse relationship with GDP, sovereign debt, inflation rate, and money supply. The findings are useful for formulating macro-prudential along with fiscal policies to avoid the subsequent NPLs shock in SAARC countries.

Keywords: Non-performing loans; Macroeconomic determinants; SAARC countries; Panel data; South Asia, Financial crisis

Table of Contents

List of Tables

List of Figures

List of Acronyms

CEIP	Carnegie Endowment for International Peace
EU	European Union
FE	Fixed Effect
FSIs	Financial Soundness Indicators
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GMM	Generalized Method of Moments
IMF	International Monetary Fund
MENA	Middle East and North Africa
MS	Money Supply
NPLs	Non- Preforming Loans
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Square
RBI	Reserve Bank of India
RE	Random Effect
SAARC	South Asian Association for Regional Cooperation
VAR	Vector Auto Regression
VIF	Variance Inflation Factor

Glossary

Non-Performing Loans (NPLs)	Non-performing loans (NPLs) refers to default loan that the borrowers are unable to pay interest and principal amount within a specified period (generally due >90 days) (IMF, 2005)
Money Supply (M2GDP)	Money supply refers to the aggregate stock of money in an economy for a specific period. In general, money supply (MS) is classified as Reserve Money (M0), Narrow Money (M1), Broad Money (M2) based on size and type of account (Badar et al., 2013)
Exchange Rate (EXC)	The exchange rate measures the domestic currency's worth with another currency (Zameer & Siddiqi, 2010)
Government Budget Balance (FISCAL)	Government Budget Balance (also called as public fiscal balance) refers to the gross difference between federal revenues and spending that measures the comprehensive fiscal performance of the government
Gross Domestic Product (GDP)	GDP refers to the aggregate value of finished goods and services that are produced in a country within a specified period (Badar et al., 2013)
Inflation Rate (INFL)	Inflation is referred to as a price spiral for goods and services for a specified period in a particular economy.
Sovereign Debt (DEBT)	Sovereign debt refers to the central government consolidated debt to finance the trade deficit and/or budget deficit.

Chapter 01 Introduction

1.1 Study Background

Non-performing loans (NPLs) are those financial assets that remain unpaid and therefore, no installment and/or interest payments are received by banks as planned. According to IMF (2005), the loans are considered as NPLs when it does not generate principal or interest rate for at least 90 days. Moreover, Joseph et al. (2012) denoted that when the loans are past due, generally more than ninety days and unable to 'perform'/ receive interest anymore. However, when the banks are unable to collect the total principal or interest on the due date and there is no possibility of repayment in foreseeable future, this is called non-performing loans (Alton & Hazen, 2001) and this study is based on their NPLs concept. Besides, the high inflation rate, vulnerable fiscal and monetary policy, and weak economic activities are primarily responsible for increasing the bank's exposure to credit risk and, consequently, threaten the financial stability.

Increasing NPLs are considered as a major proxy of credit risk since the entire banking system is directly impacted by NPLs. The financial crisis in Asia during 1997 and the financial crisis of 2007-2008 are the most vivid paradigm of how non-performing loans lead to an unstable banking system. The NPLs ratio is one of the vigorous indicators of the onset of the banking crisis as it reduces the credit growth (Reinhart & Rogoff, 2010) and, hence, overall economic stability significantly disrupts (Ivanović, 2016). Rising NPLs ratio is the indicator of a susceptible financial system, while a lower rate of NPLs is a signal of financial soundness. High NPLs further affect any country's respective commercial banks and ultimately commercial banks ' significant exposure to credit risk jeopardizes entire financial system and, thereby, state's economy (Feijó, 2011). Certainly, a consistent upward shift of NPLs adversely affect the financial efficiency and thus chance of the banking crisis are introduced (Louzis et al., 2012; Nkusu, 2011). More precisely, NPLs reduce the investment opportunities, restraints interest revenues, and boost the liquidity crisis that is initially responsible for bankruptcy in a

financial system. Hence, the prerequisite of maintaining financial and economic stability is to detect the determinants that affect NPLs.

The remainder structure of the study is as follows. Sect. 02 reviews empirical pieces of literature on macro-economic determinants of non-performing loans. Sect. 03 explains data sources and study variables, formulates hypotheses, illustrates the econometric framework, and discusses analytical techniques. Sect. 04 depicts the diagnostic tests and analyzes the research findings while section 05 includes concluding remarks.

1.2 Objectives

1.2.1 Primary Objective

The study purpose is to explore the macroeconomic determinants that have a noteworthy influence on non-performing loans (NPLs) in the banking sector of SAARC countries.

1.2.2 Specific Objectives

- To gain a deep insight regarding NPLs.
- To identify the influence of macro-economic determinants on NPLs.
- To consider the analytical finding's implications from practical perspectives.

1.3 Research Gap

Although various studies examined the determinants of non-performing loans in worldwide, according to the best knowledge of the author, no studies have been conducted previously on the impact of macro-economic determinants on NPLs based on the banking system of the SAARC countries. Here, the paper attempted to evaluate the non-performing loans' sensitivity in SAARC countries, using six macroeconomic determinants (broad money supply, exchange rate, government budget balance, GDP, inflation rate, and sovereign debt) under the panel dataset and static panel estimation technique.

1.4 Rationale of Study

Although in 2007-2008, the world economy experienced Global Financial Crisis (GFC), the great recession mainly affected America, EU countries (especially Ukraine), Latin America (especially Argentina), and African Countries (especially Jamaica). Conversely, according to Carnegie Endowment for International Peace (2009), the Asian countries i.e. China, India, and Japan were listed as the 'least affected countries'. The GFC has more or less affected all of the SAARC countries significantly.

Afghanistan is overburdened with strategic and political problems and the country is highly reliant on foreign aid. According to World Bank (2012) almost 90% of Afghanistan's budget is dependent on foreign aid. During the financial crisis, the big donors were severely affected, and therefore, in 2011 their donation fell by 3% (OECD, 2011). Hence, the financial crisis in 2008 highly affected Afghanistan's crisis-stricken banks. Pakistan's banking system also experienced an increasing NPLs volume by almost two-fold from 2009-20011 (Badar et al., 2013). The status of NPLs of Bhutanese and Maldives banks are somewhat satisfactory as in recent years, the non-performing loans ratio are declining from 13.3% in 2008 to 8.45% in 2019 and 16.40% in 2009 to 9.39% in 2019 respectively (IMF, 2021). Sri Lankan banking system also witnessed NPLs shock in recent decades and according to the study of Fonseka (2009) Bangladeshi banking system experienced highest and Sri Lankan banking system witnessed second highest NPLs among Bangladesh, Malaysia, Sri Lanka, Indonesia, Thailand, and Philippines.

Despite Bangladesh, India and Nepal are currently holding the position of the strongest economy (Investopedia, 2020), the scenario of the Nepalese banking system is alarming as the aggregate NPLs are undoubtedly in an upward trend from 2010 (Koju et al., 2018). Moreover, Bangladesh is highly burdened with non-performing loans in the last few decades. Based on the international standard, the NPLs rate of 2% or below is considered as standard but

unfortunately, the NPLs rate of Bangladesh is 5 to 6 fold higher in recent years (Kumar et al., 2020). Furthermore, the Reserve Bank of India (2017) stated that the financial health of the Indian banking system deteriorated the asset quality because of the minimum capital requirement (as per the Basel norm). Hence, the banking groups witnessed a crucial surge in NPLs in recent years.

The continuous upward trend refers that the banks are heading towards a liquidity crisis and an unstable financial stability will prevail in the recent future. Hence, maintenance of long-term economic and financial stability significantly requires assessing the macroeconomic variables of NPLs in SAARC economy.

1.5 Limitations of Study

One of the main limitations of this paper is time constrain. The report might have provided better analysis if the period was extended. This report is conducted based on only static panel estimation, whereas dynamic panel estimation could have been used to avoid biased and inconsistent results (if any). Lastly, the sample size of this paper is <100, and therefore, further inference of results is somewhat questionable.

Chapter 02 Review of Literature

2.1 Background of Non-Performing Loans

According to the published data at the country level and overall banking system level, the amount of nonperforming loans and its factors are increasing significantly in recent years. The surge in the credit risk during and after the global crisis took the researchers' attention and, therefore, factors that negatively impact the bank's portfolio has been severely investigated. The result of several studies revealed that a surge of irresistible problematic loans along with the banking sector's fragility and financial vulnerability undermined the banking crisis in '90s. Due to a negative shock in social welfare and economic growth, González-Hermosillo (1999) Barseghyan (2010), and Zeng (2012) concluded the Non-Performing Loans as *'financial pollution'.*

Keeton (1999) studied 50 US banks between 1982 and 1996 and showed that the lax credit standards are one of the pivotal reasons for a sudden surge in NPLs. In line with the previous study, McGoven (1998) also found that unsecured loans, low credit standards, and borrowers' attitudes have a crucial impact on raising loan loss in the US banking system. Moreover, a study on banking system of Argentina between 1993 and 1996 was conducted by Bercoff et al. (2002) where he applied an *Accelerated Failure Time (AFT)* method and that revealed both bank-specific[1] and macroeconomic determinants had equal influence on NPLs.

2.2 Empirical Literature

This paper reflects several researchers' investigative and analytical studies regarding the factors that impact the non-performing loans for both individuals and a panel of countries. Some of the researchers investigated both macroeconomic and bank specific variables, while others investigated macro-economic or bank-specific factors separately.

[1] Bank specific variables are solvency rate, operating efficiency, quality of asset, leverage and deposits, bank size, liquidness etc.

Using macroeconomic determinants, Babouček and Jančar (2005) explored the NPLs in the Czech Republic for 11 years and used the VAR method to examine the macroeconomic determinants' (real GDP, unemployment percentage, inflation, , exports, imports, interest percentage, exchange rate and aggregate bank loans) influence. Their findings demonstrated that GDP growth rate reduces the NPLs ratio while raising inflation and exchange rate deteriorate the bank's loan portfolio quality.

The correspondence between NPLs and macroeconomic along with bank-specific determinants was explored by Espinoza and Prasad (2010) while considering a panel of 80 banks from the GCC zone. The study highlighted that macroeconomic variables, particularly interest rate and non-oil GDP had remarkable effect on the credit risk. Moreover, the study also depicted that some distinct bank-specific factors (credit growth, capital sizes, and efficiency) had an impact on non-performing loans. The study results suggested a short, yet, strong feedback effect from the banking industry to the economy.

Kastrati (2011) analyzed the impact of NPLs ratio during the period of 1994-2009 on 15 transition countries (Azerbaijan, Albania, Armenia, Bosnia and Herzegovina, Belarus, Bulgaria, Moldova, Macedonia, Kosovo, Romania, Serbia, Montenegro, Croatia, Georgia, and Ukraine) by using dynamic panel data method. The report demonstrated the nonperforming loans were highly persisting from one year to another and inflation rate, real economic growth rate and competition had a noteworthy impact on the NPL ratio.

Using dynamic GMM and fixed effect model, Ghosh (2015) analyzed the bank specific and economic variables of aggregate NPLs by taking 50 banks in both Columbia and USA between 1984 and 2013. The results implied that increasing GDP, housing price index, and personal income growth rate declines NPLs, while sovereign debt and rate of unemployment increase

the NPLs significantly. Afterward, Konstantakis et al. (2016) confirmed the impact while conducting a study on the Greek economy from 2001 to 2015.

Boudriga et al. (2010) conducted an empirical investigation based on 12 selected MENA countries considering a sample of 46 banks and analyzed the impact of nonperforming loans on the bank-specific, institutional, and business environment factors for the 2002-2006 year timespan. Their result revealed foreign participation from developed countries, institutional environment, loan-loss provision, and credit growth possess a significant impact on bad debt.

The factors of nonperforming loans in the Greek Bank during 2003Q1-2009Q3 were scrutinized by Louzis et al. (2012) where they used dynamic panel data estimation techniques and considered various types of loans (mortgage, consumer, and business). The study findings exhibited that the NPLs ratio of business loans were, primarily, highly sensitive to the unemployment rate change, the NPLs ratio of consumer loans were highly sensitive to real growth rates changes, while NPLs ratio of mortgage was comparatively less sensitive to change in macroeconomic environment. Moreover, they presumed the hypothesis of '*sovereign debt*' and asserted that higher sovereign debt leads to rising NPLs.

De Bock and Demyanets (2012) investigated the macroeconomic variables of NPLs spanning from 1996-2000 by considering a group of 25 emerging markets. Their study highlighted that economic expansion, trade growth (goods), exchange rate, capital flows had a significant impact on NPLs.

Messai and Jouini (2013) conducted an empirical study on 85 banks in Spain, Italy, and Greece where they evaluated both macroeconomic and bank specific variables of nonperforming loans on for a period of 2004 to 2008 and found a significant relationship between financial and macroeconomic variables (i.e. rate of unemployment, rate of GDP growth, loan loss reserves, and return on assets), real interest rate and nonperforming loans.

Caporale et al. (2014) investigated the impact of financial and macroeconomic determinants on the quality of bank portfolio based on the Italian banking sector spanning from 2008-2012 and they found that economic recession leads to a high volume of NPLs since the banks grant high volume of credits during economic boom. The findings revealed that the deterioration of economic condition caused a record in NPLs surplus in the recessionary period and, during the pre-crisis years, the Italian banks promoted the lending policy.

Reinhart and Rogoff (2011) investigated a group of 70 developed and developing countries consisting of 209 sovereign default[2] and 290 banking crises episodes for a prolonged span from 1800 to 2009. In the seminal paper, they revealed that the sovereign default/ government default affected the quality of bank portfolio, irrespective of commitment size. In line with the findings, a strong linkage between sovereign debt and nonperforming loans rate was explored by Makri et al. (2014) while investigating 14 EU countries from 2000 to 2008.

The effect of financial crisis 2007-2008 on financial soundness indicators of banks were investigated by Kasselaki and Tagkalakis (2014) on 20 industrialized OECD countries spanning the period from 1997 to 2009. The study demonstrated that the global financial crisis caused a significant increase in nonperforming loans, real interest rates (both short and long term). Authors suggested the policymakers to develop a prior warning system so that the stability of the banking sector is fragile/threatened or not will be known beforehand.

Chaibi and Ftiti (2015) examined the macroeconomic impact of nonperforming loans on quality of bank's portfolio where the laisse-faire economy (France) was compared with the credit-based economy (Germany) for the span of 2005-2011. The authors found that, in both of the economic contexts, all the chosen macroeconomic determinants (excluding the rate of

[2] Sovereign default is the failure of a government to repay some or all of the country's outstanding debt (*Investopedia*, 2021).

inflation) had a noteworthy influence on NPLs. The findings suggested that a laisse-faire economy possesses a greater credit risk than a credit-based economy.

The empirical study of Castro (2013) demonstrated that macroeconomic environment and nonperforming loans have noteworthy correlations in the euro-zone countries. Moreover, the study considered the financial variable's impact on the NPL ratio.

Individual empirical analysis of Jakubík and Reininger (2013), Škarica (2014), Klein (2013) confirmed the prior findings that the real economy affects significantly to nonperforming loans in the observed countries, while they examined the factors of NPLs for Eastern and South-Eastern, and Central European countries and their findings.

Bofondi and Ropele (2011) explored the macroeconomic variables of NPLs on the banking system of Italy between 1990Q1 and 2010Q2. The study highlighted that aggregate money supply, lending rates, and rate of unemployment are directly associated with NPLs and GDP is negatively interrelated with NPLs. Contrarily, Ahmad (2003) conducted a study on NPLs as a proxy of credit risk based on 65 Malaysian deposit-taking institutions, and Kalirai and Scheicher (2002) analyzed the NPLs impact on the Austrian banking system, and both of them found a significant negative association between credit risk and money supply. Fofack (2005), however, found no impact of money supply on nonperforming loans.

Lastly, Khemraj and Pasha (2009) scrutinized the determinants of nonperforming loans in Guyana spanning from 1992 to 2004. The findings showed that the real effective exchange rate, the high lending rate had a positive relationship with nonperforming loans while GDP had a negative relationship with NPLs. In line with the previous study, Beck et al. (2013) explored the NPLs' determinants for 75 developed and emerging economies for 2000-2010 and found a significant impact on lending rate, share price, nominal effective exchange rate (based on local currency), and GDP growth rate.

Chapter 03 Research Framework

3.1 Samples and Data Collection

The study examines the impact of various macroeconomic determinants on NPLs for the eight SAARC countries. The paper included an extended and the most recent period of 12 years (2008-2019) to reflect a realistic scenario of the influence of macroeconomic determinants on the bank's loan portfolio during the financial crisis of 2007-2008 and post-crisis condition. The analysis of study was carried out based on secondary data and these were extracted from the IMF, World Bank and the Annual Report/Bulletin of some of the country's respective Central Bank.

3.2 Variables of Study

3.2.1 Measured Variable

3.2.1.1 Non-Performing Loans (NPLs)

According to IMF (2005), non-performing loans (NPLs) refers to the default loan that the borrowers are unable to pay interest and principal amount within a specified period (generally due >90 days). In other words, when the scheduled payment is overdue and no longer likely to be paid in the foreseeable future, then the loans and advances become non-performing (Alton & Hazen, 2001). Hence, NPLs are the pivotal unit for measuring the loan loss. Since the non-performing loans ratio measures the bank's financial soundness of credit portfolio and asset quality, therefore, this study considers NPLs ratio as a measured variable and this has been taken as a proxy of credit risk.

3.2.2 Explanatory Variables

3.2.2.1 Money Supply (M2GDP)

Money supply denotes to the aggregate stock of money in a financial system for a specific period. In general, Money Supply (MS) is classified as Reserve Fund (M0), Narrow Money (M1), Broad Money (M2) based on size and account types. As a proxy of money supply, this

study considered Broad Money (M2) since it includes both M0 and M1. Moreover, reserve money, also known as central bank money is a central bank's obligation that comprises currency and depository accounts of the central bank. Narrow money (M1) comprises M0 and all scheduled bank's time and demand deposits, while broad money consists of M1 and all foreign currency deposits. Moreover, the money supply has a significant impact on nonperforming loans since the money supply influences borrowers' behavior. During the expansionary monetary policy, the required reserve rate and discount rate get reduced and therefore, productivity and profitability increase (N. H. Ahmad & Ariff, 2007). Increased money supply, thereby, revitalizes the investment and consumption pattern which consequently increases income. Additionally, increasing the money supply decreases the cost of funds that results in cheaper funds. These consequences escalate the borrower's ability to pay the outstanding on due time and thus bank's credit risk exposure declines. Hence, the study formulates:

H1. Broad Money Supply is inversely related to NPLs

3.2.2.2 Exchange Rate (EXC)

In developing economies, exchange rate volatility creates economic instability. The exchange rate measures the domestic currency's worth with another currency (Zameer & Siddiqi, 2010). The problem that occurs frequently is the rising exchange rate for the home country meaning foreign currency appreciation against the home currency and, therefore, home country's cost of imported goods increase. When the exchange rate increases, the local currency value depreciated and hence the local goods and commodities become cheaper. Consequently, domestic country's export increase, and imports become costly. Therefore, local customer retention becomes challenging as the price of the final product (which is sold locally) becomes expensive. As the value of local currency depreciates, costly imported inputs create pressure on the financial letter of credit which is issued by a commercial bank to the traders, and

therefore, the bank's default risk increases (Sirpal, 2009). In other words, currency depreciation has an expansionary impact that leads to an increased operating profit in terms of export as the export becomes cheaper but causes shrinkage in import due to the opposite rationale (Nucci & Pozzolo, 2001). Additionally, significant local currency depreciation deteriorates the net worth of a firm, primarily, via the *'balance sheet effect*[3] (Pratap & Urrutia, 2004). Hence, the study proposes:

H2. Exchange rate fluctuation is positively related to NPLs

3.2.2.3 Gross Domestic Product (GDP)

Gross Domestic Product (GDP) is a significant economic element in the economic cycle that measures economic development. The relationship between credit risk exposure of banks and the economic cycle is dialectical. During the economic stagnation/recession the credit risk of financial intermediaries generally increases since the economy suffers to maintain the employment, prices, and outputs at the desired level. On the flip side, during the economic boom, increasing economic activities lead to an increase in cash volume for both households and businesses. Again, confidence among the lenders and borrowers boosts up for new investment and increasing borrower's income level strengthen their capacity to repay the financial outstanding (Poudel, 2013). Therefore, the sequential impacts lead to a reduction of credit risk for commercial banks. Therefore, the study originates:

H3. GDP growth rate has a negatively related to NPLs.

3.2.2.4 Government Budget Balance (FISCAL)

Government Budget Balance (also called public fiscal balance) refers to the gross difference between federal revenues and spending that measures the comprehensive fiscal performance

[3] Balance sheet-effect refers to the fact that financial net worth declines due to real depreciation and therefore increases the burden of dollar-dominated outstanding debt for any firm.

of the government. During the expansionary fiscal policy, the government uses budgetary instruments (e.g. raise government spending/decrease tax) that increase the money supply (Dimitrios et al., 2016) and boosts productivity. Hence, the expansionary fiscal policy (which leads to the budget deficit) alleviates/mitigates the credit risk. Hence, the study originates the following hypothesis:

H4. Government Budget Balance is positively associated with NPLs.

3.2.2.5 Inflation Rate (INFL)

Inflation is referred to as a price spiral for goods and services for a specified period in a particular economy. Since inflation depreciates the original value of money, hence, high inflation leads to the high cost of borrowing/ loan interest, and therefore, the borrower's obligation increases and that results in an increased default risk (Poudel, 2013). Based on the Price Stability Indicator, high inflation degrades the borrower's real income and their loan repayment capability decrease, whereas, low inflation leads to economic growth. Conversely, increasing inflation rate decreases the aggregate value of loans and, thereby, the borrower's ability to timely pay their financial obligations increase that ultimately reduce the default risk (Koju et al., 2018). Hence, correlation between inflation rate and nonperforming loans might be ambiguous (Nkusu, 2011). Therefore, the study formulates the following hypothesis:

H5. Inflation has a positive/negative relationship with NPLs.

3.2.2.6 Sovereign Debt (DEBT)

Sovereign debt refers to the central government consolidated debt for financing the trade deficit and/or budget deficit. This is also termed as public debt/general government gross debt/per capita outstanding debt. Sovereign debt is, primarily, caused due to trade deficit or budget deficit (Koju et al., 2018). When sovereign debt increases, the government might take some

fiscal measures i.e. curtail the *public social spending*[4] (Louzis et al., 2012). These consequences render a negative shock in household income and, therefore, borrowers become unable to pay their outstanding on due time. Hence, the aggregate NPLs increase drastically. Hence, study generates:

H6. Sovereign debt is positively related to NPLs.

Table 1 The variables and their anticipated relationships

Notations	Variable Explanation	Source(s)	Estimated Effect
NPLs	Ratio of Non-performing Loans to Total Bank Loans	World Bank, IMF & Annual Report	***** *(dep. v)*
M2GDP	Broad Money Supply as % of GDP	World Bank	**(-)**
EXC	Exchange Rate (average)	IMF	**(+)**
GDP	GDP Growth Rate as annual percent	World Bank	**(-)**
FISCAL	Government Net Lending/Borrowing as % of GDP	World Bank	**(+)**
INFL	Inflation on Consumer Prices as annual %	World Bank	**(+)/(-)**
DEBT	Sovereign Debt, Consolidated as % of GDP	IMF	**(+)**

Source: *Author's Compilation*

[4] Public social spending refers to the general government expenditures where the government offers tax-breaks, cash benefits and other direct in-kind support of goods and services especially to the low-income/ underprivileged households, unemployed, sick, disabled or elderly individuals.

3.3 Conceptual Structure

The conceptual structure for this paper is illustrated as follows:

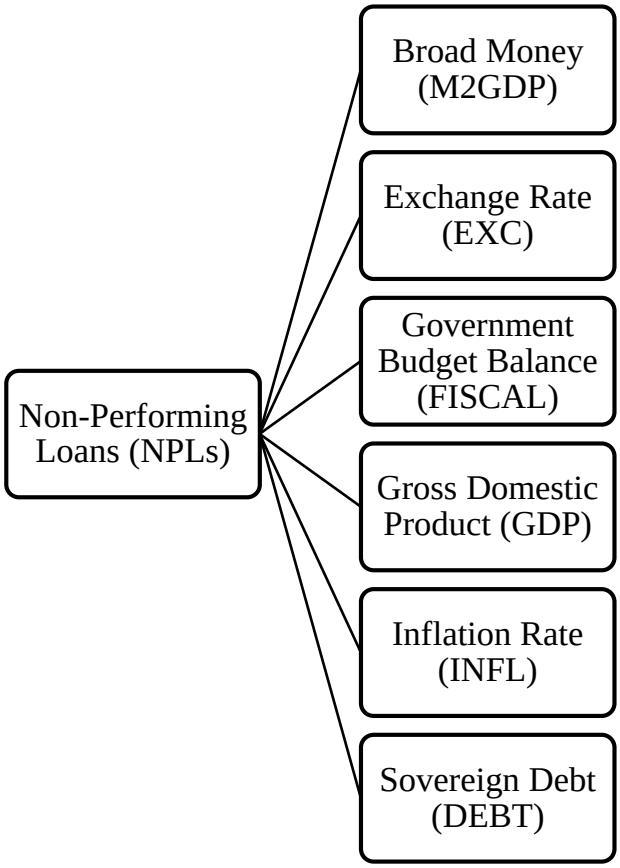


Figure 1 Conceptual Structure

3.4 Econometric Framework

The following equation has been evolved to estimate the determinants of NPLs:

$$NPL_{it} = \beta_0 + \beta_1 M2GDP_{it} + \beta_2 EXC_{it} + \beta_3 GDP_{it} + \beta_4 FISCAL_{it} + \beta_5 INFL_{it} + \beta_6 DEBT_{it} + \varepsilon_{it}$$

This study further converted the equation into a logarithm model to make the dataset concise since a large sample is unable to anticipate a relevant result. In special cases, log transformation demonstrates results with significant accuracy. The small dataset displays a small variance and hence it shows a coherent and accurate outcome. Therefore, the study has taken the natural log of NPLs, M2GDP, EXC, and DEBT.

where,

NPLs	=	Non-Performing Loans
M2GDP	=	Broad Money (% of GDP)
EXC	=	Exchange Rate
GDP	=	Gross Domestic Product
FISCAL	=	Government Budget Balance
INFL	=	Inflation Rate
DEBT	=	Sovereign Debt
β_0	=	The Intercept
β_1 - β_6	=	Respective Coefficient Terms
i (Number of Countries)	=	1, 2, … ,8
t (Time-Interval)	=	1,2, … ,12
ε_{it}	=	Random Error

3.5 Analytical Techniques

This study conducted an empirical investigation and analysis by applying panel data regression analysis. This study is by nature, exploratory, the dataset is strongly balanced and certain similar entities in a specific timeframe will be observed. Hence, panel data regression analysis is preferred. In the panel data regression, a combination of time series (year) and cross-sectional data (individual countries) will ostensibly correspond to error/residuals (Zulfikar & STp, 2019). Hence, a conventional regression model that is Pooled OLS (Ordinary Least Square) might produce biased estimation.

OLS model was applied to check for multi-collinearity by conducting correlation matrix and Variable Inflation Factor (VIF) test. The multi-collinearity problem occurs due to a significant correlation between the independent variables. Hence, the increasing *p-value* decreases the *t*-statistics that create a significant variable distinctly insignificant (F. Ahmad & Bashir, 2013). Therefore, highly correlated variables were dropped to resolve this issue.

Furthermore, Fixed Effect (FE) & Random Effect (RE) Estimates were applied for checking significance of explanatory variables. In general, Fixed Effect estimates are considered better since it assumes that residuals **(ε)** are not correlated with regressors **(β_s)**. As a result, Hausman Test was employed to selected the appropriate estimation between FE and RE estimation.

Based on the outcome, Fixed Effect estimation was carried out and Modified Wald Test was conducted afterward, to check whether the residuals are heteroskedastic or homoscedastic. To determine the first-order serial correlation/autocorrelation and cross-sectional independence in FE Model, Wooldridge Test and Pesaran Test were employed respectively. Finally, the strongly balanced dataset turned out as heteroscedastic, and consequently, Fixed Effect Robust Standard Error was conducted to remove heteroscedasticity.

Chapter 04 Diagnostic Tests & Findings

4.1 Descriptive Statistics

The descriptive analysis of both dependent and explanatory determinants of SAARC countries for the period of 12 years (2008-2019) with a total observation of 96 illustrate in ***Table 02***. The result of descriptive statistic in this study indicated that the mean value of non-performing loans (NPLs) of SAARC countries recorded as 7.93%, while the standard deviation (SD) was 5.95% and the range of significant disparity among the countries are between .5% (Afghanistan, in 2010) and 48.4% (Afghanistan, in 2011). The average broad money supply (M2GDP) was 58.51% with a minimum value of 29.512% (Afghanistan, in 2008) and a maximum value of 97.17% (Nepal, in 2019). Moreover, minimum value of Exchange Rate (EXC) was 12.8 (the Maldives, in 2008) with a SD of 35.99, while the maximum was 178.745 (Sri Lanka, in 2019) with a mean value of 73.82.

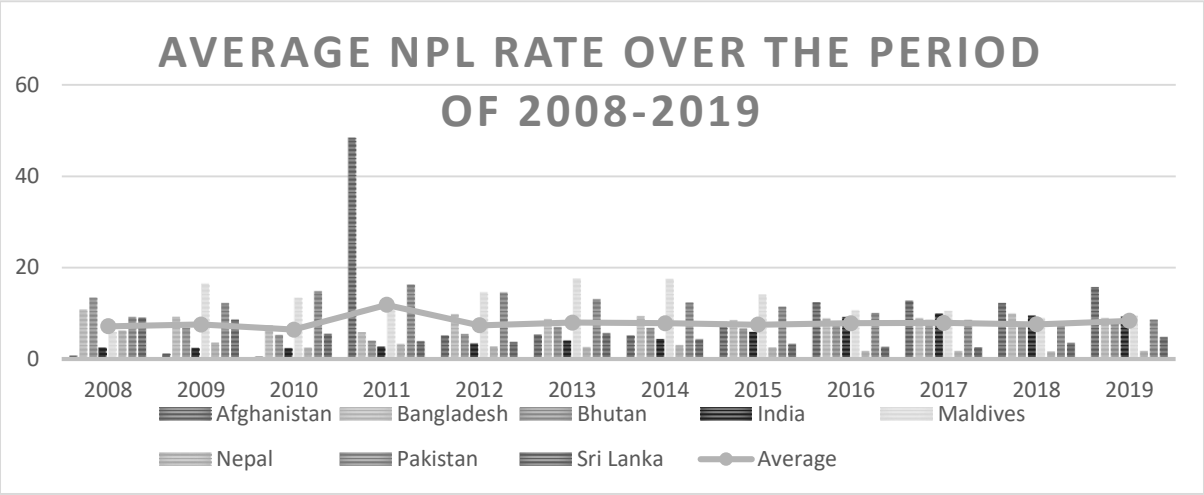
Table 2 Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
NPLs	96	7.928	5.947	.5	48.4
M2GDP	96	58.506	16.347	29.512	97.17
EXC	96	73.816	35.988	12.8	178.745
GDP	96	5.57	3.291	-7.229	21.391
FISCAL	96	-4.368	3.769	-17.9	7.9
INFL	96	6.733	4.608	-6.811	26.419
DEBT	96	53.624	25.784	6.769	114.2

Source*: Author's Calculation*

The average GDP growth rate (GDP) recorded as 5.57% with a lower standard deviation of 3.29% and demonstrated a substantial-high variability since the minimum and maximum values were -7.23% (Maldives, in 2009) and 21.39% (Afghanistan, in 2009) respectively. The minimum value of GDP is, however, negative and the mean value is very small which refers that some of the SAARC countries experienced a negative growth during 2008-2019. Concerning the public finance determinants, the mean value indicated a budget deficit of 4.37% of GDP under the government budget balance (FISCAL) variable with a SD of 3.77%, while individual country's highest budget deficit was -17.9% (Maldives, in 2009) of GDP and a much

smaller budget surplus of 7.9% (Bhutan, in 2010) of GDP. The inflation rate (INFL) average recorded as 6.73% and this ranges between a minimum value of -6.81% (Afghanistan, in 2009) and the maximum value of 26.42% (Afghanistan, 2008) with a standard deviation of 4.61%. Finally, the average sovereign debt (DEBT) recorded as 53.624% with 25.784% disparity, while the minimum value was 6.769% (Afghanistan, in 2012) and the maximum value was 114.2% (Bhutan, in 2016) and this indicated that from 2008 to 2019, many SAARC countries registered high debt with an unsustainable level.



Source: *Author's Complication*

Figure 2 Trend of average NPLs rate during the period of 2008-2019 in SAARC countries

Figure 2 illustrates the dynamics of the average NPLs ratio of SAARC countries from 2008 to 2019. During the great recession of 2008, individual country's loan portfolio quality was significantly deteriorated. When the global financial crisis was at its onset, the unemployment rate surged, corporate and household incomes declined, some of the national currencies depreciated, and asset values, especially, real estate value decreased. The post-crisis impact exhibits that among the other SAARC countries, Maldives, Pakistan, Afghanistan, and Bangladesh were recorded a dramatic increase of NPLs during the period of 2009-2013.

4.2 Multi-collinearity Test

In the equation of multiple regression, multi-collinearity exists when there is a significant correlation between two or more explanatory variables. When a multi-collinearity problem undermines the significance of the independent variable as a higher standard error leads to a lesser significance in the regression coefficient (Allen, 1997). Additionally, significant collinearity of independent variables is unacceptable since a dataset with a multi-collinearity problem is unable to measure the role of explanatory variables accurately while explaining the difference of the dependent variable's value (Haitovsky, 1969). To test the multi-collinearity among the determinants, the following tests were run after conducting the Pooled OLS regression ***(Appendix A).***

4.2.1 Correlation Matrix

Table 3 Matrix of correlations

Variables	L_NPLs	L_M2GDP	L_EXC	GDP	FISCAL	INFL	L_DEBT
L_NPLs	1.000						
L_M2GDP	-0.259	1.000					
L_EXC	-0.275	0.242	1.000				
GDP	-0.355	-0.013	-0.112	1.000			
FISCAL	-0.187	0.051	0.217	0.204	1.000		
INFL	-0.092	0.043	0.088	-0.242	-0.061	1.000	
L_DEBT	0.072	0.446	0.042	-0.034	-0.440	0.073	1.000

Note: Natural logarithm of Non-performing Loans (NPLs), Natural logarithm of Broad Money Supply as % of GDP (M2GDP), Natural logarithm of Average Exchange Rate (EXC), GDP Growth Rate annual percentage (GDP), Government Budget Surplus/Deficit (FISCAL), Inflation Rate (INFL), Natural logarithm of Sovereign Debt (DEBT)

Source*: Author's Calculation*

Table 03 explains correlation among the independent variables**.** The correlation matrix explains whether the multi-collinearity problems are present in the dataset. If the value of the correlation coefficient is greater than .80 or 80%, then there exists a multicollinearity problem between two independent variables (Gujarati, 2003; Kennedy, 2008). The outcome of the dataset illustrates that the independent variables are not significantly correlated as all of the correlation coefficients are less than .50. Therefore, the multi-collinearity problem is not present in this strongly balanced panel dataset.

4.2.2 Variance Inflation Factor (VIF) Test

Marquaridt (1970), Neter, Wasserman, and Kutner (1989), and Kennedy (2008) recommended the maximum acceptable VIF value is 10 (VIF≤ 10), and hence, it correspondent to the tolerance of .10, since 1/.10 =10. Hence, the rule of thumb is VIF≤10 is the highest critical value to decide the existence of multi-collinearity. However, Richter et al. (2016) and Ahmed et al. (2021) considered the benchmark value of VIF was ≤5 based on their research criteria. The result of VIF and its tolerance level is illustrated in ***Table 04.*** The outcome demonstrates the VIF values of all the independent variables are within the cut-off VIF as the values are below 5 and within cut-off tolerance statistics as the tolerance values are greater than .05. Hence, the dependent variables indicate that there is no existence of multi-collinearity as this panel dataset demonstrates the VIF's critical value of 0.05<VIF<5.

Table 4 VIF Test

	VIF	1/VIF
L_M2GDP	1.428	.7
L_EXC	1.149	.87
GDP	1.141	.876
FISCAL	1.524	.656
INFL	1.071	.934
L_DEBT	1.728	.579
Mean VIF	1.34	.

Source: *Author's Calculation*

4.3 Regression Analysis: Fixed and Random Effect Model

Although pooled OLS model was conducted earlier for testing the multi-collinearity problem, one of the significant shortcomings of this model is it ignores the individuality and heterogeneity in the data. Hence, fixed and random effect models were carried out ***(Appendix B & Appendix C)***. In the fixed-effect model, EXC and FISCAL demonstrate a positive relationship with the NPLs rate, whereas, M2GDP, GDP, INFL, along with DEBT indicate negative relation with NPLs. The outcome suggests that M2GDP, GDP, INFL, and DEBT have a significant relationship with the NPLs.

However, the random effect estimates illustrate that only FISCAL has a positive impact and the rest of the variables – M2GDP, EXC, GDP, INFL, DEBT have a negative relationship with NPLs. The result exhibits that M2GDP, GDP, and INFL have a significant relationship with the NPLs which is slightly different from the outcome of fixed effect estimates. Moreover, both of the models are statistically significant as the F statistic value indicates that both of the models are below the .05 significance level.

4.4 Hausman Test

To identify the suitable test between FE and RE estimates, Hausman test was carried out. Hausman test refers if the *p-value* is less than 5% then the null hypothesis (H_0: Difference in coefficients not systematic) is rejected.

Table 5 Hausman (1978) Specification Test

	Coef.
Chi-square test value	18.694
P-value	.005

Source: Author's Calculation

Table 05 shows that the *p*-value is at the .05 (significance) level. Hence, H_0 is rejected, and a fixed (systematic) effect model is accepted.

4.5 Test of Heteroscedasticity

To check the heteroscedasticity in fixed effect estimates, the Modified Wald test was carried out. If heteroscedasticity presents in the FE model, then the standard error for coefficients and respective *t-values* most likely provide the wrong outcome. In that case, the outcome suggests to reject null hypothesis since *p-value* <.05 and, hence, it can be determined that the residuals are failed to comply with the assumption of homoscedasticity.

Modified Wald Test

chi2 (8) = 731.55

Prob>chi2 = 0.0000

The result demonstrates that the value of chi^2 is less than at the .05 (significance) level and hence, the study rejects the null hypothesis. Therefore, there is a presence of heteroscedasticity in the fixed effect regression estimates.

4.6 Test of Autocorrelation

Autocorrelation or serial correlation leads to a smaller standard error of coefficient than its actual values and therefore, the R^2 gets Inflated (Mehmood et al., 2013). This report deals with time elements where t=12>20 and, hence, it indicates a micro panel dataset. In general, the autocorrelation does not exist in the dataset that is dealing with less than 20 years of the time variable. However, the Wooldridge test for autocorrelation was carried out to test the exactness.

Wooldridge Test

F (1, 7) = 3.538

Prob > F = 0.1020

The outcome it indicates that the *p-value* is 10.20% which is more than .05 and, hence, the study fails to reject null hypothesis. Therefore, it is above the significance level and there is no presence of autocorrelation in this strongly balanced dataset.

4.7 Test of Cross-Sectional Interdependence

To check whether the residuals have contemporaneous correlation/ cross-sectional dependence, the Pasaran CD test was carried out. If the residuals are correspondent to across the variables, then the outcome will be biased.

Pesaran's Test

Cross-sectional interdependence = -1.779,

Pr = 0.0752

The null hypothesis is there is no cross-sectional interdependence across the entities. The outcome indicates that the *p-value* is 7.52% which is above .05. Hence, the study fails to reject the null hypothesis.

4.8 Model Specification Result

The above-mentioned diagnostic tests illustrate that there is no existence of multi-collinearity, autocorrelation, and cross-sectional dependence within FE estimates. However, there is a presence of heteroscedasticity in the fixed effect regression estimates. To deal with the heteroscedasticity problem, the robust standard error for the FE model was carried out since robust standard error estimates automatically corrects heteroscedasticity.

Table 6 Robust Standard Error Fixed Effect Regression Results

L_NPLs	Coef.	St.Err.	*t-value*	*p-value*	[95% Conf	Interval]	Sig
L_M2GDP	-1.868	.679	-2.75	.029	-3.474	-.262	**
L_EXC	.655	.761	0.86	.418	-1.146	2.455	
GDP	-.094	.025	-3.82	.007	-.152	-.036	***
FISCAL	.033	.011	3.00	.02	.007	.059	**
INFL	-.027	.013	-2.12	.072	-.057	.003	*
L_DEBT	-1.048	.533	-1.97	.09	-2.308	.212	*
Constant	11.464	2.557	4.48	.003	5.417	17.512	***

Mean dependent var	1.825	SD dependent var	0.757
R-squared	0.418	Number of obs	96
F-test	14.406	Prob > F	0.001
Akaike crit. (AIC)	123.776	Bayesian crit. (BIC)	139.162

**** refers p<.01, ** refers p<.05, and * refers p<.1*

Source: *Author's Calculation*

According to the findings, the robust standard error in the FE model ***(Table 06)*** indicates,

NPLs = 11.464 - 1.868M2GDP + .655EXC - .094GDP + .033FISCAL - .027INFL - 1.048DEBT

The findings suggest that the entire robust standard error of the Fixed Effect Model's F-statistic value of 14.406 renders .1% which is at the .05 (significance) level. As these values indicate the fitness of the model, hence the model is fit for analysis. Additionally, the R-square is 41.8% meaning that the macroeconomic determinants explain nearly 42% variance in the dependent variable (NPLs). The empirical result also indicates that at the .05 (significance) level, M2GDP and GDP have negative and FISCAL is positively associated with NPLs. While at .10 level, inflation and sovereign debt have significant negative association with NPLs. However, the average exchange rate illustrates an insignificant positive relationship with NPLs.

4.9 Discussion

The broad money as a percentage of GDP (M2GDP) exhibits *p-value* is statistically significant (.029) at 95% level and reveals an inverse relationship with non-performing loans. The outcome implies that the interest rate reduces significantly if the growth of money supply increases; as the borrowers tend to receive funds with a comparatively cheaper rate and hence, this increases their ability to pay back their financial obligations. The findings are consistent with Kalirai and Scheicher (2002), Vogiazas and Nikolaidou (2011), and Poudel (2013). Ahmad (2003) also found a significant negative relationship between these factors while assuming M3 as a proxy of the money supply. Additionally, Adusei (2018) considered M1, M2, and M2+, while Badar et al. (2013) took M2 as a proxy of money supply and found similar findings. However, at the .05 level, Akinlo and Emmanuel (2014), Leka, Bajrami, and Duci (2019) found an insignificant but positive relationship with NPLs and argued that increased money supply deteriorates the bank's portfolio due to inaccurate credit analysis.

Although the exchange rate (EXC) reveals an anticipated relationship with NPLs, the value is not statistically significant. The direct relation of EXC to NPLs signifies that rising exchange rates undermine the performance of import-oriented sectors due to trade deterioration in the entire economy and therefore, the crisis in the banking system exacerbates. The findings are similar to the results of Fofack (2005), Khemraj and Pasha (2009), and Akinlo and Emmanuel (2014), but in contrast with the result of Ahmad and Bashir (2013), since they stated that the international competitiveness inversely impacts the NPLs.

The outcome exhibits that the beta coefficient of annual GDP growth rate (GDP) have an inverse relationship at the .01 (significance) level which implies a noteworthy impact on NPL. The result indicates that the economic growth improves the business performance and increase their payment capacity and that leads to a decrease in NPL. Additionally, during the economic downturn, the borrower's income and collaterals' value goes down, and hence, the borrower's

ability to pay decreases. The findings are clearly in line with the predetermined hypothesis and in line with the findings of Salas and Saurina (2002), Rajan and Dhal (2003) Fofack (2005), Jesus and Gabriel (2006), Espinoza and Prasad (2010), Dash and Kabra (2010), Louzis et al. (2012), Castro (2013), Messai and Jouini (2013), Jakubík and Reininger (2013), Klein (2013), Makri et al. (2014), Škarica (2014), Erdinc and Abazi (2014), Kasselaki and Tagkalakis (2014), Chaibi and Ftiti (2015), Dimitrios et al. (2016).

The result of the government budget surplus/deficit (FISCAL) positive and statistically significant (.02) at 95% level. This outcome is in line with the study's hypothesis. The government budget balance has a positive relationship with NPLs due to the measures of budgetary consolidation. The budgetary consolidation occurs either due to insignificant budgetary expenditure (e.g. defense services, grants to state, pensions, public employee's remunerations, health services, etc.) and/or significant budgetary revenues (through raising prevailing taxes/ adding new taxes, excise customs, and other duties, etc.). These measures could yield a lower income that reduces the borrower's ability to repay the outstanding debt and hence, the bank's NPLs increase. The findings are similar to that of Roman and Bilan (2015) and Dimitrios et al. (2016) where they argued that budgetary consolidation results in a low budget deficit of high budget surplus and, thereby, deteriorates the bank portfolios. Our study is, however, opposite to the study of Makri, Tsagkanos, and Bellas (2014), since they argued that by nature, the government budget surplus/ deficit has a negative influence on sovereign debt, and hence, government budget balance is adversely correlated with NPLs.

The inflation rate (INFL) depicts an adverse relationship with loan portfolio quality and the *p-value* <.10 which is at the .10 (significance) level. This refers that if inflation rate upsurges by 1%, then NPLs will be decreased by .027%. The finding is confirmed by the study of Shu (2002), Zribi and Boujelbegrave (2011), Vogiazas and Nikolaidou (2011), Zribi and Boujelbegrave (2011), Klein (2013), Erdinc and Abazi (2014), Škarica (2014), Chaibi and Ftiti

(2015), Ekanayake and Azeez (2015), Anjom and Karim (2016), Koju et al. (2018). Nonetheless, Makri et al. (2014) and Kasselaki and Tagkalakis (2014) found an insignificant association between inflation and credit risk. In contrast with these findings, Rinaldi and Sanchis-Arellano (2006) and Nkusu (2011) found significant and direct association between inflation and credit risk, while an insignificant positive relationship was found by Castro (2013). He argued that high inflationary pressure decreases the real income of borrowers and the real value of outstanding debt. Hence, the final result of inflation can be neutralized as one effect is compensated through another impact.

The expected hypothesis regarding sovereign debt (DEBT) is completely dismissed. The findings suggest that the beta coefficient of sovereign debt of SAARC countries has a strong but negative association with NPLs at the .10 level. The rationale behind the outcome is that the remodeling, innovation, and development in the financial sector may reduce credit risk. Since innovation and development require massive government borrowing, it ultimately reduces nonperforming loans. This result is consistent with Garr (2013), Anjom and Karim (2016) and Dimitrios et al. (2016), and contrast to that of Louzis et al. (2012), Makri et al. (2014), Roman and Bilan (2015), and Koju et al. (2018). They asserted that higher amount of sovereign debt decreases the loans in the financial market and then interest rates on loans increase. Since increasing interest rates increase the cost of loans, hence NPL increases due to poor loan repayment capability of borrowers in a timely manner.

Chapter 05 Concluding Remarks

5.1 Conclusion and Policy Implications

Non-performing loans are one of the significant proxies of the financial and economic stability of any country. The paper empirically evaluates the relationship between the macroeconomic performance and banking system across SAARC countries for the period of 2008-2019 and analyzes the shock of financial crisis 2007-2008. The study findings indicate slower economic growth, low level of inflation, sluggish money supply growth, currency depreciation are driving macroeconomic factors that are responsible for high NPLs in the SAARC economy. Moreover, this paper uses two public finance variables and the findings suggest that high government budget balance and lower level of sovereign debt are primarily responsible for a high level of NPLs. These findings are useful for formulating macro-prudential along with fiscal policies to avoid the subsequent NPLs shock in SAARC economics.

This is the first study that empirically examined the impact of selected macroeconomic variables of NPLs in SAARC countries. The study pinpoints that the bank's quality of loan portfolio is adversely affected by a wide range of macroeconomic determinants. To reduce the aggregate NPLs in the SAARC economy, the respective country's government should identify the financial sector's vulnerabilities and, thereby, emphasize on boosting the economic growth, appreciating local currency, ensuring a moderate level of money supply along with inflation rate. This empirical analysis enables the respective country government and regulatory authorities of banks to forecast the NPLs trends in the upcoming years for both the macro-level and individual commercial banks in SAARC countries. Hence, the banks will stay alerted during the adverse economic situation and be able to avoid credit risk.

5.2 Future Research Avenues

This paper solely focused on external (macroeconomic) factors for examining the NPLs of the SAARC economy. Hence, future research avenues should be directed towards comparison among the SAARC countries, aiming at examining both macroeconomic and bank-specific variables of NPLs in SAARC countries.

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Appendix A: Pooled OLS Estimation

Table 7 Appendix A: Pooled OLS Estimation

L_NPLs	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
L_M3	-.804	.269	-2.99	.004	-1.337	-.27	***
L_EXC	-.308	.11	-2.80	.006	-.526	-.089	***
GDP	-.101	.021	-4.71	0	-.143	-.058	***
BUG	.015	.022	0.70	.485	-.028	.058	
INF	-.029	.015	-1.96	.054	-.058	0	*
L_DEBT	.265	.12	2.21	.03	.027	.502	**
Constant	6.153	.987	6.23	0	4.191	8.115	***

Mean dependent var	1.825	SD dependent var	0.757
R-squared	0.328	Number of obs	96
F-test	7.240	Prob > F	0.000
Akaike crit. (AIC)	193.775	Bayesian crit. (BIC)	211.726

**** p<.01, ** p<.05, * p<.1*

Source: Author's Calculation

Appendix B: Fixed Effect Estimation

Table 8 Appendix B: Fixed Effect Estimation

L_NPLs	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
L_M3	-1.868	.543	-3.44	.001	-2.949	-.787	***
L_EXC	.655	.412	1.59	.116	-.166	1.475	
GDP	-.094	.017	-5.44	0	-.128	-.059	***
BUG	.033	.023	1.45	.152	-.012	.078	
INF	-.027	.013	-2.03	.046	-.054	-.001	**
L_DEBT	-1.048	.314	-3.33	.001	-1.674	-.423	***
Constant	11.464	2.539	4.52	0	6.413	16.515	***

Mean dependent var	1.825	SD dependent var	0.757
R-squared	0.418	Number of obs	96
F-test	9.831	Prob > F	0.000
Akaike crit. (AIC)	125.776	Bayesian crit. (BIC)	143.726

**** p<.01, ** p<.05, * p<.1*

Source: Author's Calculation

Appendix C: Random Effect Estimation

Table 9 Appendix C: Random Effect Estimation

L_NPLs	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
L_M3	-.907	.43	-2.11	.035	-1.751	-.064	**
L_EXC	-.169	.232	-0.73	.465	-.623	.285	
GDP	-.104	.018	-5.72	0	-.139	-.068	***
BUG	.035	.024	1.49	.136	-.011	.081	
INF	-.033	.013	-2.60	.009	-.059	-.008	***
L_DEBT	-.054	.207	-0.26	.793	-.46	.351	
Constant	7.343	1.773	4.14	0	3.867	10.819	***

Mean dependent var	1.825	SD dependent var	0.757
Overall r-squared	0.199	Number of obs	96
Chi-square	38.261	Prob > chi2	0.000
R-squared within	0.327	R-squared between	0.107

**** p<.01, ** p<.05, * p<.1*

Source: Author's Calculation

Appendix D: Individual Data Source

Table 10 Appendix D: Individual Data Source

Variables	Sources
The Ratio of Non-performing Loans to Total Bank Loans	World Bank. World Development Indicators, IMF. Financial Soundness Indicators Annual Report/Bulletin of Da Afghanistan Bank, Bangladesh Bank, Nepal Rastra Bank, National Bank of Moldova, Royal Monetary Authority of Bhutan, and Central Bank of Sri Lanka
Broad Money Supply (% of GDP)	World Bank. World Development Indicators
Exchange Rate (average)	IMF. International Financial Statistics
GDP Growth Rate (annual %)	World Bank. World Development Indicators
General Government Net Lending/Borrowing (% of GDP)	World Bank. World Development Indicators
Inflation, Consumer Prices (annual %)	World Bank. World Development Indicators
General Government Gross Debt, Total (% of GDP)	IMF. World Economic Outlook