Impact of Industry-Specific and Macroeconomic Factors on Non-Performing Loans of Licensed Banks in Sri Lanka

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Abstract

This study aims to examine the factors affecting to non-performing loans (NPLs) covering 30 licensed banks (LBs) in Sri Lanka. The selected variables affecting to NPLs considered as industry-specific and macroeconomic variables which can easily identify the internal and external influenced to the position of NPLs of LBs. The study covers the data from 2000 to 2019 exploring autoregressive distributed lag model and checking the robustness of the results using Vector Error Correction Model. The test results revealed that both industry-specific and macroeconomic variables significantly influenced on NPLs in LBs in Sri Lanka. Some industry-specific factors such as loan growth of LBs, net operating profits and deposit rates show the significant positive relationship with NPLs. Among the macroeconomic factors, gross domestic product and unemployment rate had a negative effect on NPLs. However, domestic credit and exchange rate included into macroeconomic variables revealed that positive relationship with NPLs in LBs. The study recommends when releasing loans to businesses including micro, small and medium scale enterprises, need more concentrate about both industry specific and macroeconomic factors due to main constraint of a LB is NPL which may increase or decrease at any time. The findings of this study may use for casting and measuring of NPLs in the future scenarios and to take decisions on all financial sector related industries in Sri Lanka. The research recommends further to maintain higher level of provisions for bad loans if high NPLs are observed in the books of accounts in LBs.

Keywords: *macroeconomic variables, licensed banks, non-performing loans, GDP, inflation*

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Introduction

Over the past decade, the credit quality of loan portfolios viz the total accommodations (term loans, hire purchases, leases, overdrafts, pawning, trade loan, housing loans, etc.,) of the financial sector across most countries in the world remained relatively stable until the financial crises hit the global economy in 2007 and 2008. During the financial crises, asset quality of financial sector deteriorated sharply due to the global economic recession. Credit quality of the financial institutions are measured through the Non-Performing Loans (NPLs) that is the interest and principal payments of a loan are overdue for more than 90 days. Accordingly, one of the major tools used for measuring financial system stability of a country is NPLs. Many developing countries including Sri Lanka, financial sector institutions take high risks to expand the market share of an industry. When increasing the profits of a financial institution, risks are automatically going to be high due to these risks have directly linked with lending portfolio which can be identified through the level of NPLs of such institutions (Barseghyan, 2010; Zeng, 2012). Therefore, NPL is the major concern for any country in the world and needs to address carefully with its determinant factors.

Exploring the determinants of credit risk is an issue due to substantial importance for regulatory authorities concerned with financial stability and for the management of banking industry. The credit risk arises from NPLs and it is a considerable factor in the financial sector. NPLs can also be used to mark the onset of a financial crisis. Many studies have been investigated the determinants of NPLs using either macroeconomic or industry-specific variables and found that the significant relationship with the variables (Fajar, 2017; Zheng, Bhowmilk & Sarker 2019; Foglia, 2022. Ekanayake (2018) investigated the impact of bank specific and macroeconomic factors on NPLs in licensed commercial banks in Sri Lanka (LCBs) using the panel data methodology and revealed that the return on assets has a negative impact on NPLs significantly while non-interest income had positively correlated with NPLs. Further, there are some other factors such as bank size, return on capital employed GDP growth rate, net interest margin, inflationary pressure, return on assets and interbank loans are significantly influence on bank's NPLs (Warue, 2013; Salas & Saurina, 2002; Fofack, 2005). In Sri Lanka, there were two financial crises in 1988 and 2008 mainly due to high NPLs in the system and deterioration of all macroeconomic variables and industry specific variables.

The financial system in Sri Lanka comprises several main financial institutions, namely the Central Bank of Sri Lanka (CBSL), licensed commercial banks (LCBs), licensed specialized banks (LSBs), licensed finance companies (LFCs), specialized leasing companies (SLCs), primary dealers (PDs), pension and provident funds, insurance companies, rural banks, stock brokers, securities market intermediaries, unit trusts and thrift and credit co-operative societies; the major financial markets, such as foreign exchange market, money market, capital market and the informal financial market; and the financial infrastructure which is the legal framework relates to the financial system and the payment and settlement activities.

The financial sector contributes to the economic growth of any country through mobilizing deposits and allocating the resources efficiently to the most productive way and investing the real

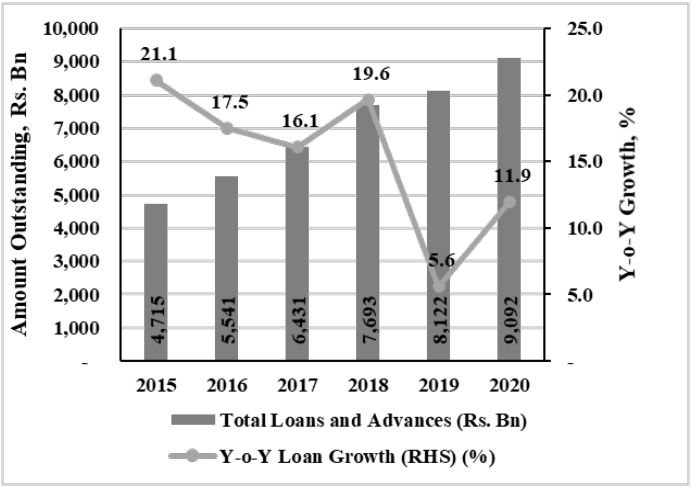
sector. LBs are the first and largest source of debt funding in the financial sector and extend credit to different types of borrowers for many diverse purposes, either for personal, business or corporate clients (Saunders & Cornett, 2003). Further, role of the financial sector has expanded considerably and has no longer limited to taking of deposits and providing credits (Fourie et al. 1998; Valdez, 2000). Financial sector industries continue businesses in a competitive environment and hence bad performance of an LB directly affect the entire sector of a country. This will cause variation of financial performance and generate fear in the industry. When quality of loans goes down, it would automatically create systemic risk which leads to reduce deposits or more withdrawals of the customers and finally influence financial intermediation framework in the system. This will directly influence the slowdown of the economy. Therefore, NPL plays an important role in any financial institution in the world and when NPLs are higher in LBs then it will be caused for creating a poor performance overall in an economy (Demirgüç-Kunt, 1998; González-Hermosillo, 1999). NPLs identify as a 'financial pollution' considering the negative impact arises from continuous improvement of NPLs (Demirgüç-Kunt, 1998; González-Hermosillo, 1999). When regulators take actions with regard to the performance of the financial sector when implementing various rules and regulations to maintain the financial system stability, it should be be mindful with the underline determinant of NPLs.

Banking Sector in Sri Lanka

There are 32 LBs in Sri Lanka which is broadly categorised into two major segments i.e., LCBs and LSBs, 26 and 6 in number, respectively (end 2019, Annual Report, 2019, CBSL). The entire banking sector in Sri Lanka accounted for 62.1% of the 12 trillion financial sector assets end 2019 (Annual Report 2019, CBSL). Every LBs in Sri Lanka shall classify loans and advances as 'non-performing' where payment of principal and/or interest have been in arrears for a period of 3 months or more; and also make provision for loans and advances classified as non-performing and the amount of such provision shall at least be the aggregate of 50 per cent of all loans and advances in arrears for a period of 6 months or more but not exceeding 12 months and loans and advances in arrears for a period over 12 months is 100 per cent (Banking Act Directions issued by CBSL).

When consider the LBs in Sri Lanka, there are some risks due to nature of the business models, lending patterns and target groups. Performance of the banking sector fluctuates during the past period in an environment of subdued economic activities**.** The banking sector ensured its resilience despite the added stress stemming from the adverse business environment that prevailed previously due to adverse weather conditions, financial crisis, political uncertainties and the terrorist attack like April 2019 and before 2009. Figure 1 reflects the movements of bank lending of LBs during the past five years.

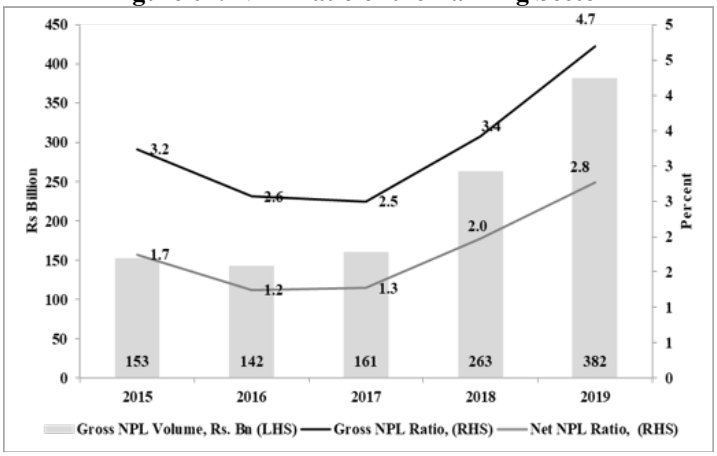
Figure 01: Growth in Loans and Advances of the Banking Sector in Sri Lanka



Source: Annual Report, CBSL, 2019

It was observed that with the expansion of lending by banks, NPLs have also been increased during the past period. Due to several key factors such as economic crisis which come from both domestically and/or internationally, natural disasters (example: flood, drought) were led to lower growth in credit and an increase in the NPLs. Figure 2 shows the movements of NPLs in the banking sector in Sri Lanka during the past five years period.

Figure 02: NPL Ratio of the Banking Sector



Source: Annual Report, CBSL, 2019

At present, total NPLs ratio which means ratio of total NPLs and total loans and advances of LBs reached 4.7% highlighting the reasons such as high NPLs are both increasing NPLs and decreasing of total loans and advances of individual LB's portfolio. Compared to 2018 (3.4%), NPL has been increased up

to 4.7% in 2019 mainly due to both industry-specific and macroeconomic factors i.e., the combined impact of an increase in NPL volumes and the lower demand for credits due to subdued economic activities resulting from the adverse business environment that prevailed during the period.

Due to industry-specific and macroeconomic factors in Sri Lanka, the NPLs in LBs are fluctuating. Hence, this study investigates both industry-specific and macroeconomic variables that can be influenced for NPLs of selected 30 LBs, covering the period of 2000 to 2019. This study can be considered as a reference to understand and measure the determinants of NPLs in Sri Lankan banking sector using a time series data with an annual frequency. When analyzing the dataset, this research used ARDL model and then used the Johansen test for co-integration to find the co-integration with the variables and conducted VECM model. The regression results revealed that both models are analogous, indicating the robustness of the study. However, some diagnostic tests were employed to investigate the stability of the model.

Problem Statement

The main goal of each LB is to maximize the profitably in order to maintain its stability and improve growth and expansion. In a LB's portfolio, losses stem from outright default due to inability or unwillingness of a customer to meet commitments in relation to lending, trading, reduction in portfolio values due to actual or perceived deterioration in credit quality, settlement and other financial transactions. For this reason, LB's credit and risk managers would like to distinguish "good" periods from "bad" periods in addition to telling "good" loans from "bad" loans. "Good" and "bad" periods refer to boom and recession state of economy, respectively. Regulators and policy makers seek to understand how fluctuations of industry-specific and macroeconomic variables in an economy are related to typical pattern of NPLs occurrences.

The credit exposures of the banking sector for industry-specific and macroeconomic shocks can be identified through the behaviour of a loan portfolio. Therefore, the study examines the impact of industry-specific and macroeconomic variables on the asset quality which is measured by NPLs of the banking sector. NPLs are defined as loans on which the borrower does not make any payments in respect of interest or principal for a period recognised by the regulator. Therefore, it is important to study the impact on both industry-specific and macroeconomic variables on the NPLs of LBs as it provides to analyse the performance of LBs by improving asset quality of the LBs during the period of tight or relax monetary policy frameworks or any other economic conditions. It helps policy makers to take decisions on the limitations or relaxations of certain regulations.

When NPLs are increasing, it will be a problem in the future as major assets portfolio of a bank is the loan portfolio. Considering the evolution of the banking sector it is logical to assume that the determinants of NPLs must have changed over time and some of the industry-specific and macroeconomic variables are directly affect these variations. Therefore, the research attempts to find out the impact of industry-specific and macroeconomic factors on NPLs in LBs in Sri Lanka.

Research Questions

During the study, we found that many literatures worked to identify the variables, models and surrounding of the NPLs (Klein, 2013; Makri, 2014 Day 2019). However, several studies had concentrated about macro and industry specific factor affected for NPLs in individual countries (Zheng, Bhowmik & Sarker, 2019; Hasan 2019; Fajar, 2017; Zheng, Bhowmilk & Sarker 2019; Foglia, 2022). In Sri Lankan context, it has lacking the literature on findings the variables affected in NPLs specially in the banking sector covering both LCBs and LSBs. Keshani & Jayathilake (2021) had investigated the factors affecting NPLs of ABC Financed Limited and found that customer relating factors are the most influential factor affected NPLs. Kumarasinghe (2017) had found that GDP growth and export growth are the main factors which are significant in determining NPLs of banks in Sri Lanka. This study only covered macroeconomic factors. Hence there is a huge gap towards identifying both macro and industry-specific factors that affect NPLs in both LCBs and LSBs in Sri Lanka. In this research, the researchers investigate the following research questions in order to achieve the objectives of the research.

- Is there any relationship between industry-specific or macroeconomic variables and NPLs of LBs?
- What are the most significant industry-specific or macroeconomic factors influences on NPLs?

Objectives of the Study

The general objective of this study is to identify the cause of NPL of LBs in Sri Lanka. In considering the above, the specific objective of this study is to investigate the industry-specific or macroeconomic variables that have significantly influence on NPLs in the banking sector in Sri Lankan context.

Literature Review

Skarica (2014) found that prime sources of NPLs are economic (GDP) downturn, lac of employment and inflation rate. In a broader manner both macroeconomic variables and unsystemic or industry-specific variables have been theorized and tested for their influence on credit risks on financial sector industries (Cebenoyan & Strahan, 2004; Warue, 2013; Waqas et al. 2017). Both banking (LBs) and non-banking sectors (licensed finance companies and leasing companies) experience the bad loans problems which consist of a stock component that is not performing and a flow component that may become non-performing. NPLs negatively affect borrowers and thereby for financial sector and finally for the economy (Zheng et al. 2019). The wealth of a bank basically measures through the level of NPLs (Faiar, 2017) of a bank. NPL caused slowdown of an economy mainly the global economy slowdown (Louziz et al. 2012; Abid et al. 2014). Macroeconomic are affected by global condition, shifting to microeconomic conditions was considered affecting by the non-performing loan trend (Faiar, 2017). Further, this study revealed that, from the external perspective, this condition is driven by decreasing demand and commodity prices. Hence, the implication brought as high default and constraints to the financial system stability. Failures of receiving loan repayments according to the timeline, banks are experiencing cash flow problems for meeting the liquidity requirements of other borrowers as well as of the depositors. Bad loans have the

potential of creating financial instability which may result of failure the projects thus affecting a country's economy adversely.

Theoretically, financial intermediation theory and agent theory (Diamond, 1984, Jensen & Meckling, 1976) play an important role when dealing in the financial sector. Financial institution is functioning an intermediary role in a country's financial activity. Subsequently, they play an agent in an economy by collecting information or transferable instruments/funds while investing those funds on their behalf (Saunders & Cornet, 2008). When playing intermediary role by a bank, it automatically acts as an agent which is a principal role played by a bank and the people who are the agents obtained services from activities performed by banks. Hence, investigating the factors influence to the principal is timely important topic as most of the agents are actively engaged with the process implemented by a bank.

After reviewing many literatures, it was found two main sources of factors determine the NPL in the financial sector industries which can be applied for LBs in Sri Lanka. The first one is the macroeconomic factors which include GDP, inflation (Klein 2013 and Fofack 2005), unemployment (Makri, Tsagkanos and Bellas, 2014) and real interest rate (Messai and Joini 2013 and Fofacck 2005). The second source is the industry specific factors such as management efficiency (Podpiera and Weill 2008 and Messai and Joini 2013) and size of the finance institution (Louzis et al., 2012 and Berger, 1997) which may influence the ability to repay loans.

Some scholars found a relationship between macroeconomic variables and quality of the loans which is the critical factor of the financial sector's health. Several research findings revealed that bad loans decrease with the expansion of the economy as the borrowers have sufficient income to repay loans as per the given repayment schedules (Fajar, 2017; Zheng, Bhowmilk & Sarker 2019; Foglia, 2022). When increasing the growth of an economy, managers are approving loans irrespective of the creditworthiness of the borrowers and as a result during the economic slowdown, NPLs automatically goes up (Messai & Jouini, 2013). NPL used to increase when there is a decreasing trend in an economic growth which results an increase in risk aversion and interest rates. Louzis et al. (2012) investigated the various types of loans such as customers, business, mortgage etc., to explore the determinants compelling NPLs and concluded that macroeconomic factors like GDP, interest rate, unemployment and public debts may affect the growth of NPLs. Further, when investigating literature, it was found that some of the important industry-specific factors which impact on NPLs viz profitability as indicated in return on asset (ROA) or return on equity (ROE) (Zheng et al, 2019), capital of a financial institution measured by the capital adequacy ratio (CAR) (Berger & De-Young, 1997) and industrial performance measured by managerial efficiency (Day, 2019). Accordingly, ROE and ROA considered as variables to explain managerial efficiency in the study carried out by Zheng et al. (2019). Weak credit monitoring and lack of control over operating expenses lead to decrease cost efficiency which reflected the bad management theorem (Berger, 1997). Podpiera & Weill (2008) used cost efficiency to show the management quality to explore the underline relationship with NPLs and for this investigation, researchers performed Granger causality tests to highlight the

unconditional relationship of inefficiency to NPLs. Louzis et al. (2012) explored the dynamic panel data and concluded that management quality together with GDP, unemployment, interest rate and public debt determine NPLs in a significant level. Dey (2019) identified the lack of following up of loan disbursements to the customers and unwillingness to write off bad loans are the main factors that influenced to increase in NPLs.

Brown, Mallett & Taylor (1993) indicated that the losses of bad loans (NPLs) caused reducing capital resource of the bank which affects its ability to grow and develop the business. Disclosure of the extent of these losses in the financial statement may lead to a loss of confidence in the management which impact the reduction in its credit ratings. The NPL is one of the concrete embodiments of credit risk which financial sector takes greater implication on the function of the banks and finance companies as well as the overall financial sector development.

There are many literatures on the macroeconomic indicators that have been explored to find the relationship between these variables and NPL in the financial sector mainly covering the banking sector in many jurisdictions (Fajar, 2017; Zheng, Bhowmilk & Sarker 2019). Baum & Ozkan (2002) had used U.S. bank's data to find the relationship between macroeconomic uncertainty and bank lending. In this research, it was found that the uncertainty of macroeconomic variables narrow the cross-sectional distribution of loans to asset ratios of banks. If a bank has high NPL level, it may affect reducing the bank's expectation of lending even though some countries have different threshold for their aspiration to the lending (Hou, 2007). Berger & DeYoung (1997) investigated the relationship among firm specific factors, efficiency indicators and credit issues. The study explained that cost efficiency will increase credit issues in future. Abid et al. (2014) explored the impact of both macroeconomic and bank specific factors of NPLs and revealed that bank specific factors such as solvency ratio, ROE had negative and significant impact on NPLs.

Masood & Aktan (2009) explored the bank level data in Turkey and Pakistan during the period of 1999-2001 and 1996-1998 respectively, using a questionnaire covering the credit managers. The study had identified the NPL in Turkey banks is affected due to poor credit risk assessment, high number of related party transactions and external government.

Bofondi & Ropele (2011) found the inverse relationship between real GDP growth rate and house prices due to bad loans which come from household lending in Italian banks. Further, this investigation revealed the variation of NPL with short term nominal interest rate and the unemployment rate. Louzis, Vouldis & Metaxas (2012) analyzed the banking data in Greek banks to investigate the determinants of NPL using individual loan categories. This examination explored, NPLs may classify the banking industry using macroeconomic variables including interest rates, unemployment, public debt and GDP.

Warue (2013) looked into several bank specific factors in 44 commercial banks in Kenya from the period of 1995-2009 which was found that ROA, bank size and per capital income had significantly influenced on NPLs. Garcia-Marco & Robles-Fernandez (2008) investigated the industry specific factors using 129 Spanish banks from 1993 to 2003 and revealed that higher ROE had been key reason to boost risk and higher default

rates in the financial sector. Bank specific factors comprised the factors that can be controlled by the bank itself or a central bank can introduce mechanisms to keep check on other factors (Beck et al. 2015; Louziz et al. 2012). In the study carried out by Ahmed et al. (2021) considering the bank specific factors such as credit growth, loan loss provision, operational efficiency, bank size, profitability and net interest margin, using dynamic-GMM estimations, found that operating efficiency, ROA and bank size highly influenced on NPLs in commercial banks in Pakistan.

Mileris (2012) investigated the NPLs in banks and how macroeconomic variables influenced on NPLs using cross-country analysis. The study found that the NPL ratio is highly depends on macroeconomic changes in a country. Saba, Kouser & Azeem (2012) found the significant impact of real GDP per capita, inflation and total loans on NPLs. Murumba (2013) attempted to explore the relationship between NPL and real GDP using the Nigerian banking data from 1995 to 2009 applying time series data analysis and found that there is a positive relationship between real GDP and NPL. Badar & Javid (2013) looked into the long- and short-term dynamics of NPLs and macroeconomic variables in Pakistan considering the period from 2002 to 2011. This study identified the long run relationship between NPL and macroeconomic variables such as inflation, exchange rate, interest rate, GDP and money supply. Further, they found that there is a causality viz inflation and exchange rate Granger caused to NPL in Pakistan.

Among the bank specific and macroeconomic factors on NPL, it was found that the bank specific factors contributed more to NPL than the macroeconomic factors (Ghosh, 2015; Adusei, 2018). Şahbaz & İnkaya (2014) analyzed NPL and its relationship with real GDP, private consumption and private fixed capital expenditures covering the period of 1998 to 2012 using Granger Causality test and VAR model. This study revealed that the long-term relationship between NPL and macroeconomic variables. Makri et al. (2014) identified the strong correlation between NPL and macroeconomic variables such as public debt, unemployment, GDP growth rate. Beck et al. (2015) examined panel data investigation for 75 countries covering ten-year period and revealed that the significant effect of real GDP, share prices, exchange rate and lending rate on NPL ratios. Beaton & Myrvoda (2016) found the bank asset quality attribute both macroeconomic and bank-specific factors.

Khemraj & Pasha (2009) examined the determinants of NPLs in the banking sector of Guyana using firm level panel data covering 1994 to 2004 by employing fixed effect model and identified that the real effective exchange rate had a positive significant impact on NPLs. Further, the results showed that the GDP growth negatively influence the NPLs and if higher the charging interest rate from the customers and continuously expand the credit portfolio may leads to higher NPLs in the banking sector. Adebola et al. (2011) studied the determinants of NPL in the Islamic banks in Malaysia considering the macroeconomic variables such as industrial production index, interest rate and producer prices. This examination revealed that the interest rate significantly and positively influenced the long run impact on NPLs. Except the above factors, real GDP growth rate, level of unemployment and lending rate are also influenced for the variation in NPLs (Dimitrios, Angelos & Vasilios, 2011). Miyajima (2017) studied the determinants

of bank level credit growth using panel data covering the period from 2000 to 2015 and revealed that strong bank balance sheet environment, economic activity and oil prices support for increasing the bank lending. NPL is a main concerned factor of any financial institution in any country due to its unambiguous nature of the determinant factors and country-specific factors. Saif-Alyousfi, Saha & Md-Rus (2018) identify the oil and gas prices shocks that do not have direct impact on NPL but indirectly influence on country specific macroeconomic and institutional factors. Causi (2018) conducted a study on how macro specific factors influence on loans and bad loans of non-financial sector in the period of 1998 to 2014 and concluded that the new bad loan entry rate caused loan variables when structural economic factors are removed.

Hypothesis Development

Effects of macroeconomic variables, industry-specific variables and quality of loans have been the concern in many economies (Louzis et al, 2012; Nkusu, 2011). At the expansionary stage of an economy, bad debts are relatively low due to both borrowers and firms' revenues do not enable them to repay their debts (Abid et al, 2014). In terms of the theoretical literature of lifecycle consumption models (Modigliani & Miller, 1958) and business cycle theory (Hayek, 1940) highlighted that GDP growth has a significant negative effect on NPLs due to macroeconomic developments which make economic agents more able to repay their debt (Abid et al. 2014). The theoretical literature of life cycle consumption models provided eminent macroeconomic factors on NPLs and probability of default, the model states that low-income borrowers are expected to not to repay their loans (Abid et al, 2014). The default of loans is mainly due to unemployment and high interest rate where inflation, exchange rate and private sector credits are influential factors on changing NPLs (Ranaldi & Sanchis-Arellano, 2006).

Apart from the macro variables, financial sector industries are using different firm specific factors which influence on the position of NPLs (Louzis et al, 2012). The relationship between NPLs and bank-specific factors had been investigated during the past (Berger & Deyoung; 1997; Louzis et al, 2012). Following Louzis et al.'s (2012) and Beck et al.'s (2013) studies, the following hypothesis formed under this study to find the impact of both industry-specific and macroeconomic variables on NPLs in LBs in Sri Lanka which are most important for LBs while considering the availability of time series data for the analysis (Table 01).

H1: There is a positive relationship between gross loans and growth of NPLs LBs in Sri Lanka

H2: There is a positive relationship between liquidity management and NPLs of LBs in Sri Lanka

H3: Negative relationship between growth of NPLs and net operating profits of LBs in Sri Lanka

H4: Positive relationship between bank lending rate and growth of NPLs

H5: Negative relationship between growth of NPLs and deposit rates of LBs in Sri Lanka

H6: There is a negatively relationship between GDP and NPLs of LBs in Sri Lanka

H7: There is a negative relationship between inflations and NPLs of LBs in Sri Lanka

H8: There is a positive relationship between increase in private sector credit and NPLs of LBs in Sri Lanka

H9: There is a positive relationship between unemployment rate and NPLs of LBs in Sri Lanka

H10: There is a positive relationship between movement of exchange rate and NPLs of LBs in Sri Lanka.

Based on the literature study key attributes which are identified, the factors affecting to NPLs in LBs in Sri Lanka are divided into main two parts, industry-specific factors and macroeconomic factors. There are many factors influence determining the level of NPLs which had been identified many scholars in their studies (Louziz et al. 2012). Using the selected factors considering the availability of time series data and most influential determinants in the Sri Lankan context, the conceptual framework is defined for this study is shown in Figure 3 to study the factors affecting non-performing loans in LBs.

Conceptual Framework

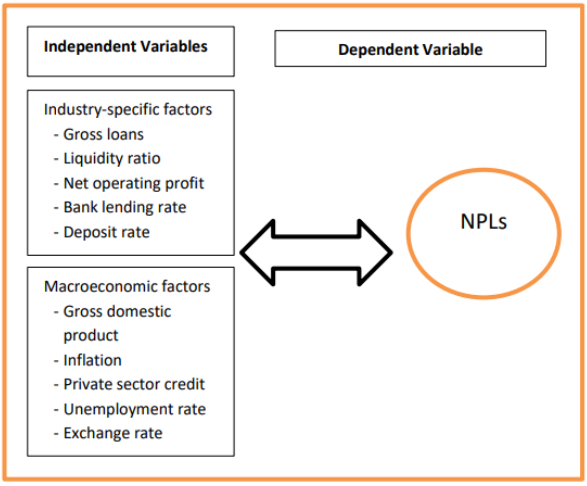


Figure 03: Conceptual framework

Methodology

In evaluating the relationship between NPLs and both industry-specific and macroeconomic variables, this paper adopts the research approach used by Nursechafia & Absuh (2014); Badar & Javis (2013) exploring the econometric techniques. This paper suggests that NPLs in LBs in Sri Lanka depend on both industry-specific and macroeconomic variables. The functional relationship of the variables (Formula 1) is as follows;

$$NPLR_t = \int (ISF_t, MEF_t) \qquad (1)$$

where $NPLR_t$ indicates the non-performing loan ratio of LBs which is the dependent variable in the research at time t, ISF_t includes the industry specific variables for time t, and MEF_t comprises

the macroeconomic variables causing LBs for time t.

In this study, to check the problem of multi-collinearity, the following two models were formulated (Formulas 2 and 3) and all variables were converted into log formation.

$$lnNPLR_t = \alpha_0 + \alpha_1 lnGL_t + \alpha_2 lnLQ_t + \alpha_3 lnNOP_t + \alpha_4 BR_t + \alpha_5 lnDR_t + \varepsilon_t \quad (2)$$

$$lnNPLR_t = \beta_0 + \beta_1 lnGDP_t + \beta_2 lnINF_t + \beta_3 lnPC_t + \beta_4 UR_t + \beta_5 lnER_t + \varepsilon_t \quad (3)$$

where '*ln*' denotes the natural logarithmic form of selected variables for this study and'α_0', 'β_0' are the constant coefficients of the above two models, respectively. α_1, …., α_5 and β_1, …,β_5 denote the partial coefficients of the selected independent variables of both models relating to industry-specific and macroeconomic factors. ε_t indicates the error term.

The following tests were performed in this study;

Unit Root Test (URT)

This study uses the Augmented Dickey-Fuller (ADF) and Philip and Perron (PP) URT to test the unit root (to check the stationary of the time series data). For this purpose, the null hypothesis written as;

H0 - The series have a unit root

H1 - The series doesn't have a unit root.

The regression for ADF test (Formula 4) is given below.

$$\Delta\gamma_t = \Phi\gamma_{t-1} + \sum_{i=1}^{p} \alpha_i y_{t-1} + \mu_t \quad (4)$$

ARDL Model

This is an Ordinary Least Square technique which can be regressed for time series data sets. To test the co-integration of non-stationary variables, this model is used and permitted to a large number of lags for testing. This model accepts the creation of a dynamic error correction model that coordinates short-run variables with long-run stability without harming any long-run data (Masih & Hamdan, 2008; Shrestha, 2019). ARDL model reflects the following equation (Formula 5).

$$\Delta\gamma_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i \Delta y_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta X_{t-1} + \sigma_1\gamma_{t-1} + \sigma_2 X_{t-1} + \mu \quad (5)$$

Johansen Co-integration test

Since all series stationary at the first differentiation I(1), this test employed for persuading the convergence in the long run (Johansen & Juselius, 1990). The test recommends the existence of co-integration for at least one co-integration vector.

VECM model

If the variables are co-integrations, then VECM can be employed to check the long-run equilibrium associations. To test the short-run and long-run coefficients of variables, the following models were developed (Formula 6 & 7).

$$\Delta ln\text{NPLR}_t = \alpha_0 + \sum_{i=1}^{n} \alpha_1 ln\text{NPLR}_{(t-j)} + \alpha_2(ln\text{GL})_{(t-j)} + \alpha_3(\Delta ln\text{LQ})_{(t-j)} + \alpha_4(\Delta ln\text{NOP})_{(t-j)} + \alpha_5(\Delta ln\text{BR})_{(t-j)} + \alpha_6(\Delta ln\text{DR})_{(t-j)} + \alpha_7\varepsilon_{(t-1)} + \mu_t \quad (6)$$

$$\Delta \text{ln}\text{NPLR}_t = \beta_0 + \sum_{i=1}^{n} \beta_1 ln\text{NPLR}_{(t-j)} + \beta_2(ln\text{GDP})_{(t-j)} + \beta_3(\Delta ln\text{INF})_{(t-j)} + \beta_4(\Delta ln\text{PC})_{(t-j)} + \beta_5(\Delta ln\text{UR})_{(t-j)} + \beta_6(\Delta ln\text{ER})_{(t-j)} + \beta_7\varepsilon_{(t-1)} + \mu_t \quad (7)$$

The variation of dependent variable is reflected by 'Δ' and the error correction term indicates by '$\varepsilon_{(t-1)}$'. Further, α_1 and β_1 are the speed of adjustment where the short-run and long-run equilibrium is adjusted. μ_t is the error term in this model.

Data Collection and Sample

This study is based on the time series data obtained from the secondary data sources which is available in the Annual Reports of individual LBs, published data relevant to LBs by CBSL, Monthly Economics Bulleting and Socio-Economic Indicators published by the CBSL and balance sheets, income statements of selected LBs in Sri Lanka. The data covered from the period of 2000 to 2019. Financial data is nominated in terms of Sri Lankan Rupees (millions) and considered as ratios as the percentage**.**

For the purpose of this study, population has been defined in terms of the number of banks registered with the CBSL as LCBs and LSBs in Sri Lanka. Presently there are 32 banks registered with the CBSL as LBs. Depending on the availability of information and manageability of the research work within the 19 years period, only 30 LBs were selected for the study. The selected variables for this study mainly divided into two parts i.e. industry-specific and macroeconomic. The basis of selecting both factors is mainly due to high relevancy of affecting these variables in changing NPL position in Sri Lankan banks. The definition of selected variables for the above two factors are indicated as follows.

Table 01: Interpretation of Variables

Variables		Interpretation
Dependent variable	NPLR	Non-performing loan ratio – doubtful and bad loans to total loan ratio
Independent variables		
Industry-specific variables	GL	Gross loan – annual aggregate loan disbursement by LBs
	LQ	Liquidity ratio – liquidity assets ratio provided by the CBSL
	NOP	Net operating profit of LBs
	BR	Bank lending rate – weighted average lending rate of LBs which individual bank lends to its customers
	DR	Deposit rate – average weighted deposit rate offered by LBs for collected funds from its customers
Macroeconomic variables	GDP	Growth rate of gross domestic product – annual growth rate of GDP in Sri Lanka
	INF	Annual inflation rate

	PC	Private sector credit – loans and advances including leasing and higher purchase
	UR	Unemployment rate – annual unemployment rate of Sri Lanka
	ER	Exchange rate – nominal effective exchange rate

Empirical Results and Discussions

Descriptive Statistic

The Table 02 shows the descriptive statistics which may understand data pattern of the selected variable.

Table 02: Descriptive Statistics of the Selected Variables

Descriptive Statistics						
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**	**Variance**
*ln*NPLR	54	1.87	14.80	9.1754	3.15880	9.978
Industry-specific variables						
*ln*GL	54	10.83	13.54	12.23	1.73341	4.546
*ln*LQ	54	7.26	9.86	8.53	1.03022	1.544
*ln*NOP	54	11.23	12.54	11.98	2.43021	1.020
*ln*BR	54	13.44	20.13	17.1481	1.99836	3.993
*ln*DR	54	2.67	7.75	5.35	1.33	1.557
Macroeconomic variables						
*ln*GDP	54	-5.15	12.30	2.9104	5.03150	25.316
*ln*INF	54	.01	15.33	3.9476	5.20634	27.106
*ln*PC	54	14.35	14.59	14.42	0.04201	2.433
*ln*UR	54	3.90	11.20	7.3778	2.26488	5.130
*ln*ER	54	94.58	129.58	1.0860	10.97434	120.436

Unit Root Test

The Table 03 depicts the ADF and PP Unit Root Tests for variables in industry-specific and macroeconomic factors.

become stationary at first differentiation I(1) at 5% level of confidence.
Simultaneously, the ADF Unit Root test results of the macroeconomic factors, it can observe that two macroeconomic

The regression runs for ADF Unit Root test for industry–specific factors which could be observed that lnNOP and lnDR become stationary at level I(0) at 5% and 10% level of confidence. Further, it could be observed that lnGL, lnLQ and lnBR variables are stationary at level I(1) at 5% level of confidence. These two variables are lnGDP and lnER. However, PP test results indicates that only lnGDP is stationary at I(0) and all other variables

except lnINF are stationary after first differentiation I(1) at 5% confidence level. lnINF become stationary at first differentiation I(1) at 10% confidence level

Table 03: Unit Root Test

Variables	ADF				PP			
	At the Level		First Differentiation		At the Level		First Differentiation	
	T-Stat	0.10	T- Stat	0.10	T-Stat	0.10	T-Stat	0.10
*ln*NPLR	-07120	-2.6130	-2.987**	-2.6150	-1.0150	-10.4700	-28.871***	-10.4500
Industry-specific variables								
*ln*GL	-0.4000	-2.6130	-6.772***	-2.6150	-0.3730	-10.4700	-34.433***	-10.4500
*ln*LQ	-3.3210	-2.6130	-4.324**	-2.6150	-9.6210	-10.4700	31.715***	-10.4500
*ln*NOP	-3.872*	-2.6130	-6.252***	-2.6150	-12.861*	-10.4700	-39.541***	-10.4500
*ln*BR	-2.871***	-2.6130	4.68***	-2.6150	-5.7260	-10.4700	26.214***	-10.4500
*ln*DR	-4.263**	-2.6130	-5.62***	-2.6150	-9.4350	-10.4700	-21.614***	-10.4500
Macroeconomic variables								
*ln*GDP	3.4760***	-2.6130	-9.345	-2.6150	-34.887**	-10.4700	-65.723***	-10.4500
*ln*INF	-0.1670	-2.6130	-3.324**	-2.6150	-0.921*	-10.4700	-12.279***	-10.4500
*ln*DC	1.1840	-2.5230	-7.258***	-2.6150	0.4730	-10.4700	-32.725***	-10.4500
*ln*UR	-1.8240	-2.6130	-6.325***	-2.6150	-3.200	-10.4700	-47.342***	-10.4500
*ln*ER	-5.710***	-2.6130	-5.986***	-2.6150	-3.158**	-10.4700	-32.672***	-10.4500

*, **, *** indicates the level of significance i.e. 10%, 5% and 1%, respectively.

ARDL Model

Taking into consideration of the formula (5) above, to reduce the multi-collinearity among the variables, ARDL model was performed, and test results shows in the Table 04.

As in Table 04 below, analyzing the zero hypothesis; H0: Ω=1, Ω=2,…, Ω_n =0, co-integration relationship of the variables was examined. The F statistics of ARDL model indicates 30.708 and 15.448 for two models i.e. industry-specific variables and macroeconomic variables. For both models, F values are significant i.e. F statistics are higher than the upper limit. Therefore, the null hypothesis rejects and confirms that there are co-integration among the variables and accordingly run the Akaike's Information Criterion (AIC) to find the optimal lag lengths for each model and the test results reflect in Table 05.

Table 04: Autoregressive Distributed Lag Model

Category	F Statistics	at 10%		at 5%		at 2.5%		at 1%	
		LL*	UL*	LL*	UL*	LL*	UL*	LL*	UL*
Industry-Specific	30.708	2.2500	3.3600	2.2500	3.8800	2.9700	4.2700	3.2400	4.7700
Macroeconomic	15.448	2.2500	3.3600	2.2500	3.8800	2.9700	4.2700	3.2400	4.7700

*LL-lower Limit /UL-Upper Limit

Table 05: Vector Auto-regression Lag Order Selection Criteria

Lag Rank		Akaike's Information Criterion (AIC)	Schwarz Information Criterion (SIC)
Industry-specific variables	0	-2.8154	-2.5473
	1	-13.8745	-12.2066
	2	-14.4703	-10.7631
	3	-15.6072	-10.2802
	4	-18.5347*	-11.7082*
Macroeconomic variables	0	-13.472	-13.2101
	1	-26.3417	-24.5415
	2	-28.1157	-23.9685*
	3	-28.651	-23.6341
	4	-29.4081*	-22.7458

*indicates the number of lag (s)

When the AIC formed, it has provided a smaller standard deviation than the Schwarz information criterion when running in a model (Pesaran & Pesraran, 1997). The AIC for industry-specific variables selected for the ARDL model shows (3,3,4,1,4,2) and for macroeconomic variables it reflects as (4,3,4,3,2,1). After, tested the long-run and short-run dynamics (error correction model) in the ARDL model and the test results indicates in Table 06 and Table 07, respectively. The coefficients were found to have multiple connections between NPLs and industry-specific and macroeconomic variables (Rifat, 2016).

As in Table 06, the long run results of the industry-specific factors indicate that LB's gross loan growth (*ln*GL) shows a negative relationship with NPLs in Sri Lankan context. Net operating profit (*ln*NOP) and deposit rates (*ln*DR) indicate the same effect of the above with respect to NPL where the growth of LBs lending by 0.64 per cent may impact on decrease bad loans by one per cent which indicates healthy behavior of the banking sector. NPLs reduce the profitability of LBs by 0.02 per cent when NPL increase by one percent. Similarly, a one per cent increase in bad loans effect on reducing the capacity of LBs to provide attractive returns to its customers which is 0.87 per cent. Further, we observed that another two significant factors that affect NPLs of LBs reflecting a one per cent increase in lending rates (*ln*BR) and liquidity (*ln*LQ), increase NPLs by 3.89 per cent and 2.77 per cent, respectively, which is similar to the findings of Amir (2019).

From the macroeconomic variables, *ln*GDP shows a significant negative effect on *ln*NPL, indicating that the bad lending decrease when economy becomes stronger (Day, 2019; Berger & DeYoung, 1997). Hasan (2019) also found that NPLs are affected by GDP or inflation which has used ARDL model in his study using the banking data in Bangladesh. If there is an increase in one per cent in economic growth, NPL decreases by 1.48 per cent in the long run in LBs in Sri Lanka. Further, *ln*INF also shows a negative relationship with *ln*NPL. However, this relationship is insignificant in the long run. Further, it observed that there is a positive relationship of both private sector credit growth (*ln*PC) and exchange rate (*ln*ER) and this relationship is significant with NPL of the LBs in Sri Lanka in the long run. If one per cent increases in private sector credit and exchange rate, the

increase in NPL is 1.077 per cent and 3.86 per cent, respectively. Unemployment rate (*ln*UR) shows a significant negative relationship with bad loans where one percent increase in unemployment effect on decrease in bad loans by 7.72 per cent.

The test results of the long run relating to the industry specific variables, the loan growth of banks have a negative relationship with NPLs. Simultaneously, deposits rates and net operating profits have the same impact on NPLs with significant ρ values, means with the growth of bank lending by 0.64 per cent, decrease of bad loans by one per cent, reflects healthy behavior of the banking sector in Sri Lanka.

For both models, the R^2 and adjusted R^2 reflect a good number in this study which means that models explain in a remarkably good way. The R^2 and adjusted R^2 for industry-specific variables are 0.9623 and 0.8963 while for macroeconomic variables, this numbers show 0.9247 and 0.8326 indicating that model used in this study is quite well where models can explain 96.23 per cent and 92.47 per cent of the changes in the NPLs.

Table 07 shows the short-run test results of the industry-specific factors. LBs' loan growth shows an insignificant positive association with NPLs while *ln*NOP and *ln*DR also show the same impact over the NPLs which is statistically significant. Liquidity and lending rates found a statistically significant negative association with NPLs in LBs in Sri Lanka. The findings of the study supported by the findings of the Messai & Jouini (2015) which has identified liquidity and lending rates are significant factors associated to NPLRs.

Outcome of the test results revealed that the growth of GDP tested a significant positive influence on NPLs which reflects if GDP increased by one per cent will impact on increasing NPLs of LBs by 0.37 per cent. In the short-run, only unemployment has a significant positive relationship with NPLs showing that one per cent increase in unemployment (*ln*UR) will cause a 2.33 per cent decrease in bad loans in LBs. The impact of other macroeconomic variables is insignificant in the short run in LBs in Sri Lanka. Skarika (2014) revealed that main sources of NPLRs are the downturn of the economy i.e., GDP, lack of employment and the inflation rate which was further identified in this study too as the prime factors of determining NPLRs.

Table 06: Long-Run coefficients of ARDL Model

Industry-specific			Macroeconomic		
Determinants	Coefficients	SE	Determinants	Coefficients	SE
$lnGL$	-0.6404***	0.047	$lnGDP$	-1.4850**	0.5718
$lnLQ$	2.7689***	0.5104	$lnINF$	-0.87031	0.7372
$lnNOP$	-0.01836***	0.0041	$lnPC$	1.07734*	0.5723
$lnBR$	3.8907***	0.3249	$lnUR$	-7.7294***	2.018
$lnDR$	-0.8769***	0.156	$lnER$	3.8649***	1.152
Cons	-3.8749***	0.6451	Cons	0.3097	0.3621
R-squared=0.9623;			R-squared=0.9247;		

Adj. R-Squared=0.8963	Adj. R-Squared=0.8326

*,**,***indicates 10%, 5% and 1% level of significance, respectively

Table 07: Short-Run coefficients of ARDL Model

Industry-specific			Macroeconomic		
Determinants	Coefficients	SE	Determinants	Coefficients	SE
$lnGL$	-0.2060	0.1231	$lnGDP$	-0.37361***	0.1131
$lnLQ$	-2.2381***	0.4335	$lnINF$	-5.0281***	0.9796
$lnNOP$	-0.0083***	0.0026	$lnPC$	-0.3729	0.1791
$lnBR$	-1.5827***	0.3123	$lnUR$	2.3360***	0.2376
$lnDR$	0.3160	0.2405	$lnER$	-0.8780**	0.4361
Cons	-3.8749***	0.6040	Cons	0.3097	0.3621
R-squared=0.9623; Adj. R-Squared=0.8963			R-squared=0.9247; Adj. R-Squared=0.8326		

*,**,***indicates 10%, 5% and 1% level of significance, respectively

Co-Integration Test

It was observed that two co-integration relationship in the first model and four co-integration connections with the second model. Table 08 reflects the existence of more than one co-integrating equation which indicates a long run convergence of the two models. Co-integration figures trace using 5 per cent level of significance.

VECM

The assessment of short run and long run coefficient, this study applies the VECM. We observed that four lag periods for industry-specific variables and two lags periods for macroeconomic variables which imply in Schwarz information criterion. Table 09 shows the VECM test results.

Table 08: Johansen Co-integration Tests

Max. Rank		Parms	LL	Eigenvalue	T. Statistics	5% Critical Value
Industry-specific variables	0	42	274.94		113.8798	94.1600
	1	54	295.82	0.76	71.9441	69.5100
	2	63	309.81	0.63	43.8952*	48.3200
	3	70	320.67	0.55	21.8334	30.7600
	4	75	326.74	0.36	10.1203	16.5200
	5	78	331.06	0.23	0.4546	
		79	331.34	0.01		
Macroeconomic variables	0	42	497.5177		207.6193	94.1600
	1	54	528.7665	0.8917	122.8704	69.6700
	2	63	554.1811	0.8496	72.0256	48.4700
	3	70	571.668	0.6886	37.345	30.1700
	4	75	582.3987	0.5459	15.6751*	16.5100

	5	78	589.7765	0.4365	0.0372	4.8500
	6	79	589.7875	0.0008		

*, ** and *** indicates 10%, 5% and 1% level of significance

Table 09: Results of the VECM

	Industry-specific variables				Macroeconomic variables			
Description	**Variables**	**Coefficient**	**SE**	**T Statistics**	**Variables**	**Coefficient**	**SE**	**T Statistics**
Speed of Adjustment	Δ*ln*NPLR	-0.198504	0.140857	-1.54	Δ*ln*NPLR	-0.246621***	0.0310667	-10.65
Short-run coefficients	Δ*ln*GL	-0.191432	0.341075	-0.85	Δ*ln*GDP	-0.794116***	0.0864501	-8.65
	Δ*ln*LQ	0.4986788**	0.2017648	2.34	Δ*ln*INF	0.7590761***	0.1420756	6.31
	Δ*ln*NOP	0.2878798	0.3176499	1.08	Δ*ln*PC	-0.0610673	0.1566071	-0.53
	Δ*ln*BR	0.7270934*	0.3270863	1.78	Δ*ln*UN	-0.4328669	0.3799071	-1.61
	Δ*ln*DR	0.8850681***	0.2107955	3.85	Δ*ln*ER	0.3142714	0.1632996	1.67
Long-run coefficients	*ln*GL	0.3782571***	0.0245773	12.47	*ln*GDP	0.4377218**	0.3417661	1.89
	*ln*LQ	-0.518621	0.4628467	-1.34	*ln*INF	0.1946772	0.5377518	0.43
	*ln*NOP	0.0705125***	0.0035719	13.74	*ln*PC	-0.4510945**	0.3488039	-2.73
	*ln*BR	-4.896358***	0.2279431	-21.86	*ln*UN	7.9603756***	0.7331418	11.67
	*ln*DR	2.871603***	0.3417396	12.71	*ln*ER	-4.1462306***	0.4561673	-6.57

The first model (Formula 8) shows that a 19.85 per cent speed of adjustment in *ln*NPLR where influence come from *ln*GL, *ln*LQ, *ln*NOP, *ln*BR and *ln*DR. This is a yearly basis impact to the model. The finding is similar with the findings of Amir (2019) which highlights the liquid, lending rates and deposits are adjusted with changes of the non-performing loan ratio of a bank. Simultaneously, the second model (Formula 9) proposed that *ln*NPLR helps to long run equilibrium with a 24.66 per cent speed of adjustment in each year due to influence of *ln*GDP, *ln*INF, *ln*PC, *ln*UN and *ln*ER. The test results recommend that long run adjustment in the independent variables has a considerable influence on NPLR compared to short run variables in terms of both models.

Model 1

$$lnNPLR_t = \alpha_0 - 0.37825 lnGL_t + 0.5186\ lnLQ_t - 0.0705 lnNOP_t + 4.4963 lnBR_t - 2.8171 lnDR_t + \varepsilon_t \quad (8)$$

Model 2

$$lnNPLR_t = \beta_0 - 0.4377 lnGDP_t - 0.1947 INF_t + 0.4511 lnPC_t - 7.9604 lnUR_t + 4.1462 lnER_t + \varepsilon_t \quad (9)$$

Formula 8 denotes that how industry-specific variables influence towards changing NPLR. *ln*GL shows the negative movements with NPLR which means when *ln*GR move towards negatively by one per cent, then NPL will rise by 0.37825 per cent. Subsequently, *ln*NOP and *ln*DR also show the negative

relationship with NPLR which reflect when one per cent decrease in *ln*NOP and *ln*DR may affect increase in NPL (*ln*NPLR) by 0.0705 per cent and 2.8171 per cent, respectively. However, it is observed that there is a positive relationship between *ln*LQ and *ln*NPLR, *ln*BR and *ln*NPLR. When *ln*LQ and *ln*BR increase by one per cent will effect on increase in *ln*NPLR by 0.5186 per cent and 4.4963 per cent, respectively.

In terms of the test results obtained for macroeconomic variables (Formular 9), *ln*GDP, *ln*INF and *ln*UR denote the negative relationship with *ln*NPLR. It means, when one percent negative movement of the above three variables may affect increase in *ln*NPLR by 0.4377 per cent, 0.1947 per cent and 7.9603 per cent, respectively. Subsequently, *ln*PC and *ln*ER show a positive relationship with *ln*NPLR where both variables increase by one percent (increase in *ln*ER means appreciation of the currency) will cause increase in bad loans by 0.4511 per cent and 4.1462 per cent, respectively.

Further, this research performed Lagrange-multiplier test to find out whether there is any autocorrelation observed for both models and where both models are free from autocorrelation problem.

Apart from the above, to test the robustness of the study, it was performed some diagnostic tests of the ARDL model and could examine the overall stability of the models.

The Darbin-Watson test results reveal that neither the industry-specific nor macroeconomic variables have autocorrelation among them. As per Jarque-Bera, Breusch-Godfrey and White's tests results, it implies that in cannot be rejected the zero-hypothesis due to all coefficients are not significant and prove that models are normal as well as no serial correlation among the variables. Further the models are free from the problem of heteroscedasticity (Table 10).

Table 10: VECM Diagnostic Test (Lagrange-Multiplier Test)

	Industry-specific variables			Macroeconomic variables		
Nature of the test	**Lag Order**	**p value**	**Interpretation**	**Lag Order**	**p value**	**Interpretation**
Auto-correlation test	Lag 1	0.7581	No	Lag 1	0.1357	No
	Lag 2	0.7263	Autocorrelation	Lag 2	0.9352	Autocorrelation

Table 11: Diagnostic tests for ARDL

Test Details		**Industry-specific variables**		**Macroeconomic variable**	
Test	**Test Nature**	**p Value**	**Interpretation**	**p Value**	**Interpretation**
Durbin-Watson	Autocorrelation	2.5361	No autocorrelation	2.374	No autocorrelation
Jarque-Bera	Normality	0.4386	Normal	0.3275	Normal
Breusch-Godfrey LM	Serial Correlation	0.0731	No serial correlation	0.3189	No serial correlation
White's	Homoscedasticity	0.5361	Homoscedastic	0.4326	Homoscedastic

Conclusion

The main purpose of this study was to investigate the impact of industry-specific and macroeconomics variables on the asset quality of licensed banks viz licensed commercial banks and licensed specilised banks in Sri Lanka. Hence, the non-performing loans of licensed banks were considered to observe the asset quality of LBs. In this study, important factors could be observed from the hypothesis tests employed for the industry-specific and macroeconomic factors that influence the non-performing loans in Sri Lankan banks.

ARDL suggests that non-performing loans negatively affect economic growth in Sri Lanka in the long run which reflects the economy is in a good condition and moving towards high growth, the borrowers are more capable of repaying loans and thereby reduce NPL. The changes in the exchange rate is an important variable in the model due to its effect on the NPL is a positive factor which means that the exchange rate is increased, borrowers have to pay higher amounts for their imports resulting a reduction in the repayment capacity of loans. Moreover, in the short run, when NPL increases unemployment also increases thereby it creates economic instability in the country.

In the long run, if there is a loan growth in the economy, it may result in reducing non-performing loans. As the lending pattern of the country has been changed during the past years, small and medium sector and micro industries were expanded rapidly and demand for loans and advances, leasing and higher facilities were also increased not only from LBs but also from other financial sector industries i.e., licensed finance companies in Sri Lanka and gradually reduce the NPLs due to repayment capacity of people, were enhanced. In the short run, with the increase of loan growth, NPLs tend to increase. This may be resulted in reduction of LB's profitability due to LBs need to make higher provisions against future losses. It has a spillover effect on lending rates and thereby for deposits rates in the sector and finally for the economy. When NPL increases may automatically leads to increase lending rates and subsequently decrease deposit rates in the country. Therefore, LBs need to carefully manage the liquidity requirements of the bank so that LBs do not become too ambitious and enhance bad loans. Further, it could be observed that a positive correlation between NPLs and liquidity by giving a signal that there is a high chance of excess liquidity to be converted into a bad loan by the management intervention, so that need to be careful when economy is expanding through high credit growth scenario, LBs need to be more vigilant when lending to the customers. Accordingly, Central Bank of Sri Lanka and policy makers need to consider this situation when policy rates are continuously reducing with the aim of expanding the credit growth in the economy and need to issue clear guidance in this regard specially for remedial measures or reduction of NPLs in the long run. When economy is downturn, LBs may control lending by implementing contractionary lending policies and during the economic growth that they can implement expansionary lending policies which may help in the long run sustainability of LBs. Therefore, any Central Bank needs to carefully monitor the domestic credit growth and exchange rate movements to scale down the impact of bad loans in an economy.

These findings have an interesting policy implication which may add to the ongoing research on the issues of the asset quality of licensed banks in Sri Lanka. Further,

the results of this study may use to project fundamental grounds of NPLs in the Sri Lankan economy not only for LBs but also taking into considering whole financial sector in Sri Lanka. Researchers may use the grounds of this research for further studies covering whole developing and emerging economies to investigate more factors covering macroeconomic, industry-specific and other variables towards implications on credit quality of financial sector lending and how these factors influence on economic growth of a country.

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