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Determinants of Non-Performing Loans: Evidence from Sri Lanka

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ABSTRACT

Purpose: The increasing trend of non-performing loans in Sri Lanka threatens the banking system. This study attempts to identify the determinants of non-performing loans in licensed commercial banks in Sri Lanka to fill the void in the finance research arena.

Methodology: This study is carried out with a sample of eight licensed commercial banks using macroeconomic factors and bank-specific factors: the real interest rate, annual GDP growth rate, annual inflation rate, exchange rate, unemployment rate, the efficiency of the bank, bank size, lending rate, and ROA. Financial data were analyzed for the period of 2008-2018 using panel data regression analysis.

Findings: Results show that GDP growth rate, Exchange rate, Unemployment rate, inflation rate, and bank size have a significant effect on non-performing loans in the Sri Lankan banking industry. However, bank efficiency and return on asset (ROA) do not significantly correlate with NPLs. Among these relationships, only the exchange rate shows a positive relationship with the NPL, whereas all other variables show a negative relationship.

Implications: According to the study's findings, it is recommended that Sri Lankan commercial banks have their focal point on credit risk management based on maximizing return on its assets while keeping its non-performing loans within acceptable limits.

KEYWORDS

Exchange rate; Inflation;
Gross Domestic
Production;
Unemployment rate

JEL

CLASSIFICATION

G21, C33

I. Introduction

The link between the non-performing loans and banks' loss is an important relationship that received colossal attention during the past years. According to Saba et al. (2012), an increase in NPL rate is often referred to as the failure of credit policy. One of the bank's primary functions is lending. Lending has two main components: Loans and demand deposits. The high growth of non-performing loans is due to management failure, threatening the bank's asset base. New banks are in the pipeline to join the banking sector, and existing banks are expanding their branch networks. Hence, it is essential to regulate and monitor the banks to manage the financial sector properly.

The robustness of the Sri Lankan banking sector represents the health of the country's

entire economy. Hence, a higher percentage of non-performing loans occur because of the difficulty of collecting interest and principal on the credits. This may lead to fewer profits for the banks in Sri Lanka and, possibly, bank closures (Ekanayake & Azeez 2015).

As per the current context, the credit quality of the Sri Lankan banking sector, Licensed Finance Companies (LFCs), and Specialized Leasing Companies (SLCs) sector deteriorated considerably during 2018, with non-performing loans (NPLs) increasing by Rs.102.5 billion compared to the increase of Rs. 18.3 billion in 2017. Further, the overall performance of the LFCs and SLCs sector slowed down significantly during 2018 due to low credit growth, unfavorable weather conditions that prevailed in 2017. The slowdown of economic activities in 2018 paved the way to declining profitability and

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increasing non-performing loans. (CBSL,2018)

Consequently, Sri Lanka's non-performing loans ratio stood at 3.4 % in Dec 2018, compared with 2.5 % in the previous year. Moreover, total loan loss provisions increased by Rs. 38.9 billion during 2018, out of which specific provisions accounted for 86.8 % of the increase. Apart from that, Bad loans in Sri Lanka's banks had risen 64 % in the first quarter of 2019, the worst since 2013 when gold-backed loans went bad, leaving lenders with thinner capital buffers (CBSL, 2018).

In addition, small banks had higher bad loans as impaired loans to gross loans at small banks had climbed to 7.4% by the end of 2018. In larger banks, it was 6.9%; this is due to the stagnating economy since the borrowers find it unable to service their loans as expected, which results in those loans automatically being transferred to the non-performing loan section. Therefore, regulators need to be cautious of a further increase in non-performing loans (NPLs) and ensure that proper risk management mechanisms are in place to mitigate all relevant risks emanating from increasing NPLs.

Borrowing from surplus units and lending to the deficit units is the core business of the banking sector. What is challenging is when a considerable portion of these loans and advances are not paid back and when they become due together with interest charged. When this outstanding balance remains in excess continuously for three consecutive loan installments, or overdraft remains in excess for 90 days or more, such loans are classified as non-performing Loans (CBSL,2013). This has been identified as the most critical factor that will affect a bank's catastrophe.

With the growing importance of banks to accelerate economic development, banks should be strategic and focused on lending their money to the right set of customers. Furthermore, the contradictory conclusions

from the previous studies call for a detailed investigation to be conducted in the area. Messai and Jouini (2013), found that NPL has a negative relationship with the growth rate of GDP and the profitability of banks' assets and has a positive relationship with the unemployment rate, the loan loss reserves to total loans, and the real interest rate which are inconsistent with the findings of Anjom & Karim, (2016). Besides that, previous studies are solely based on macroeconomic determinants that affect NPL while ignoring the bank-specific factors to their consideration. When considering the Sri Lankan context, there are findings that contradict with above. Ekanayake and Azeez (2015), have found a negative relationship between the efficiency of the banks on NPL. According to the study conducted by Kumarasinghe (2017), which is based on secondary data from 1998 to 2014 of licensed commercial banks in Sri Lanka in order to study the macroeconomic determinants of banks' loan quality in Sri Lanka has found that the relationship of the GDP with the NPL is found to be positive. According to Rachman et al. (2018), the negative relationship between profitability and NPL suggests that the more profit a bank gets, the less likely the bank is to have NPLs in the respective year

In general, the contradictory findings and lack of sufficient research on both macroeconomic and bank-specific factors together on non-performing loans in the Sri Lankan context and a knowledge gap in the area provide reasons to initiate this study. Therefore, the objective of this study is to examine the factors that affect non-performing loans of banks in Sri Lanka and to fill the knowledge gap that exists in the area.

The rest of the paper is organised as follows. Section 2 presents the findings of past studies. Section 3 explains the data and methodology. In Section 4, we present findings and data analysis, In section 5 the discussion on results is done, and Section 6 concludes with recommendations.

II. Literature Review and Hypotheses Development

In review, the researchers especially consider two sets of root causes to explain the surging of NPLs over the past decade, which provide a background for this study to minimize the knowledge gap in reviewing the literature.

Macroeconomic Variables

Messai and Jouini (2013) detect the determinants of non-performing loans using a sample of 85 banks in three countries namely; Italy, Greece, and Spain, for 2004-2008. They found that NPL has a negative relationship with the growth rate of GDP and the profitability of banks' assets. Further, they found a positive relationship between the unemployment rate, the loan loss reserves to total loans, and the real interest rate. But these findings are inconsistent with the findings of Anjom and Karim (2016), which are carried in SAARC countries. However, both studies have found that return on asset (ROA) has a significant negative relationship with NPL.

A somewhat different perspective on the NPLs was discussed by Rajha (2016), using panel data regression in the Jordanian banking sector during the period 2008-2012. According to his study, a negative relationship is observed between economic growth, inflation rate, and efficiency with NPL and a positive relationship between Lending rate and size of the bank with NPL. Apart from that, they stress that large banks are effective in screening customers who applied for loans compared to their smaller counterparts. However, these findings do not facilitate the findings of Anjom and Karim (2016), Fofack (2005), and Khemraj and Pasha (2009).

Kumarasinghe (2017) conducted a study based on secondary data over 1998 to 2014 of licensed Commercial Banks in Sri Lanka in order to study the macroeconomic determinants of banks' loan quality in Sri Lanka. He found that the relationship of the GDP with the NPL is positive, which is antagonistic with the results of the investigation conducted by Beck, Jakubik,

and Piloiu (2015) using novel panel data set covering 75 countries to study the macroeconomic determinants of NPL. Besides, all these studies are solely based on macroeconomic determinants that affect NPL while ignoring the bank-specific factors to their consideration.

Farhan, Satar, Chaudhry, and Khalil (2012), examined the perception of Pakistan bankers regarding the economic factors causing non-performing loans in the Pakistan banking sector since 2006. This study sample included the Top 10 Pakistan banks, and the study was carried out to analyse the impact of selected independent variables including Interest Rate, Energy Crisis, Unemployment, Inflation, GDP Growth, and Exchange Rate on the non-performing loans of Pakistan banking sector using correlation and regression analysis. This study found that Interest Rate, Energy Crisis, Unemployment, Inflation, and Exchange Rate has a significant positive relationship with the non-performing loans of the Pakistan banking sector, while GDP growth has a significant negative relationship with the non-performing loans of the Pakistan banking sector. However, these findings are inconsistent with many previous findings, such as Kumarasinghe (2017), Rajha (2016), Beck, Jakubik, and Piloiu (2015).

Several empirical studies found that the NPL ratio rises when economic growth decreases. Khemraj and Pasha (2009), studied the determinants of NPL in the Guyanese banking sector. Prasad and Espinoza (2010), used a dynamic panel over 1995–2008 on a sample of 80 banks of the Gulf Cooperation Council region for their study. They found that the real effective exchange rate (REER) has a positive effect on impaired loans which is different from the findings of Beck, Jakubik, and Piloiu (2015).

Louzis, Vouldis, and Metaxas (2010), studied NPL from a different perspective compared to other studies. They used panel data to highlight the factors causing non-performing loans in the Greek banking sector from 2003 to 2009, considering each loan category. The

loan categories they considered are corporate loans, consumer loans, and mortgage loans. According to their investigation management, quality is the significant determinant of non-performing loans in the banking sector of Greece.

Khemraj and Pasha (2009), explore the determinants of non-performing loans in Guyana, considering the data between the years 1994 to 2004. According to the authors, growth in the gross domestic product has an inverse relationship with the non-performing loans explaining it as a good performance in the economy, which causes a reduction in non-performing loans.

In addition, Boakye-Adjei and Amuakwa-Mensah (2015), identified loan growth, inflation, GDP, and exchange rate as significant determinants of NPLs in the banking industry in Ghana. He also found that NPL has a negative relationship with GDP, inflation rate, and exchange rate, contrary to many previous studies. Moreover, Hoggarth, Sorensen, and Zicchino (2005) conducted research in the UK during the time period 1988-2004. They found that inflation and interest rates have a positive relationship with non-performing loans.

Jakubik and Reininger (2013), and Klein (2013) investigates determinants of NPLs are based on the panel data set for CESEE countries (Central, Eastern and Southeastern European) such as Bulgaria, Croatia, the Czech Republic, Hungary, Poland, Romania, Russia, Slovakia and Ukraine. Their results show that economic growth is the primary driver that is negatively correlated with NPL development. Other important determinants of NPL change are also identified, such as past credit growth, unemployment, inflation, and exchange rate changes.

Considering the above-mentioned literature, the following variables were selected as macroeconomic variables for the study. **Gross Domestic Production:** Several empirical studies have found a negative association between NPL and real GDP growth (Fofack, 2005; Khemraj & Pasha,

2009; Boakye-Adjei & Amuakwa-Mensah, 2015). In contrast, Shingjergji (2013), Kumarasinghe (2017) and Anjom and Karim (2016) found that there is a positive relationship between GDP and NPL.

Unemployment: Berge and Goddin, (2007) found that the problem loans were highly sensitive to the real interest rates and unemployment for the Nordic banking in Norway. A positive relationship between unemployment and NPL could be described based on the findings of Farhan et al., (2012) and Akinlo & Emmanuel, (2014).

Exchange Rate: Fofack (2005) explores that real exchange rate appreciation is a significant determinant of NPLs in several sub-Saharan African countries. In a similar way, Otašević, (2013) finds that, a deteriorating business cycle and the exchange rate depreciation led to weakening of quality of the bank's loan portfolio in Serbia.

Inflation: Otašević, (2013) suggests that higher inflation can make debt servicing easier by reducing the real value of outstanding loans when salaries are sticky, thus lead to a decrease of the credit risk ratio in the short-run. Thus, according to the literature, relationship between inflation and non-performing loans can be positive or negative depending on the economy of operations.

Thereby, we proposed the first hypothesis as,

H₁: There is a significant relationship between the macroeconomic factors (GDP growth rate, Unemployment rate, Inflation rate and Exchange rate) and the non-performing loan rate.

Bank Specific Variables

In addition to macroeconomic variables, several empirical studies suggest that factors Specific to the bank such as bank size, efficiency, credit terms and rates, and ROA are essential determinants of NPL because they can cause risky loans and eventually become the default.

By analyzing the micro and macro determinants of non-performing loans of the

Czech banking sector for the period 1994-2005, Podpiera, Weill, and Schobert (2008), concluded that efficiency is negatively associated with increases in non-performing loans. The same results were found by Louzis, Vouldis, and Metaxas (2010), in the case of Greek banks and in the study conducted by Rajha (2016).

However, the empirical evidence relating to the impact of bank size on NPLs appears mixed. Some studies report a negative association between NPLs and bank size such as Ranjan and Dhal (2003), Salas and Saurina (2002), Hu, Li and Chiu (2004), Jakubik and Reininger (2013). They argue that a negative relationship is attributed to large banks having better risk management strategies and more resources that usually translate into more superior loan portfolios than their smaller counterparts. On the other hand, Khemraj and Pasha (2009), Boakye-Adjei and Amuakwa-Mensah (2015), and Rajha (2016) explored that bank size and NPL has a significant positive relationship.

As banks increase the loans they give to their clients, there is a higher tendency to default, especially in crisis periods. Many studies prove this relationship. In contrast, the few studies that found a negative relationship between loan growth and NPLs concluded that proper monitoring and screening strategies, when put in place by banks, can reduce NPLs despite high growth in loans.

Nevertheless, most of the literature is based on country-specific studies. For instance, Salas and Saurina (2002) analyzes the problem loans of the Spanish commercial and savings banks. They find that credit risk is determined by microeconomic individual bank-level variables, such as bank size, net interest margin, capital ratio, and market power, in addition to real GDP growth. More recently, Louzis, Vouldis, and Metaxas (2010), examine the determinants of NPLs in the Greek banking sector. They concluded that credit quality among Greek banks could be explained mainly by macroeconomic fundamentals.

Thus, considering the above-mentioned literature following variables were selected as bank-specific variables for the study.

ROA: Godlewski (2008) stated that there is a direct relationship between NPLs and ROA; the lower the ROA, the higher will be NPLs and vice versa. Ahmad and Bashir (2013) affirm that ROA and NPLs have a direct association.

Bank Size: Several authors Salas and Saurina, (2002); Ranjan and Dhal, (2003); Jakubik and Reininger, (2013) found that bank size is one of the most significant factors that explained the variations in bad debts, further they found a negative relationship between bank size and NPLs.

Efficiency: Podpiera, Weill, and Schobert, (2008) and Ekanayake and Azeez, (2015) have found a negative relationship between the efficiency of the banks and NPL. But Anjom and Karim, (2016) found that efficiency and NPL have a significant positive relationship.

Thus, our second hypothesis is,

H₂: There is a significant relationship between the bank-specific factors (ROA, Size and Efficiency) of the bank and the non-performing loan rate.

III. Methodology

Data and Sample Selection

In order to investigate the determinants of non-performing loans in the Sri Lankan banking sector, this study uses panel data regression analysis. The sample includes eight commercial banks (cross-section) over 10 years (2008-2018). The research strategy used for this study is the experimental strategy. Due to the quantitative nature of data, the deductive reasoning method is used to examine the cause-and-effect relationships between NPLs and determinants in this study.

This study only considered data from 2008 to 2018 mainly to neglect any irregular behavior in data that occurred due to the prevailing Covid-19 pandemic. As mentioned, the

above time period is selected to prevent the consequence of manipulated results due to this irregular behavior.

Eight commercial banks have been selected for this study, excluding thirteen foreign Banks and five non-listed banks. Foreign licensed commercial banks were also excluded from the study because of several reasons. First is the difference in the banking operation and accounting format compared with the domestic commercial banks, mainly due to multicurrency transactions. Second is the unavailability, reliability, and accuracy of the financial data.

Measurements of Variables

Non-Performing Loan is the ratio of the substandard loan, doubtful loan and loss loan to total loans. NPL is measured as the ratio of defaulted and un-collected loans to total loans of banks as per Messai and Jouini (2013) and Alhassan et al., (2014). Data for NPLs obtained from annual reports of commercial banks. GDP will be measured as the annual growth in the real GDP Rate in the year t. The unemployment rate in year t is considered using key economic indicators. Both GDP and unemployment rates are collected from the annual reports of the central bank of Sri Lanka. The Colombo Consumer Price Index (CCPI) is used to gauge the inflation rate of the country and the data were taken from the Department of Census & Statistics in Sri Lanka. The exchange rate is the weighted average rate of actual USD/LKR (Khemraj & Pasha, 2009). The SPOT Exchange rate at the time will be considered in the measurement (Fofack, 2005). The size of the bank is taken as the relative market share of the bank (Rajha, 2016). ROA is taken as the ratio of net income to total assets of the bank (Messai and Jouini, 2013).

For this study, only secondary data have been employed from annual reports of the respective banks and the central bank. The information related to total non-performing loan amounts, loan provisions, facts and figures related to loan recovery system, NPL rates, operating income, operating expenses,

and return on assets (ROA) etc were obtained from those sources.

Model Specification

Based on our review of the literature, it is clear that there is extensive international evidence that suggests NPLs may be explained by both macroeconomic and bank-specific factors. Henceforth, in this study, the following econometric model was developed similar to international evidence, but with some modifications that suit the Sri Lankan banking industry.

$$NPL / TL_{i,t} = \alpha + \beta_1 GDP_t + \beta_2 INF_t + \beta_3 EXC_t + \beta_4 UN_t + \beta_5 ROA_{i,t} + \beta_6 \ln Size_{i,t} + \beta_7 EFI_{i,t} + \mu_{i,t} \dots \dots \dots (1)$$

Where,

$NPL / TL_{i,t}$: The ratio of non-performing loans to total loans for bank i in year t . GDP_t : The annual real GDP rate at period t . INF_t : The annual inflation rate at time t . EXC_t : Effective exchange rate at time period t . UN_t : The rate of unemployment at period t . $ROA_{i,t}$: ROA ratio of bank i at time t . $\ln Size_{i,t}$: Total assets of bank i at time t . $EFI_{i,t}$: Efficiency of the bank i at time t . $\mu_{i,t}$: The error term is assumed to have zero mean and independent across time period.

IV. Data Analysis

This section presents the results and findings of the study to identify determinants of non-performing loans in commercial banks of Sri Lanka.

Descriptive Statistics

The descriptive statistics are presented in the Table 1. Accordingly, the mean, where the average of the number which calculated the central value of the data set for NPL is 4.05% with a maximum of 13.17% and a minimum of 1.2%. This states that, from the total loans of Sri Lankan commercial banks, an average of 4.05% were being uncollected or defaulted over the sampled period. The standard deviation is used to quantify the amount of variation of the data of NPL is 2.093. This shows that the non-performing loan fluctuation between the sampled banks was somewhat high.

Table 1. Summary of Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max	Observations
NPL Ratio	4.05	2.0930	1.2000	13.1700	N = 88
Inflation	4.80	1.9546	2.1350	7.5000	T = 11
GDP growth	5.37	2.1227	3.1000	9.1000	n = 8
Exchange rate	130.05	17.1603	108.3340	162.4650	
Unemployment	4.61	0.5312	4.0000	5.8000	
Bank size	123.36	86.6669	14.0000	399.0000	
Efficiency	49.13	8.3475	28.9000	69.2800	
ROA	1.68	0.6261	0.1900	3.8000	

Further, regarding the independent variables in this model, the inflation rate showed a mean value of 4.80 where price Index (CCPI) for a particular time with a maximum of 7.5% and a minimum of 2.5 %. This indicates that the inflation rate of the Sri Lankan economy had increased highly over the period under consideration.

Bank Size presented the highest standard deviation of 86.66 in this model and also a

substantial mean value of 123.36. On the other hand, the mean value of the exchange rate is 130.045 which is the highest mean value in the model with a maximum of 162.45 and a minimum of 108.334. The existence of correlation was tested using the correlation matrix. According to table 03, all the variables are not correlated with each other as every correlation coefficient in the output is below 0.6. Therefore, the probability of having multicollinearity is very low.

Table 2. Correlation Matrix

	Inflat~u	GDPgro~l	Exchan~e	Labour~R	Banksiz	Effici~y	ROA
Inflationc~u	1.0000						
GDPgrowtha~l	0.3559	1.0000					
Exchangerate	-0.0857	0.3619	1.0000				
LabourStat~R	0.3109	-0.3787	-0.4969	1.0000			
Banksiz	0.0433	0.0292	-0.0468	-0.0285	1.0000		
Efficiency	-0.0327	0.1911	0.2949	-0.2125	-0.3259	1.0000	
ROA	0.2419	0.3382	0.1230	-0.1174	0.3227	-0.5609	1.0000

Model Estimation

In order to analyze the data of this study, initially, both the pooled OLS and fixed effect were run. F-test values come to 19.13 with a probability of $F = 0.0000$, which leads to rejecting the null hypothesis at a 95% confidence level (appendix 01). Hence it confirms that there is no firm fixed effect.

These results indicated that the fixed effect model is better than the pooled OLS model.

Then, the best effect out of pooled OLS and random effect was checked using the LM Test; "Breusch and Pagan Lagrangian multiplier test." The probability of significant depicts in the value $Prob > \chi^2 = 0.0000$

is less than the value 0.05 (appendix 02). Accordingly, data cannot be pooled, and the random effect model is preferred over the pooled OLS model.

Finally, based on the results obtained so far, it is concluded that the fixed effect model is better than pooled OLS model and, the

Random effect model is better over pooled OLS. Therefore, it is required to select the best suitable method out of Fixed and Random effect models which are derived from the F test and LM Test. Therefore, to analyze best out of fixed and random effects, the "Hausman test" can be used in this study.

Table 3. Hausman Test

	(b) Fe	(B) Re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
GDPgrowtha-l	0.4042	0.4360	-0.0317	0.0417
Exchangerate	-0.0081	-0.0079	-0.0002	0.0046
LabourStat~R	1.906	1.8785	0.0279	0.1102
Banksiz	0.0025	0.0002	0.0022	0.0031
Efficiency	0.0421	0.0314	0.0106	0.0268
ROA	0.9364	0.6912	0.2452	0.2723

b = consistent under H_0 and H_a ; obtained from *xtreg*

B = inconsistent under H_a , efficient under H_0 ; obtained from *xtreg*

The results generated from the Hausman Test (Prob>chi2 = 0.9706) have failed to reject the null hypothesis as the p-value (Prob>Chi2) is higher than the 5% significant level. Owing to these results, a Random effect model should be selected.

This study used the result of "Wald-Test statistics amount" to test heteroscedasticity. As shown in table 04, Wald Test output statistics suggest the existence of heteroscedasticity in this study. For this reason, the probability of Wald test value is stated as *P-Value* > *Chi2(8)* 0.0000, where the p-value is significantly lower than 0.05.

Table 4. Wald Test

Panel Groupwise Heteroscedasticity Tests		
Ho: Panel Homoscedasticity - Ha: Panel Groupwise Heteroscedasticity		
Lagrange Multiplier LM Test	4649.557	P-Value > Chi2(7) 0.0000
Likelihood Ratio LR Test	23.2003	P-Value > Chi2(7) 0.0016
Wald Test	1.18E+04	P-Value > Chi2(8) 0.0000

"Wooldridge test" was used to check the Autocorrelation for this model. The result *Prob* > *F* = 0.0076, which is lower than 0.05, concludes that this study has serial correlation (Autocorrelation).

"Pesaran's test" was adopted to check the cross-sectional dependence in the model. According to the generated results, the probability value is higher than 5%,

concluding that the residuals are not correlated, which means that this study has no cross-sectional dependence.

However, this study has presented heteroscedasticity and serial correlation problems based on the diagnostic results. Therefore, as a remedial action, "panel cluster option (panel var)" has been used to rectify the problem. Through the panel cluster

option, we obtained robust standard errors, proving that both the problems of heteroscedasticity and serial correlation have been resolved. After obtaining the panel cluster option final output has been derived.

Regression Analysis

As the final step, regression analysis was performed based on the random effect method after running all the pretests mentioned above.

Table 5. Regression Analysis

Dependent Variable: non-performing Loans			
Independent variables	Estimates (1)	Robust standard errors (2)	p-values (3)
Inflation Rate	-0.0641*	0.03441	0.062
GDP	-0.3220***	0.1065	0.003
Exchange Rate	0.0764***	0.0166	0.000
Unemployment rate	-0.5703***	0.1888	0.003
Bank Size	-0.0049***	0.0020	0.017
Efficiency	-0.0155	0.2945	0.600
ROA	-0.1039	2.6016	0.724
Time-fixed effect	No		
Company fixed effect	No		
No. of Groups	8		
No. of observations	88		
P-value	0		
R-squared- within	0.6459		
R-squared –between	0.1181		
R-squared - overall	0.499		

*This table reports coefficients, standard errors and t-values from the estimation of Equation in Columns (1), (2) and (3) respectively. *, **, *** denote statistical significance at the 10%, 5% and 1% level, respectively.*

According to the main analysis, it shows that GDP growth rate, Exchange rate, Unemployment rate, and bank size have a significant effect on non-performing loans in the Sri Lankan banking industry at a 95% confidence interval. The inflation rate also has a significant impact, however, only at a 90% confidence level. But bank efficiency and return on asset (ROA) do not show any significant relationship with NPLs.

V. Discussion

Among these relationships, only the exchange rate shows a positive relationship.

However, Beck, Jakubik, and Piloju (2013), Khemraj and Pasha (2009), Atanasijevic and Bozovic (2016), Alhassan, Coleman, and Andoh (2014) showed that exchange rate has a negative correlation with NPL in their studies which is the in contrary to the findings of this study.

This may be due to frequent appreciation of foreign currencies against the local currency, causing daily depreciation of rupee value. Hence companies in Sri Lanka must pay substantial money to foreign suppliers causing unexpected losses to the company. Not only that, Sri Lanka has a huge balance

of payment deficit. This may also be another reason for this positive relationship.

Hence, this must be the reason to show a positive relationship with the non-performing loans according to the output of the study, which agree with the results with Farhan, Satar, Chaudhry, and Khalil (2012); and Prasad and Espinoza (2010); and Rulyasri, Achسانی, and Mulyati (2017).

Apart from the exchange rate, all the other variables show a direct negative relationship on non-performing loans including inflation rate, unemployment rate, bank efficiency, bank size, GDP, and ROA.

According to Santoni (1986), inflation is vital for banks in their capacity of financial intermediation, having adjusted for anticipated inflation, and can suffer massive default risk depending on the fluctuation of inflation between the anticipated and actual inflation rates on their fixed instrument. According to the main analysis of this study, the inflation rate shows a significant negative relationship related to the NPL. Further, previous literature such as Alhassan, Coleman, and Andoh (2014), Khemraj and Pasha (2009), Hoggarth, Sorensen, Zicchino (2005) and Fofack (2005) show a positive correlation of inflation with NPL, which is in contrast with the results of the study. However, Rajha, (2016) and Boakye-Adjei and Amuakwa-Mensah, (2015) suggested a negative correlation between inflation and NPL. According to the results of the study, a negative relationship may be due to the strict inflation-target-based monetary policy frameworks initiated in the country when granting loans. In this kind of situations, banks will filter their potential customers based on their capacity, collateral, capital, character, and conditions. Then banks will lend money to the right set of customers that can assure that they will repay their loans.

Lawrence (1995), showed that borrowers with low incomes have higher default rates due to the increased risk of facing unemployment and being unable to pay. In turn, an increase in unemployment will be

reflected mainly in a decrease in production due to the decline in effective demand (which results in lower growth rates). This may result in a decrease in the revenues of firms and, therefore a decrease in their ability to meet their debt obligations. Accordingly, in periods of high economic growth and low unemployment rates, borrowers are able to pay back the debt. Consequently, resulting in the decline in NPLs. However, this study proved otherwise. This finding could be explained in a number of dimensions. This may be because unemployed customers in Sri Lanka got no fixed income, no collateral, and no social security like other developed countries, where they get allowances from the government till they find a job. Hence due to these insecurities, people without employment cannot assure that they can repay the loan. Therefore, banks are also discouraged from granting loans to unemployed people. Accordingly, these factors justify the negative relationship between unemployment and NPL. Messai and Jouini (2013), Farhan, Satar, Chaudhry, and Khalil (2012), showed that NPL has a positive relationship with the unemployment rate, while Anjom and Karim (2016) showed a significant negative relationship with NPL, which were precisely similar to the result of the variable derived in the study.

Bank size showed a negative impact on NPL, which means when bank size is increasing, it is enriched with more assets, more funds and cash flow. Hence, a company can pool those funds to implement risk-mitigating actions like background checking, credit rating checks, credit investigations and implement more processes and controls when granting loans. This will help banks to decrease the risk of NPL. These facts justify the negative relationship with NPL. Furthermore, when the size of the banks increases, that determines the bank is well experienced in customer behaviors. So that they could decide on to whom, when, and how much to grant their customers. All these factors confirmed the negative relationship of bank size with NPL in Sri Lankan context. Several authors like Salas & Saurina (2002), Ranjan

and Dhal (2003), Jakubik and Reininger (2013) and HU, LI, and CHIU (2004), also found a negative relationship between bank size and NPLs. On the contrary, Rajha (2016), Khemraj and Pasha (2009), Boakye-Adjei and Amuakwa-Mensah (2015), concluded that the size of the bank positively impacts NPL.

ROA and efficiency show an insignificant negative relationship on NPL in Sri Lankan Banking Industry. This insignificance may be caused due to both ROA and efficiency of the banks, which are internal factors of the banks subject to the different unobservable and uncontrollable internal factors. Many scholars such as Rajha (2016), Podpiera, Weill, and Schobert (2008) and Ekanayake and Azeez (2015) have found a negative relationship between the efficiency of the banks and NPL.

VI. Conclusion and Recommendation

The main objective of this study is to examine the determinants of non-performing loans in commercial banks of Sri Lanka. In order to achieve this objective, the quantitative approach was used. The data were collected from the Central Bank database, Commercial Banks' annual publications as well as from web pages of different banks. The sample that has been selected to proceed with the study consists of eight commercial banks and the study has been done to the period of 2008 to 2018.

As per the results derived, there is a significant relationship between the independent variables; GDP growth rate, unemployment rate, inflation rate, foreign exchange rate, and bank size with the dependent variable; non-performing loan rate. According to the results, the relationship between independent variables; efficiency and ROA with the dependent variable; non-performing loans rate was proved to be insignificant.

The primary motive of the study is to test how the bank will adopt themselves to mitigate the risk of non-performing loans on bank

performance. The analysis could be of interest to policymakers in order to access the impaired loans and determinants in the financial sector, which is a crucial element of macro-prudential investigation. A comprehensive understanding of significant drivers that affect the NPL in the financial system will help policymakers to impose strategic policies on the economy.

The research findings have implications for the management of banks in Sri Lanka as well as banks in other developing countries. They can identify the impact of inefficiency in their core business activity in order to maximize profitability. It will also facilitate them in strategic decision-making. Further, these results can serve as a cross-check for bank supervisors in emerging markets who wish to set up econometric models linking NPLs with macroeconomic indicators. When collecting financial data to study the non-performing loan matter related to commercial banks in Sri Lanka, the study limits the mandatory disclosed financial data due to confidentiality of their policies in practice. Hence, the non-availability and accessibility of data prevent a comprehensive study on bank-specific variables.

Not only that but also the study uses most of the variables in the form of aggregate percentages, as percentages do not ideally disclose the exact amount and the quality of its workings.

For comprehensive investigation, future researchers may take the following factors into their consideration; Increasing the sample size and extending the period of time; Consider categories of non-performing loans. E.g., Business Loans, personal loans, bank overdrafts etc.; Cover cross countries to capture countries' differences and to uncover differences from the financial system and regulation factors; Consider the impact of global implications on non-performing Loans in Sri Lankan banking industry; Consider different types of financial institutions. E.g., Private banks, public banks and leasing companies.

References

- Akinlo, O., & Emmanuel, M. (2014). Determinants of non-performing loans in Nigeria. *Accounting & taxation*, 6(2), 21-28.
- Alhassan, A. L., Andoh, C., & Kyereboah-Coleman, A. (2014). Asset quality in a crisis period: An empirical examination of Ghanaian banks. *Review of Development Finance*, 4(1), 50-62.
- Amuakwa-Mensah, Franklin & Boakye-Adjei, Angela. (2015). Determinants of non-performing loans in Ghana banking industry. *Int. J. Computational Economics and Econometrics*, 5, 35-54. 10.1504/IJCEE.2015.066207.
- Anjom, W., & Karim, A. M. (2016). Relationship between non-performing loans and macroeconomic factors with bank specific factors: a case study on loan portfolios—SAARC countries perspective. *ELK Asia Pacific Journal of Finance and Risk Management*, 7(2), 1-29.
- Atanasijević, J., & Božović, M. (2016). Exchange rate as a determinant of corporate loan defaults in a Euroized economy: Evidence from micro-level data. *Eastern European Economics*, 54(3), 228-250.
- Badar, M. & Yasmin Javid, A. (2013), "Impact of macroeconomic forces on nonperforming loans: an empirical study of commercial banks in Pakistan", *WSEAS Transactions on Business and Economics*, Vol. 10 No. 1, pp. 40-48.
- Beck, R., Jakubik, P., & Piloju, A. (2013). Non-performing loans: What matters in addition to the economic cycle?.
- Beck, R., Jakubik, P., & Piloju, A. (2015). Key determinants of non-performing loans: new evidence from a global sample. *Open Economies Review*, 26(3), 525-550.
- Berge, O., & Goddin, K. (2007). An analysis of banks' problem loans. *Economic Bulletin*, 78, pp. 65-76.
- CBSL. (2013). Directions, Determinations, and Circulars issued to Licensed Commercial Banks. Sri Lanka. Sri Lanka: Central Bank Sri Lanka. Retrieved from https://www.cbsl.gov.lk/sites/default/files/cbslweb_documents/laws/cdg/bsd_LCB_Up_to_30_Nov_2013_compressed_0.pdf
- CBSL. (2018). Annual Report. Sri Lanka: Central Bank of Sri Lanka. Retrieved from [cbsl.gov.lk: https://www.cbsl.gov.lk/sites/default/files/cbslweb_documents/publications/annual_report/2018/en/12_Chapter_08.pdf](https://www.cbsl.gov.lk/sites/default/files/cbslweb_documents/publications/annual_report/2018/en/12_Chapter_08.pdf)
- Ekanayake, E. M. N. N., & Azeez, A. A. (2015). Determinants of non-performing loans in licensed commercial banks: Evidence from Sri Lanka. *Asian Economic and Financial Review*, 5(6), 868.
- Espinoza, M. R. A., & Prasad, A. (2010). Non-performing loans in the GCC banking system and their macroeconomic effects. *International Monetary Fund*.
- Farhan, M., Sattar, A., Chaudhry, A. H., & Khalil, F. (2012). Economic determinants of non-performing loans: perception of Pakistani bankers. *European journal of business and management*, 4(19), 87-99.
- Fofack, H., & Fofack, H. L. (2005). Non-performing loans in Sub-Saharan Africa: causal analysis and macroeconomic implications (Vol. 3769). World Bank Publications.
- Godlewski, C.J. (2008), "Bank capital and credit risk taking in emerging market economies", *Journal of Banking Regulation*, Vol. 6 No. 2, pp. 128-145, doi: 10.1057/palgrave.jbr.2340187.
- Hoggarth, G., Sorensen, S., & Zicchino, L. (2005). Stress tests of UK banks using a VAR approach.
- HU, J. L., Li, Y., & CHIU, Y. H. (2004). Ownership and non-performing loans: Evidence from Taiwan's banks. *The Developing Economies*, 42(3), 405-420.

- Jakubík, P., & Reininger, T. (2013). Determinants of non-performing loans in Central, Eastern and Southeastern Europe. Focus on European Economic Integration, 3, 48-66.
- Khemraj, T., & Pasha, S. (2009). The determinants of non-performing loans: an econometric case study of Guyana.
- Klein, N. (2013). Non-performing loans in CESEE: Determinants and impact on macroeconomic performance. International Monetary Fund.
- Kumarasinghe, P. J. (2017). Determinants of non performing loans: Evidence from Sri Lanka. International Journal of Management Excellence, 9(2), 1113-1121.
- Louzis, D. P., Vouldis, A. T., & Metaxas, V. (2010, August). The determinants of non-performing mortgage, business and consumer loans in Greece: A dynamic panel data study. In International Conference on Applied Economics—ICOAE (pp. 479-487).
- Messai, A. S., & Jouini, F. (2013). Micro and macro determinants of non-performing loans. International journal of economics and financial issues, 3(4), 852.
- Otašević, D. (2013). Macroeconomic determinants of the quality of banks' loan portfolio in Serbia (No. 27).
- Pruteanu-Podpiera, A., Weill, L. & Schobert, F. (2008). Banking Competition and Efficiency: A Micro[1]data Analysis on the Czech Banking Industry. Comparative Economic Studies, 50, (2), 253-273.
- Rachman, R. A., Kadarusman, Y. B., Anggriono, K., & Setiadi, R. (2018). Bank-specific factors affecting non-performing loans in developing countries: Case study of Indonesia. The Journal of Asian Finance, Economics and Business, 5(2), 35-42.
- Rajan, R., & Dhal, S. C. (2003). Non-performing loans and terms of credit of public sector banks in India: An empirical assessment. Reserve Bank of India Occasional Papers, 24(3), 81-121.
- Rajha, K. S. (2016). Determinants of non-performing loans: Evidence from the Jordanian banking sector. Journal of Finance and Bank Management, 4(1), 125-136.
- Rulyasri, N., Azam Achsani, N., & Mulyati, H. (2017). Effects of macroeconomic conditions on non-performing loans in retail segments: an evidence from the Indonesian Banking. International Journal of Scientific and Research Publications, 7(10), 208-217.
- Saba, I., Kouser, R., & Azeem, M. (2012). Determinants of non performing loans: Case of US banking sector. The Romanian Economic Journal, 44(6), 125-136. (CBSL, 2018)
- Salas, V., & Saurina, J. (2002). Credit risk in two institutional regimes: Spanish commercial and savings banks. Journal of Financial Services Research, 22(3), 203-224.
- Shingjergji, A. (2013). The Impact of Macroeconomic Variables on the Non Performing Loans in the Albanian Banking System During 2005-2012. Academic Journal of Interdisciplinary Studies, 2(9), 335.
- Smith, L Douglas & Edward C. Lawrence. 1995. "Forecasting Losses on a Liquidating Long-term Loan Portfolio". Journal of Banking and Finance, Vol. 19, No. 6, 959-985.