

The Impact of Bank-Specific and Macroeconomic Factors on Non-performing Loans in Sri Lankan Commercial Banks

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The main purpose of this study is to ascertain the effect of bank-specific and macroeconomic factors on non-performing loans in systemically and non-systemically important commercial banks in Sri Lanka over 10 year's period from 2004 to 2013. Also, the study examines the impact of civil war that prevailed in the country for 30 years on the ex-post credit risk of the banking sector. The study employed panel data methodology to investigate the effect of bank-specific and macroeconomic factors on non-performing loans. Panel unit root test has been undertaken in order to test the stationarity of the variables. Hausman test and Wald coefficient restriction test were used to select the appropriate model out of pooled, random, and fixed effect. A dummy variable panel regression model adopted to study the war effect, considering 2009 as the structural year. Findings revealed that return on assets as a proxy for bank efficiency has a significant negative influence, while non-interest income as a proxy for income diversity is positively correlated with non-performing loans of systemically important banks. Both real gross domestic products and lending rates were highly significant in both bank types. On contrary with literature, growth in bank branches is negatively correlated. Public banks do not account for higher level of non-performing loans compared to their private counterpart. Finally, it was identified that civil war had an effect on the level of non-performing loans in commercial banks. The research would have benefited if the analysis is carried out among classified types of loans offered by commercial banks. Future researchers should involve in identifying the most significant contributing loan type to the non-performing loans and its determinants. This study is one of the few studies which have investigated the causes of non-performing loans in the commercial banking industry in Sri Lanka. The analysis of civil war and its impact on non-performing loans is the first study of that nature to be conducted in the context.

Keywords: non-performing loans, credit risk, commercial banks, civil war, Sri Lanka

Introduction

Credit risk is of utmost significant to banking institutions as lending operations form the core business. Credit risk or the risk of default is dependent on the quality of assets and is reflected through the volume of non-performing loans (NPLs). According to IMF (2009), NPLs are those loans which are 90 days or more past dues or no longer accruing interest. Researchers often associate the occurrence of financial crises with a massive

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accumulation of NPLs. In Indonesia, over 60 banks collapsed during 1997 East Asian financial and banking crisis where NPLs represented about 75 percent of total banks' loan portfolios (Caprio & Klingebiel, 1996). The banking crisis which affected a large number of Sub-Saharan African countries in the 1990s was accompanied by a rapid accumulation of NPLs (Fofack, 2005, Waweru & Kalani 2009). Sri Lanka experienced its first post independence bank failure when the Pramuka Savings and Development Bank collapsed in 2002. At that time, the bank had recorded almost 80 percent of its credit portfolio as non-performing (De Zilva, 2004). Central Bank of Sri Lanka (CBSL) reported that the gross NPL ratio of the country has increased from 3.6 percent in 2012 to 5.6 percent in 2013 (CBSL, 2013). In concern of this, CBSL has mentioned NPLs as one of the factors of banking soundness indicators (BSI) that to be used to assess the soundness of the banking sector. A bank with a high percentage of NPLs could lead to an erosion of capital. Therefore, NPLs can be treated as an undesirable cost to a bank, which decreases the bank performance (Chang, 1999).

Fonseka (2009) who studied the NPL issue across a cross section of Asian countries: Bangladesh, Indonesia, Philippines, Malaysia, and Thailand found that the Sri Lankan banking sector can be ranked only above Bangladesh in terms of the level of NPLs. As mentioned in the World Bank (2013) development indicators, Sri Lankan banks records high NPL ratio when compared with developed (Australia, Singapore, United States, and Japan) and developing countries (China, India, and Malaysia) which indicates the reduction in the NPLs and is vital for the banking industry soundness. The existence of high levels of NPLs would hinder the benefits to the county through inefficient financial intermediation. Hence, there is a national level responsibility towards banks, to manage the NPL ratio at an acceptable level. Consequently, it is important to identify "what causes NPLs". Therefore, this study would help to get an insight on the bank-specific and macroeconomic factors, which affect NPLs in commercial banks and in which magnitude it contribute to NPLs. In addition, the study would also investigate the effect of civil war on NPLs in the commercial banking sector in Sri Lanka.

In this study, NPL ratio considered as the dependent variable, while independent variables include bank-specific factors (return on assets, growth in number of bank branches, ownership, and non-interest income) and macroeconomic factors (real GDP growth rate, lending interest rate, interest rate spread, and inflation). The panel data econometric approach employing pooled panel, random effect panel, and fixed effect panel are used under two categories: systemically important banks and non-systemically important banks. Dummy variable panel regression model is employed to identify the effect of civil war on NPLs of commercial banks in Sri Lanka. The total population of local commercial banks were included in the sample during the period of 2004-2013. The relevant data are gathered from secondary sources.

Findings revealed that return on assets (ROA) is significant and negatively related with NPLs in systemically important banks (SIBs). Non-interest income had a significant positively relationship. On contrary with literature, growth in bank branches found negatively associated and insignificant in determining NPLs of SIBs. Further, it was identified that public banks do not account for higher level of NPLs. In macroeconomic variables, the growth in real GDP and lending interest rate were highly significant in both types of banks. Inflation rate and interest rate spread were insignificant in determining NPLs of commercial banks. The study revealed that bank-specific factors have more control over NPLs. Finally, it was identified that civil war had an effect on the level of NPLs in commercial banks.

The remaining of this paper is organized as follows: The second section discusses previous research findings; the third section explores on data and methodology used in deriving the output; empirical results analysis is in the fourth section; and conclusion of the study is presented in the final section.

Literature review

Theoretical Background

This study is based on Diamond's (1984) financial intermediation theory and agency theory of Jensen and Meckling (1976). Financial intermediation theory emphasized that financial institutions act as delegated monitors. Delegated monitor is an economic agent appointed to act on behalf of smaller agents in collecting information and/or investing funds on their behalf (Saunders & Cornet, 2008). Depositors delegate the monitoring role of their funds to banks. Risk increases when banks make adverse loan selection. Therefore, inefficient monitoring by banking institutions may caused high loan defaults.

The agency relationship can be defined as a contract under which one or more person (the principal) engage with another person (the agent) to perform some service, which involves delegating decision-making authority to the agent (Jensen & Meckling, 1976). If both parties to the relationship are utility maximizers, there is a good reason to believe that the agent will not always act in the best interest of the principal, which can be mentioned as principal agent problem. Once managers obtain a reasonable return on equity for their shareholders, they may engage in activities that depart from the firm's value maximization. To a certain extent that managers have limited liability, they could be favor with high risk-return strategies (i.e., over extension of credit) in order to increase the market presence and to enhance the organization (Das & Ghosh, 2003). However, Ciancanelli and Gonzalez (2000) had demonstrated that the principal agent problem in banking institutions is different to that of traditional agency problem in other corporations. Even though, agency theory maintains that shareholders are the residual claimants in the firm (Fama & Jensen, 1983) viewing of bank shareholders as the only residual claimants is problematic (Srivastav & Hagendorff, 2016). This is because, in addition to the shareholders' interest in banks, interest of debtholders (depositors) is prominent (John, DeMasi, & Paci, 2016) and considers as primary claimholders (John & Qian, 2003). Further, banks are highly leveraged and their liabilities are guaranteed by state. Thus, agency theory exacerbates risk-taking concerns in the banking industry (Srivastav & Hagendorff, 2016), which results in excessive lending over and above the optimum level that increases the level of NPLs of the bank.

Empirical Background

With the existing finance literature, it is widely believed that problem loans arise as a result of both macroeconomic and microeconomic factors. Most of the literature is based on country specific studies. For example, Sinkey and Greenwalt (1991) mentioned that both internal (bank-specific) and external (macroeconomic) factors are responsible for the loan loss rate in the United States. While investigating the leading causes of NPLs in Sub-Saharan Africa in 1990s, Fofack (2005) highlighted a strong causality between NPLs and economic growth, real exchange rate appreciation, real interest rate, net interest rate, and interbank loans. Further, they have concluded that dramatic increase in NPLs is largely driven by the macroeconomic volatilities with the exposition of economies to external shocks. The study undertaken by Aziz, Ibrahim, and Kamaruddin (2009) and Akter and Roy (2017) has identified that there is a significant and negative relationship with NPLs and bank's profitability. Warue (2013) concluded that banks' NPLs have negative and significant

relationship with return on assets, return on capital employed, and bank size. However, bank's profitability was not identified as a significant determinant of NPLs in Sri Lankan context (Ekanayake & Azeez, 2015).

If the bank is a new entrant to the product or regional market, market share strategy would be another reason for the rise in NPLs of the bank. At the initial stage of operations of a bank, NPLs might be high due to lack of necessary credit management expertise (Das & Ghosh, 2003). According to Das and Ghosh (2003), if the bank advances loans in a traditional geographical market where bank managers are familiar with their clients, problem loans can be kept under control, given that the adverse selection problem does not exist. However, Cotugno and Stefanelli (2011) revealed that extension of the branch network with more autonomy would reduce the default rate, as it reduces the functional distance of operations. As to Goetz, Laeven, and Levine (2016), geographic diversification of banks does not affect loan quality. Empirical literature gives evidence for bank diversification into non-interest income areas leads to banking sector instability. According to DeYoung and Rice (2004), non-interest income is generated from traditional and non-traditional activities. The risk and earning volatility of non-interest income in non-traditional activities are considered when determining the effect on credit risk. As to them, non-interest income increases banks' profitability yet increases the risk associated with the earnings volatility. Another aspect that would affect the level of NPLs of individual banks is the ownership structure in similar economic setup. Hu, Li, and Chiu (2006) examined the relationship between NPLs and ownership structure of commercial banks in Taiwan with a panel data set of 40 commercial banks and found that the rate of NPLs decreases as government shareholding increases of a bank up to 64 percent and thereafter it increases. However, most of the existing literature (Rajaraman & Vasishtha, 2002; Warue, 2013) found that the state-owned banks are vulnerable to political lobbying and administrative pressure, resulting in a higher NPL ratio.

There are significant empirical evidences on negative relationship between the growth in real GDP and NPLs in the financial literature. Salas and Saurina (2002) measured the aggregated economic activity by GDP growth rate current and lagged one year, and found a significant negative relationship. The same relationship was identified between NPLs and GDP through the studies done by Ranjan and Dhal (2003), Das and Ghosh (2003), Khemraj and Pasha (2008), Al-Smadi and Ahmad (2009), Jimenez and Saurina (2006), and Ekanayake and Azeez (2015). As explained by Warue (2013), a growth in real GDP usually translates into more income, which improves the debt servicing capacity of borrower, which in turn contributes to lower NPLs. Conversely, when there is a slowdown in the economy, the level of NPLs should increase.

Many previous studies proved that an increase in the rate of inflation adversely affects the financial sector performance. Among the macroeconomic variables that explain the NPLs in Jordanian banks, Al-Smadi and Ahmad (2009) found that inflation affects NPLs with the highest significance. This indicates that inflation has a substantial negative impact on the credit risk. Similarly, Fofack (2005) revealed based on a granger-causality analysis that real interest rate, growth rate of GDP per capita, net interest margin, inflationary pressure, return on assets, and interbank loans are as possible contributors to the high level of impaired loans in a number of Sub-Saharan African countries. According to Khemraj and Pasha (2008), there is a mixed relationship between inflation and NPLs. The variable has a negative relationship with NPLs at time t but a positive impact at time $t-1$. This means that high inflation in the current period should see a reduction in the level of NPLs in the banking sector. However, high inflation from the previous period causes commercial banks to incur higher NPLs. Apart from the mixed effects that inflation appears to exert on NPLs, the coefficients of the inflation variables were not

statistically significant in the study. Contrary to previous findings, Ekanayake and Azeez (2015) identified that inflation of the economy have a negative and significant impact on NPLs of the commercial banks.

Interest rates were also found as a significant contributor for commercial banks' NPLs. Espinoza and Prasad (2010) had ascertained the determinants of NPLs in the Gulf Cooperation Council (GCC) banking sector. The empirical results support the view that the NPL ratio worsens as economic growth becomes lower and lending interest rates and risk aversion increase. Similarly, in the study of Jimenez and Saurina (2006), a significant and positive relationship was identified between problem loans and interest rate measured by inter-bank interest rate. A decline of interest rate would result in decline in the problem loans of commercial banks. As to Ekanayake and Azeez (2015), in Sri Lankan commercial banks, NPLs have a significant positive influence from interest rate of the economy. This indicates that increasing trend in real interest rates is translated in to higher NPLs. Warue (2013) had identified that there is a positive and significant relationship between the interest rates spread and NPL levels across all bank categories: ownership and size. The findings implied that a positive development in interest rates spread improves NPL levels in Kenyan commercial banks. This findings concur with Collins and Wanjau's (2011) findings where they concluded that the interest rate spread affects performing assets in banks, as it increases the cost of loan charged on borrowers.

Through the above critical review of literature, it is clear that the phenomenon of NPLs is experienced by commercial banks all over the world and it is apparent that there are extensive international evidences, which suggest that NPLs of commercial banks should be explained by both bank-specific and macroeconomic factors.

Research Design

Sample Selection and Variables

By the end of 2013, Sri Lanka's banking sector comprised with 25 licensed commercial banks (LCBs) and nine licensed specialized banks (LSBs). LSBs are excluded from the sample because of the differences in the business model. From 25 LCBs, 11 domestic LCBs are selected for the analysis during the period of 2004-2013 excluding the foreign LCBs. The sample consists of two public banks (Bank of Ceylon [BOC] and Peoples' Bank [PB]) and nine private banks (Commercial Bank of Ceylon PLC [COMB], DFCC Vardhana Bank [DFCCVB], Hatton National Bank PLC [HNB], National Development Bank [NDB], Nations' Trust Bank [NTB], Pan Asia Banking Corporation [PABC], Sampath Bank PLC [SAMB], Seylan Bank PLC [SEYB] and Union Bank [UB]). The sample is further divided into two sub categories: systemically important banks and non-systemically important banks as identified by the Central bank of Sri Lanka. The analysis will be undertaken based on these two categories in order to identify the link between independent variables and NPLs. Systemically, important banks (SIBs) accounted for more than 50 percent of the assets of the banking industry and 76.4 percent of the commercial banks' assets base (CBSL, 2013). SIBs comprised with two public banks (BOC and PB) and four private banks (COMB, HNB, SAMB, and SEYB). Non-systemically important (NSIBs) category consists of five private banks: DFCCVB, NDB, NTB, PABC, and UB.

The dependent variable of the study is non-performing loans (NPLs). The increasing nature of loan defaults is a critical issue for banks and therefore research studies on NPLs have become popular. Many empirical studies identified multifold contributors for loan defaults, considering NPLs as dependent variable (Mohanty, Das, & Kumar, 2018; Mpofu & Nikolaidou, 2018; Ikram, Su, Ijaz, & Fiaz, 2016). According to IMF (2009), NPLs are

those loans which are 90 days or more past dues or loans which are for a relatively long period of time do not generate income. That is the principal and/or interest on these loans, which have been unpaid for at least 90 days. The total rupee value of NPLs outstanding in each year as a percentage of total loans and advances (NPL ratio) of sample LCBs has been considered in the study as the dependent variable. The independent variables under the study categorized into two major areas: bank-specific factors and macroeconomic factors. Bank-specific factors include: ROA, growth in number of bank branches, ownership, and non-interest income. Macroeconomic factors include: real GDP growth rate, lending interest rate, interest rate spread, and inflation.

Hypotheses Development and Econometric Model

Following hypotheses have been developed with regard to independent and dependent variables according to the expected relationship justified through the literature as discussed above:

Hypothesis 1: ROA has a negative relationship with NPLs;

Hypothesis 2: Growth in number of bank branches has a positive relationship with NPLs;

Hypothesis 3: Non-interest income has a positive relationship with NPLs;

Hypothesis 4: GDP growth rate has a negative relationship with NPLs;

Hypothesis 5: Lending rate of the economy has a positive relationship with NPLs;

Hypothesis 6: Interest rate spread has a positive relationship with NPLs;

Hypothesis 7: Annual inflation growth has a positive relationship with NPLs;

Definitions of the variables and the expected signs are presented in Table 1.

Table 1

Definitions of Variables and Expected Sign

Notation	Empirical definition	Expected sign
NPL_{it}	Ratio of non-performing loans to total loans for bank i at time t	
ROA_{it}	Ratio of net income to total assets at bank i at time t	(-)
$GBRAN_{it}$	Growth in the number of bank branches of bank i in year t	(+)
NII_{it}	Ratio of non-interest income to total income of bank i in year t	(+)
D_1	Dummy variable for ownership where public banks equal 1 otherwise 0	(+)
$GDPG_t$	The annual growth in real GDP in year t	(-)
LIR_t	Prime lending rate in year t	(+)
IRS_t	Interest rate spread in year t	(+)
INF_t	The annual inflation rate in year t	(+)

Note. Source: The researcher (2015).

To investigate the effect of bank-specific factors and macroeconomic factors on NPLs, the study would employ panel data methodology similar to Salas and Saurina (2002), Warue (2013), and Ekanayake and Azeez (2015). Panel unit root test has been undertaken in order to test the stationarity of the variables. For the regression analysis, pooled effect model (PEM), random effect model (REM), and fixed effects model (FEM) have been considered and Hausman test has been used to select the best model out of FEM and REM. Wald coefficient restriction test has been applied to select the appropriate model out of PEM and FEM. Finally, dummy variable panel regression model employed in studying the war effect, while considering 2009 as the structural year. EViews version 6 was used as the statistical software in order to run the panel data regression.

The regression one and two, as below, were constructed to determine the effect of bank-specific factors and macroeconomic factors on NPLs respectively and to determine the magnitude of bank-specific and macroeconomic variables on NPLs; the Regression Model 3 was developed adopting the approach of Warue (2013).

$$NPL_{it} = \beta_1 - \beta_2ROA_{it} + \beta_3GBRAN_{it} + \beta_4NII_{it} + \beta_5D_1 + \varepsilon_{it} \quad (1)$$

$$NPL_{it} = \beta_1 - \beta_2GDPG_t + \beta_3LIR_t + \beta_4IRS_t + \beta_5INF_t + \varepsilon_{it} \quad (2)$$

$$NPL_{it} = \beta_1 + \beta_2BS_{it} + \beta_3Macro_t + \varepsilon_{it} \quad (3)$$

Empirical Results

Unit root analysis was conducted to decide the level of stationary of the variables. As to the results in Table 2, all the p values are highly significant. Therefore, variables being used in the study are stationary.

Table 2

Results of the Unit Root Test

Variables	Statistics	Probability (p)
Non-performing loans (NPL)	-7.4241	0.0000
Return on assets (ROA)	-2.7973	0.0026
Growth in bank branches (GBRAN)	-6.4427	0.0000
Non-interest income (NII)	-3.5123	0.0002
Real GDP growth rate (GDPG)	-7.8876	0.0000
Inflation (INF)	-5.5633	0.0000
Lending interest rate (LIR)	-10.4235	0.0000
Interest rate spread (IRS)	-9.2620	0.0000

Note. Source: The researcher (2015).

Descriptive Statistics

To understand the nature of data, descriptive statistics and results are provided in Table 3. The mean NPL of all banks over the test period is 0.0823. This suggests that banks could not collect 8.23 percent of every loan given. The highest NPLs are 0.3123 while the lowest are 0.0136. In independent variables, the average ROA for the period is 0.0132. The average growth of bank branches is 12.38 percent with a high volatility. NII of banks as a percentage of total income averaged to 15 percent with a maximum of 31 percent and a minimum of 7 percent during the period. Considering the macroeconomic variables, the mean real GDP growth is 6.54 percent with highest (8.2 percent) in 2011 and the lowest (3.5 percent) in 2009. Inflation has an average of 9.84 percent with a standard deviation of 5.35 percent. The highest inflation growth of 23 percent was recorded in 2008. The average LIR and IRS of the economy is 13 percent and 5 percent respectively. Both variables have the highest values; 18.9 percent and 8 percent respectively in 2008 due to economic instability of the country.

Table 3

Descriptive Statistical Summary

Variables	Mean	Median	Maximum	Minimum	Std. dev.
NPL	0.0823	0.0681	0.3123	0.0136	0.0493
ROA	0.0132	0.0101	0.0197	-0.0072	0.0285
GBRAN	0.1238	0.0750	0.7692	-0.0255	0.1394
NII	0.1554	0.1502	0.3148	0.0719	0.0468
GDPG	0.0654	0.0655	0.0820	0.0350	0.0134
INF	0.0984	0.0755	0.2260	0.0350	0.0535
LIR	0.1304	0.1275	0.1890	0.0940	0.0312
IRS	0.0507	0.0485	0.0800	0.0300	0.0172

Note. Source: The researcher (2015).

Regression Analysis

In determining the effect of bank-specific and macroeconomic factors on NPLs of commercial banks, panel regression model has been used. Bank-specific factors and macroeconomic factors have been analyzed separately and further; effect on systemically and non-systemically important banks have been analyzed.

Effect of bank-specific factors on NPLs. Regression result of four bank-specific variables: return on assets, growth in bank branches, non-interest income, and ownership are provided in Table 4. Pooled effect model (PEM) used without considering the heterogeneity or the individuality of the selected sample. As to the results, GBRAN depicts a significant negative influence over NPLs at five percent level of significance. However, ROA, OWN, and NII are not significantly associated with NPLs.

Table 4

Bank-Specific Variables and NPLs

Variables	Pooled			Random		Fixed with dummy variables
	1 Full	2 SIBs	3 NSIBs	4 Full	5 NSIBs	6 SIBs
ROA	-0.0804 (0.6300)	-8.3389 (0.0000)***	0.0277 (0.8600)	-0.0481 (0.6976)	0.0906 (0.4244)	-4.4010 (0.0092)**
GBRAN	-0.0715 (0.0455)*	-0.0969 (0.3571)	-0.0160 (0.6779)	-0.0221 (0.4462)	-0.0017 (0.9516)	-0.0725 (0.5022)
NII	0.0714 (0.4832)	0.1239 (0.2901)	-0.0893 (0.5227)	0.1872 (0.0302)**	0.0914 (0.4075)	0.2300 (0.0764)*
OWN	-0.0173 (0.1785)	-0.0453 (0.0002)***	-	-0.0100 (0.7663)	-	-
R ²	0.0485	0.5016	0.0149	0.0495	0.0276	0.6306
F test	0.2602	0.0000	0.8731	0.2502	0.7288	0.0000

Notes. *** 1 percent, ** 5 percent, * 10 percent level of significance respectively. Source: The researcher (2015).

When the heterogeneity is considered, random effect model (REM) has been applied in the study. In order to select the best model among fixed effect model (FEM) and REM, Hausman test has been applied. *P* value of the Hausman test is 0.5705, thus null hypothesis of the Hausman test is accepted. It indicates that REM is appropriate to take the decision. Therefore, REM has been considered. Based on REM, NII has a significant positive influence on NPLs at 5 percent level with value of 0.1872. However, ROA, OWN, and GBRAN have no

significant effect. However, the validity of the finding has been affected by the insignificant probability value of F statistics. This is mainly due to the insignificant effect of non-systemically important banks (NSIBs) as these variables are not individually or jointly explain the variations of NPLs ($R^2=0.0276$).

Effect of bank-specific factors on NPLs of systemically important banks. As depicted in Column 2 of Table 4, according to the PEM, ROA, and OWN are highly significant variables at 1 percent level of significance. The values are respectively -8.3389 and -0.0453 which indicates that there is a negative relationship. While considering the individuality of banks, out of REM and FEM, FEM has been selected based on the Hausman test results. FEM has been further analyzed using dummy variables and Wald coefficient restriction test. To represent the selected SIBs, six dummy variables: D1-D6 have been used and intercept term has been removed to prevent the dummy variable trap. The null hypothesis of dummy variable zero was rejected according to the Wald test. Hence, there is an individuality of SIBs. This indicates that FEM is appropriate to take decisions. ROA is a significant variable with negative effect on NPLs as shown in the Column 6 of Table 4. NII is significant at 10 percent level and hence there is a marginal effect. As presented in Table 5, coefficients of dummy variables represent the effect of SIB on NPLs. Significant and positive values reflect that, SIBs are having a significant influence on NPLs. As to Column 6 of Table 4, R^2 of the FEM with dummy variables suggests that 63 percent of NPL variations have been explained by the independent variables.

Table 5

Individual Bank Effect on NPLs

Variables	Bank	Coefficient	p value
D1	Bank of Ceylon	0.0761	0.0186*
D2	Commercial Bank	0.0914	0.0156*
D3	Hatton National Bank	0.1029	0.0014**
D4	People's Bank	0.0901	0.0006**
D5	Sampath Bank	0.1032	0.0031**
D6	Seylan Bank	0.1672	0.0000**

Notes. ** 1 percent, * 5 percent level of significance respectively. Source: The researcher (2015).

Effect of bank-specific factors on NPLs of non-systemically important banks. NSIBs are comprised with five private banks, therefore OWN variable has been removed from the analysis. First PEM was undertaken without considering the heterogeneity of the banks. REM has been applied in the study after considering the Hausman test result. In REM, none of the variables were significant in determining NPLs. The R^2 value verifies (see Table 4) the fact that the independent variables are not individually or jointly explains the variations of NPLs in NSIBs.

Effect of macroeconomic factors on NPLs. Table 6 depicts a summary of the regression results in relation to the macroeconomic variables. First pooled effect model (PEM) has been considered without considering the individuality of the selected banks. Based on the results, GDPG and LIR are significant with negative coefficients of -1.4705 and -0.5227 respectively. However, INF and IRS were insignificant in determining NPLs as shown in Column 1 of Table 6. When the heterogeneity is considered the random effect model (REM) has been applied, and consequently, REM was selected by conducting the Hausman test. According to REM, GDPG and LIR are significant and have a negative association with NPLs. INF and IRS were not significant in REM in determining NPLs as revealed in Column 4 of Table 6.

Table 6

Macroeconomic Variables and NPLs

Variables	Pooled			Random		
	1 Full	2 SIBs	3 NSIBs	4 Full	5 SIBs	6 NSIBs
GDPG	-1.4705 (0.0008)***	-1.7425 (0.0060)***	-1.1442 (0.0573)*	-1.4705 (0.0000)***	-1.7424 (0.0000)***	-1.1442 (0.0040)***
INF	0.0363 (0.8369)	0.0730 (0.7734)	-0.0077 (0.9747)	0.0363 (0.7486)	0.0730 (0.6542)	-0.0077 (0.9606)
LIR	-0.5277 (0.0560)*	-0.7781 (0.0499)**	-0.2162 (0.5655)	-0.5277 (0.0033)***	-0.7781 (0.0029)***	-0.2162 (0.3725)
IRS	0.5655 (0.4022)	0.8731 (0.3693)	0.1962 (0.8334)	0.5655 (0.1932)	0.8731 (0.1643)	0.1962 (0.7437)
R ²	0.1868	0.1776	0.1071	0.2776	0.3436	0.2249
F test	0.0036	0.0272	0.2666	0.0000	0.0000	0.0196

Notes. *** 1 percent, ** 5 percent, * 10 percent level of significance respectively. Source: The researcher (2015).

Effect of macroeconomic factors on systemically important banks. According to Columns 2 and 5 (see Table 6), GDPG and LIR were significant and negatively related with the SIBs in both PEM and REM. The results suggest that an increase in real GDP growth rate and lending interest rate reduces the level of NPLs of SIBs. However, INF and IRS were not significantly related to NPLs in both models.

Effect of macroeconomic factors on non-systemically important banks. With regard to NSIBs, GDPG was found as significant and negatively related in both PEM and REM. This means an increase in real GDP growth rate will reduce the level of NPLs of NSIBs. As depicted in Columns 3 and 6 (see Table 6), other variables have no significant effect on NPLs in both models. Results of coefficients in both models are identical and indicate that identified association with NPLs is consistent. The F test results prove that REM is stable and reliable in deriving the results of the study in relation to the macroeconomic variables.

Magnitude of bank-specific factors and macroeconomic factors on NPL levels. According to the regression analysis of bank-specific factors, findings in relation to non-systemically important banks (NSIBs) were insignificant because the ability of the selected independent variables to explain the variations of NPLs in NSIBs were low. Further, in both PEM and REM, there was no common variable, which shows a significant influence on NPLs. In PEM, GBRAN was found as significant at 95 percent confidence level where as in REM, NII was found as significant at the 95 percent level of confidence. Therefore, in order to identify the magnitude of bank-specific and macroeconomic factors on NPLs, sub-sample of SIBs has been considered as the sample depicts a higher contribution to the overall average NPL ratio during the period. This can be further elaborated through the graphical representation as presented in Figure 1.

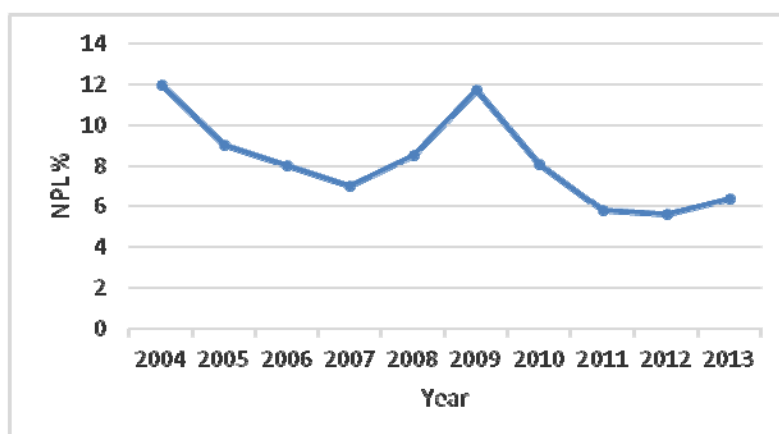


Figure 1. Weighted average NPLs ratio in 2004-2013 (Source: The researcher, 2015).

ROA variable was used as a proxy for bank-specific factors, while GDPG was used as a proxy for macroeconomic variables. The two variables were chosen on the basis of their high level of performance as analyzed in section “Effect of bank-specific factors on NPLs” with regards to the SIBs. PEM has been considered in the first instance and then REM has been considered similar to the prior analysis. Hausman test was undertaken to identify the appropriateness of REM. Therefore, researcher has considered REM in quantifying the magnitude of bank-specific and macroeconomic factors. Table 7 depicts a summary of the results of REM. According to REM, coefficient of bank-specific factors is -4.4880 and the coefficient of macroeconomic factors is -1.0582. This indicates that bank-specific factors contribute to NPLs performance more than macroeconomic factors in SIBs.

Table 7

The Selected Model Variable Results

	Coefficient	Std. error	<i>t</i> statistics	Probability
C	0.2065	0.0255	8.0815	0.0000
BS	-4.4880	1.3727	-3.2694	0.0018
Macro	-1.0582	0.3189	-3.3175	0.0016
R^2	0.3397			
Prob. (F-statistic)	0.0000			

Note. Source: The researcher (2015).

Effect of civil war on NPLs. In order to identify the war effect on NPLs, dummy variable panel regression model was used. War effect considered as the dummy variable and year 2009, where the civil war was ended as the structural shifting year. In this regard, pooled panel regression has been used to identify the war effect on NPLs and then the Hausman test was undertaken to ensure the validity of the random effect model (REM) in relation to both bank-specific and macroeconomic factors. Table 8 shows the summary results of war effect on NPLs in relation to bank-specific and macroeconomic factors. Considering the REM with respect to bank-specific factors, the probability of dummy variable war effect is significant at 99 percent level of confidence. Thus, there is an effect of war on NPLs in relation to bank-specific factors. As F test results confirm the stability of the findings, it is evident that there is a positive effect of war on NPLs. In relation to macroeconomic factors, it was found that there is a significant and positive effect of civil war on NPLs at 95 percent level of confidence.

Table 8

Significance of War Effect

	Coefficient	Std. error	<i>t</i> statistics	Probability	<i>R</i> ²	Prob. (F statistic)
Bank-specific	0.0464	0.0126	3.6846	0.0004	0.8412	0.0000
Macroeconomic	0.1255	0.0692	1.8118	0.0729	0.1736	0.0012

Note. Source: The researcher (2015).

Discussion of Findings

Effect of Bank-Specific Factors on NPLs

According to the analysis, it was revealed that results of NSIBs are insignificant as selected bank-specific factors do not explain the variations of NPLs in those banks. Therefore, the results in relation to SIBs have been considered in the discussion.

The findings of previous studies have proved that efficiency of the bank is negatively and significantly related to NPLs (Berger & DeYoung, 1997; Fofack, 2005; Al-Smadi & Ahamed, 2009; Ekanayake & Azeez, 2015). Banks with high performance are less pressure for revenue creation and are thus less constrained to engage in risky credit offerings. Therefore, efficient banks are less likely to experience high levels of problem loans. ROA was significant and negatively related to NPLs of SIBs in FEM with dummy variables. The findings concur with the previous results. According to the analysis, growth in bank branches was negative and insignificantly associated with SIBs. Das and Ghosh (2003) had mentioned that problem loans can be kept under control considering the manager's familiarity of the geographical area of expansion. Similarly, Cotugno and Stefanelli (2011) mentioned that the lesser the functional distance among branches is, the stronger the bank's recovery ability is, and hence, a low default rate could be executed. Goetz et al. (2016) were in the view that geographic expansion lowers bank risk by enabling banks to diversify their exposure to idiosyncratic local market risks. Further, in Sri Lanka and in many other Asian countries, banker and borrower's relationship has a great impact on the default rates of loans (Paravisini & Schoar, 2012). Therefore, banks can exert more power on loan recoveries by extending branch network.

Existing empirical studies have revealed that there is a significant and positive association between non-interest income and NPLs of commercial banks. In relation to United State's banking industry, Abedifar, Molyneux, and Tarazi (2014) had concluded that the introduction of non-interest generating activities may increase the credit risk due to loss of focus on lending, while lower credit exposure may encourage managers to be less conservative in their loan granting activities and hence increase the level of NPLs. However, in Sri Lanka, still interest income hold a major portion of the bank's income and non-interest income generating activities has not developed to a similar extent as that of the US commercial banking sector. Non-interest income sources have accounted only 15.5 percent on average of the total income of the banks (see Table 3). Thus, it was found that non-interest income was marginally significant yet positive in determining NPLs of SIBs in Sri Lanka.

Considering SIBs in PEM, ownership was negative and significant at 1 percent level of significance. This suggests that public ownership might not be a reason for high level of NPLs in commercial banks. As the main objective of public bank differs from private bank's maximizing shareholder wealth, public banks have no intention in enhancing their assets base. This finding is in line with Hu et al. (2006) who concluded that the public ownership of a bank does not contribute to growth in NPLs.

Effect of Macroeconomic Factors on NPLs

With regards to SIBs and NSIBs, effect of growth in real GDP is highly significant in determining NPLs. This implies that strong positive growth in real GDP usually translates into more income, which improves the debt servicing capacity of the borrower and in turn contributes to lower NPLs. On the other hand, negative development in real GDP growth rate would increase the level of NPLs of commercial banks. This result is confirmed by researchers (Rajha, 2016; Salas & Saurina, 2002; Ranjan & Dhal, 2003; Das & Ghosh, 2007; Khemraj & Pasha, 2008; Al-Smadi & Ahmad, 2009; Warue, 2013; Ekanayake & Azeez, 2015) by revealing that the real growth rate of GDP is a significant predictor of credit risk face by banks. As identified in Ekanayake and Azeez (2015), inflation has a substantial impact on NPLs of commercial banks in Sri Lanka. However, this study found no evidence that inflation was significantly related to NPLs of commercial banks in Sri Lanka. Positive association with NPLs indicates that increase in inflation would increase the level of NPLs of SIBs. However, inflation was found negatively associated with NPLs in NSIBs. This suggests that NSIBs are more selective in lending loans during high inflation periods corresponding to the previous studies. Yet the magnitude is considerably lower with a coefficient of -0.0077 and hence inflation does not describe NPLs behavior of NSIBs.

Based on the regression analysis, lending interest rate of the economy was found as a significant determinant of NPLs except for NSIBs. Although most of the previous studies have found a positive association between the lending interest rate and NPLs, results found in this study have a negative association with NPLs. In the study of Al-Smadi and Ahmad (2009), interest rate was negative and significantly related with credit risk. Further, they have explained the fact that low interest rates in the economy enhance the profit margins of the banks, but adverse selection problems of lending might consequently lead to increase the credit risk level in banks as what happened in the US during sub-prime mortgage crisis in 2008. Finally, it was found that interest rate spread in the economy positively related but insignificant with NPLs of commercial banks in Sri Lanka. The results concur with Collins and Wanjau (2011) and Warue (2013). Due to higher the spread, the borrower may be unable to pay the loan with the higher cost, hence resulting in a high default rate. This suggests that banks can use the profits to improve the lending policies in order to manage the level of NPLs.

As to the findings, bank-specific factors contribute to the NPL of SBIs more than macroeconomic factors. Therefore, for effective management of NPLs, it is vital to understand and focus more on management of bank-specific factors for which they have more control. The findings are similar to Warue (2013), where the study concluded that bank-specific factors contribute to NPLs in commercial banks at higher magnitude compared with macroeconomic factors.

Effect of Civil War on NPLs

Civil war has been characterized as “development in reverse” because of the measurable and immeasurable economic costs and further social, political, and cultural consequences all that can hinder economic development (Collier, 1999). Sri Lanka has been a victim of the civil war over 30 years. Although there are limited studies available in analyzing the effect of civil war, existing empirical studies did show that internal armed conflicts have far reaching and long lasting economic consequences (Carey, 2011).

In relation to both bank-specific and macroeconomic factors, the study found that civil war prevailed in the country had a significant and positive effect on NPLs of commercial banks in Sri Lanka. While explaining the

impact of civil war on the banking sector, Carey (2011) had mentioned that decline in the confidence in the monetary and financial system of a country would affect the borrowers' confidence in the banking system. Hence, there is an impact on credit and liquidity risks of the banks. This might have an impact on NPLs of Sri Lankan commercial banks. Despite the fact that year by year loan growth of the banking sector has decreased to -2.3 percent, NPLs of the sector has increased in 2009 (CBSL, 2013). According to CBSL, lending to agricultural, tourism and trading have affected during the period and started showing picking up partly in 2009 due to end of conflicts in the country (CBSL, 2009). This indicates that, despite of the decrease in lending activities, NPLs has increased due to the loss of confidence in the banking system and decreased GDP rate during the war period. As depicted in Figure 1, there is an increasing trend in the weighted average NPL ratio from 2006 to 2009. The weight has been calculated considering the assets value of individual bank as a proportion of total assets of the sample. However, marginal war effect in relation to macroeconomic factors and the low R^2 value indicate that the effect is further subject to other economic conditions during the period.

Conclusions and Implications

This study attempted to ascertain the effect of bank-specific and macroeconomic factors to NPLs in 11 domestic licensed commercial banks for the period of 2004 to 2013, using panel data methodology. The bank-specific factors included in the study were: ROA, growth in number of bank branches, ownership, and non-interest income; and macroeconomic factors were: real GDP growth rate, lending interest rate, interest rate spread, and inflation.

Based on the empirical analysis, findings in relation to NSIBs were insignificant as the explanatory power of independent variables on NPLs of NSIBs was low. With regard to the SIBs, ROA was found significant and negatively related with NPLs. This suggests that bank efficiency is a determinant factor in managing the level of NPLs. Accordingly with previous studies, the study identified that non-interest income is marginally significant and positively associated with NPLs of SIBs. This indicates that an increase in bank income diversity would divert the focus on quality lending hence resulting problem loans. On contrary with literature, growth in bank branches found negatively associated and insignificant in determining NPLs of SIBs. However, this indicates that managers do not follow high risk strategies in order to enhance their market presence thus, banks' represent as delegated monitors to act on behalf of the depositors on investing their funds effectively as confirmed by Diamond's (1984) theory of financial intermediation. Further, it was identified that public banks do not account for higher level of NPLs.

Considering macroeconomic variables with regard to SIBs and NSIBs, effect of growth in real GDP was highly significant. This implies that strong positive growth in real GDP usually translates into more income, which improves the debt servicing capacity of the borrower which in turn contributes to lower NPLs. Lending interest rate was negative in both SIBs and NSIBs. Therefore, an increase in the lending interest rate does not increase the NPLs of commercial banks. Inflation rate and interest rate spread were insignificant in determining NPLs of commercial banks. The study revealed that bank-specific factors have more control over NPLs. Finally, it was identified that civil war had a significant influence on the level of NPLs in the banking industry of the country.

Several policy implications can be derived from the findings of this study. Even though LCBs have employed resources to improve the quality of the assets still the banks tend to have higher problem loans. As identified in this study, in order to manage NPLs of commercial banks, it is vital to focus more on the bank-specific factors on which banks have more control. Currently, the banking soundness indicators used by CBSL to assess the soundness of the banking sector are not included with financial market or aggregate economy indicators. But the resilience of banking system cannot be measured by only using bank-specific factors because macroeconomic factors too have an influence to the quality of assets in banks, which are not under control of them. It is essential for banks to carry out proper evaluation of credit applications and closely monitor repayment capacity and cash flow of the borrowers to ensure that expansion of credit will not pose a further risk to financial system stability. Resolution of NPLs in countries like Sri Lanka ultimately lies in developing a competitive environment for the financial sector as a whole.

References

- Abedifar, P., Molyneux, P., & Tarazi, A. (2014). Non-interest income activities and bank lending. *HAL Archives*. Retrieved from <https://hal.archives-ouvertes>
- Abedifar, P., Molyneux, P., & Tarazi, A. (2014). *Non-interest income activities and bank lending*. United Kingdom: Management School of University of St Andrews.
- Akter, R., & Roy, J. K. (2017). The impact of non-performing loans on profitability: An empirical study on banking sector of Dhaka stock exchange. *International Journal of Economics and Finance*, 9(3), 126-132.
- Al-Smadi, M. O., & Ahmad, N. H. (2009). *Factors affecting banks' credit risk: Evidence from Jordan*. Retrieved August 30, 2014, from <http://www.docstoc.com/docs/15802180/key-factors-influencing-credit-risk-of-islamic-bank-a>
- Aziz, N. F., Ibrahim, I. B., & Kamaruddin, M. B. (2009). *Impact of non-performing loans (NPL) on profitability performance (ROA, ROE & NPM)*. Retrieved from <http://ir.uitm.edu.my/id/eprint/6937>
- Berger, A. N., & DeYoung, R. (1997). Problem loans and cost efficiency in commercial banks. *Journal of Banking and Finance*, 21(6), 849-870.
- Caprio, G., & Klingebiel, D. (1996). Bank insolvencies: Cross-country experience. *Policy Research Working Paper*, Policy Research Department, The World Bank.
- Carey, S. (2011). The economic consequences of civil war in Asia: A comparison of Sri Lanka and Cambodia. *SJEF*, 1(1), 78-97.
- Central Bank of Sri Lanka. (2009). *Annual report*. Retrieved from <https://www.cbsl.gov.lk/en/publications/economic-and-financial-reports/annual-reports/annual-report-2009>
- Central Bank of Sri Lanka. (2013). *Annual report*. Retrieved from <https://www.cbsl.gov.lk/en/publications/economic-and-financial-reports/annual-reports/annual-report-2013>
- Chang, C. C. (1999). The nonparametric risk-adjusted efficiency measurement: An application to Taiwan's major rural financial intermediaries. *American Journal of Agricultural Economics*, 81(4), 902-913.
- Ciancanelli, P., & Gonzalez, J. A. (2000). *Corporate governance in banking: A conceptual framework*. Retrieved from http://papers.ssrn.com/paper.taf?abstract_id=253714
- Collier, P. (1999). Doing well out of war. *Conference on Economic Agendas in Civil Wars*, April 26-27, The World Bank, London.
- Collins, N. J., & Wanjau, K. (2011). The effects of interest rate spread on the level of non-performing assets: A case of commercial banks in Kenya. *International Journal of Business and Public Management*, 1(1), 58-65.
- Cotugno, M., & Stefanelli, V. (2011). Bank size, functional distance and loss given default rate of bank loans. *International Journal of Financial Research*, 2(1), 31-44.
- Das, A., & Ghosh, S. (2003). Determinants of credit risk in Indian state-owned banks: An empirical investigation. *Economic Issues-Stoke and Trent*, 12(2), 27-46.
- De Silva, J. (2004). *Regulation of the banking and related sectors in Sri Lanka*. Retrieved September, 2013, from http://www.ips.lk/events/workshops/22_07_2004_ria/papers/joan_de_zilva_banking_supervision.pdf
- DeYoung, R., & Rice, T. (2004). Non-interest income and financial performance at U.S. commercial banks. *The Financial Review*, 39(1), 101-127.

- Diamond, D. W. (1984). Financial intermediation and delegated monitoring. *Review of Economic Studies*, 51(3), 393-414.
- 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), 868-882.
- Espinoza, R., & Prasad, A. (2010). Non-performing loans in GCC banking sector and their macroeconomic effects. *IMF Working Paper*. Retrieved from <https://www.imf.org/external/pubs/ft/wp/2010/wp10224.pdf>
- Fama, E. F., & Jensen, M. (1983). Separation of ownership and control. *Journal of Law and Economics*, 26(2), 327-349.
- Fofack, H. (2005). Non-performing loans in sub-Saharan Africa: Causal analysis and macroeconomic implications. *World Bank Policy Research Working Paper No 3769*. Retrieved from <http://documents.worldbank.org/curated/en/446961468104639856/Nonperforming-loans-in-Sub-Saharan-Africa-causal-analysis-and-macroeconomic-implications>
- Fonseka, N. (2009). Bouncing back the opportunities and constraints. Paper presented at *20th Anniversary Convention of Association of Professional Bankers*, Sri Lanka, pp. 75-84.
- Goetz, M. R., Laeven, L., & Levine, R. (2016). Does the geographic expansion of banks reduce risk? *Journal of Financial Economics*, 120(2), 346-362.
- Hu, J. L., Li, Y., & Chiu, Y. H. (2006). Ownership and non-performing loans: Evidence from Taiwan's banks. *The Developing Economies*, 42(3), 405-420.
- Ikram, A., Su, Q., Ijaz, F., & Fiaz, M. (2016). Determinants of non-performing loans: An empirical investigation of bank-specific microeconomic factors. *Journal of Applied Business*, 32(6), 1723-1735.
- International Monetary Fund (IMF). (2009). *Global financial stability report*. Retrieved from <https://www.imf.org/en/Publications/GFSR/Issues/2016/12/31/Global-Financial-Stability-Report-April-2009-Responding-to-the-Financial-Crisis-and-22583>
- Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305-360.
- Jimenez, G., & Saurina, J. (2006). Credit cycles, credit risk, and prudential regulation. *International Journal of Central Banking*, 2(2), 65-98.
- John, K., & Qian, Y. (2003). Incentive features in CEO compensation in the banking industry. *Economic Policy Review*, 9, 109-121.
- John, K., DeMasi, S., & Paci, A. (2016). Corporate governance in bank. *Corporate Governance: An International Review*, 24(3), 303-321.
- Khemraj, T., & Pasha, S. (2008). The determinants of non-performing loans: An econometric case study of Guyana. *The Caribbean Centre for Banking and Finance Bi-annual Conference on Banking and Finance*, St. Augustine, Trinidad.
- Mohanty, A. R., Das, B. R., & Kumar, S. (2018). Determinants of non-performing loans in India: A system GMM panel approach. *Prajnan*, 47(1), 37-56.
- Mpofu, T. R., & Nikolaidou, E. (2018). Determinants of credit risk in the banking system in Sub-Saharan Africa. *Review of Development Finance*, 5(6).
- Paravisini, D., & Schoar, A. (2012). The technological and agency effects of IT: Randomized evidence from credit committees. *NBER Working Paper*. London School of Economics.
- Rajaraman, I., & Vasishta, G. (2002). Non-performing loans of PSU banks: Some panel results. *Money, Banking and Finance*, 37(5), 429-431.
- 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.
- Ranjan, 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).
- 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.
- Saunders, A., & Cornett, M. M. (2008). *Financial institutions management: A risk management approach*. New York: The McGraw Hill.
- Sinkey, F., & Greenwalt, M. B. (1991). Loan-loss experience and risk-taking behaviour at large commercial banks. *Journal of Financial services research*, 5, 43-59.
- Srivastav, A., & Hagedorff, J. (2016). Corporate governance and bank risk taking. *Corporate Governance: An International Review*, 24, 334-345.

- Warue, B. N. (2013). The effects of bank-specific and macroeconomic factors on non-performing loans in commercial banks in Kenya: A comparative panel data analysis. *Advances in Management & Applied Economics*, 3(2), 135-164.
- Waweru, M. N., & Kalani, V. M. (2009). Commercial banking crisis in Kenya: Causes and remedies. *Global Journal of Finance and Banking Issues*, 3(3), 23-43.
- World Bank. (2013). *World development indicators*. Retrieved June 15, 2014, from <http://databank.worldbank.org/data/download/WDI-2013-ebook.pdf>