



What are the determinants of non-performing loans in Botswana?

By

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Abstract

The maintenance of asset quality, efficiency and profitability is a vital requirement for the survival and development of banks. Loans are the main asset class from which banks generate their major portion of income and also signify the greatest risk to banks. There has been significant indication that the financial crises in the USA, Sub-Saharan Africa and East Asia were signalled by high levels of non-performing loans (NPLs). Due to the detrimental effect that these loans have on a bank's revenue and the economic welfare of a country, it is essential to examine and investigate the determinants of NPLs in the banking industry of any country. This study examines Botswana, a developing country in Southern-Africa and is stimulated by the assumption that both the industry level variables and macroeconomic variables have an effect on NPLs. Secondary data of the banking sector was obtained from Botswana's central bank, the Bank of Botswana. Correlation and regression analysis were carried out over a period of ten years (2005–2014), using quarterly data. It was found that the following industry level variables (i.e. credit growth, industry size and profitability) and macroeconomic variables (i.e. real gross domestic product (GDP) growth, inflation, real interest rates and the unemployment rate) have a statistically significant impact on the NPL rate. On the other hand, capitalization and diversification had a statistically insignificant relationship with NPLs. The banking industry in Botswana should carefully monitor the household loan portfolio as well as their credit advancement policies with regard to the aforementioned variables to help lower their NPL ratios. This study is the first of its kind in the Botswana banking industry and therefore will provide scholars with the opportunity to enrich their knowledge and serve as a reference for other researchers in the related area while also providing a foundation for further studies.

Key words: Non-performing loans; Macroeconomic variables; Industry level variables; Botswana.

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List of Acronyms/Abbreviations

ATM: - Automated Teller

machine Cap: - Capitalization

BoB: - Bank of Botswana

CESEE: - Central, Eastern and south eastern

European CREDIT: - Credit Growth

DIVER: - Diversification

EXCH: - Exchange rate

GDP: - Gross Domestic Product

IMF: - International Monetary Fund

INFL: - Inflation Rate

NPL: -Nonperforming Loan

OBS: - Observations

PROB: - Probability

RIR: - Real interest rates ROE:

-Return on Equity ROA: -

Return on Assets VIF:-

Variance Inflation factor

1. Introduction

Economic growth is impossible without a solid and sound financial system. An efficient banking industry is necessary for the stability and growth of an economy. The stability of a banking industry is necessary for economic progression and resilience against financial crises (Chakrabarti, 2015:2133). According to Campbell (2007) as cited in Abiola and Olausi (2014:296), a commercial bank is an establishment that provides financial services, such as issuing money to the public, receiving deposits from them and lending out money to them.

The maintenance of asset quality, efficiency and profitability is a vital requirement for the survival and development of commercial banks. The weakening of a bank's asset quality is not only financially threatening for the banking system but this may also lead to a decrease in economic efficiency, impair social welfare and weaken economic activity (Ghosh, 2015:93). Loans are the main asset class from which banks generate their major portion of income and also constitute the greatest risk to banks. According to Messai and Jouini (2013:852), the decrease in the quality of loans is the key source to issues in the banking system of most advanced economies. Over the last decade, the number of bank failures in both developing and developed countries has increased significantly. In Africa alone, failures have been experienced in more than forty countries including South Africa, Kenya, Burkina Faso, Burundi, Cameroon, Congo, Uganda, and Tanzania (Kimei, 1998; Viswanadham, 2015:72).

The recent financial crisis drew attention to the severe impact that the collapse of banks can have on an economy. This encouraged some researchers to look further into the factors that could activate banking and financial crises (De Grauwe, 2008; Castro 2013: 672). As a result, macroeconomic variables were highlighted as a significant trigger of crises. These included, among others, unfavourable economic conditions of high unemployment rates, low economic growth rates and high inflation rates (Demirguç-Kunt & Detragiache, 1998; Llewellyn, 2002; Castro 2013:672). Furthermore, according to Castro (2013:672), a banking crisis may also arise when banks are overwhelmed with liquidity or insolvency issues that result from an increase in non-performing loans (NPLs).

Mwengei and Garissa (2013:155) highlighted that the prevalence of NPLs poses as a main risk to the banking sector. According to the International Monetary Fund (IMF, 2009), “ a NPL is

any loan in which interest and principal payments are more than 90 days overdue; or more than 90 days' worth of interest has been refinanced". Louzis, Vouldis and Metaxas (2012:1012) cite Reinhart and Rogoff (2010) and add that NPLs also signal the start of a banking crisis.

According to Khemraj and Pasha (2009:1), there have been significant indications that the financial crises in East Asia and Sub-Saharan Africa were signalled by high levels of NPLs. The 1997 East Asian crisis had more than a threefold surge in the size of NPLs during the period leading to the crisis (Fofack, 2005:2). Additionally, Fofack (2005:2) revealed that the Sub-Saharan African banking crisis in the 1990s was also accompanied by a rapid build-up of NPLs. Also, in this region, due to the structure of the banking industries, which is characterized by few large banks, the chances of a banking crisis occurring as a result of NPL related risks is magnified (Fofack, 2005:4). For this reason, the occurrences of crises, as a result of high NPLs are of significant interest to academia, bank officials, industry officials and regulators.

Since NPLs signify bad loans in which borrowers have been unsuccessful in meeting their payment obligations, the theme of NPLs has attracted attention in recent decades. Research has shown that they are amidst the core reasons for economic stagnation and thus it is imperative to understand the nature of NPLs. Increasing levels of NPLs are an indicator of a vulnerable financial system and furthermore a worrisome sign to bank authorities and regulators (Farhan et al., 2012:88). Additionally, an increase of NPLs in the credit portfolio may also hinder banks from achieving their set targets and objectives. Lastly, the increase in the NPL ratio i.e., the total NPLs to total gross loans has further been referred to as the failure of credit policy (Saba, Kouser & Azeem, 2012:142).

The main objective of this study is to investigate the determinants of NPLs in Botswana's banking industry. Although much research has been done on variables affecting NPLs, little is known about the impact of these variables on NPLs in Botswana. Due to the adverse impact that NPLs can have on banks, identifying and investigating the determinants of these loans should be given consideration. The scope of the study is limited to macroeconomic and industry level variables in Botswana over a period of ten years (2005-2014). Furthermore, the study employs a multiple regression analysis to examine the relationship between NPLs and several key macroeconomic and industry level variables.

This study is significant as it explains and examines NPLs, which are a vital component when managing the banking sector and the economy as a whole. Additionally, the study is the first of its kind to examine the determinants of NPLs in Botswana. It will therefore add significant contribution to existing literature by providing a basis of understanding the main drivers behind increasing levels of NPLs in Botswana. In addition to macroeconomic factors, the study also utilizes industry level factors which are seldom examined by researchers when considering the determinants of NPLs. Research in this area has also been greatly neglected in countries within Southern Africa, with a handful of researchers having studied it. This however should not be the case as the banking sector in this region is significantly growing along with the impending risk of high levels of NPLs.

According to the Banking Supervision Annual Report of Botswana (2014), the banking sector continues to operate in accordance with the regulatory requirements. Additionally, the financial soundness indicators remain at comfortable levels by international standards. However, the main concern is the concentration of household credit with mortgages accounting for about 14%, while unsecured credit accounts for 40%. The industries' NPLs have increased by a substantial amount over the years, with the deterioration in the quality of bank's loan portfolio to households accounting for a greater share of this increase (IMF Article IV Consultation Botswana Report, 2013:6). In the view of a bank failure possibly resulting from high levels of NPLs, any failure in the sector has enormous potential effect on the economy.

Henceforth, a study of this nature will be of great importance for a country where the financial sector is dominated by few large commercial banks as is the case with Botswana. Furthermore, insights can be gained about future levels of NPLs and probabilities of failure, which are of direct interest to banking authorities, regulators, and market analysts. Lastly, for researchers it will enhance and enrich their knowledge while serving as a basis for further studies.

The remainder of the study is structured as follows. Section two outlines key elements of the banking industry in Botswana. Section three focuses on both theoretical and empirical review of related literature, while section four presents the research approach which encompasses data collection, data analysis, the model variables and model specification. Section five discusses the research results and interpretation while section six covers the conclusion and recommendation.

2. The Banking Industry in Botswana

This chapter briefly outlines features of the banking industry in Botswana reviewing the credit risk assessment, liquidity risk, and lastly the profitability indicators. The section should give a snapshot view of the banking industry as a whole, the strengths as well as weaknesses. The banking industry in most areas of Africa is characterized by inefficiency and lack of competition resulting in low intermediation levels, high lending rates, high spreads and moderate levels of bank profitability (Ikhide & Yinusa, 2012:185). Botswana's banking sector can be categorized as oligopolistic with only five dominant established commercial banks (Kapunda & Molosiwa, 2012:3).

A few years before independence, the development of this industry was quite low with only two commercial banks operating. With efforts aimed at increasing the level of competition, efficiency, and lowering costs of borrowing, the Government of Botswana enacted a few financial laws and regulations to encourage new bank entrants. Currently, there are ten commercial banks excluding one offshore, as listed by the central bank. At present, Botswana's banking industry is showing slow but progressive developments in terms of number of branches, total assets, and human resource utilization.

Table 1 and 2 below depict a holistic view of the growth of the banking industry from 2009 to 2014, with regards to the total number of assets in the industry, the total branches and as well as number of ATMs across the country.

Growth of the Industry (Total Assets, Branches, ATMs): 2009-2014

Table 1: Branches and Sub-Branches

Banks	2009	2010	2011	2012	2013	2014
*ABN AMRO (On-shore & Off-Shore)	0	0	0	1	1	0
Banc ABC	2	3	4	6	8	8
Bank Gaborone	4	5	5	6	6	7
Bank of India	0	0	0	0	0	0
Barclays	40	40	40	40	42	41
Baroda	2	2	2	2	3	3
Capital Bank	2	2	2	4	4	4
FNBB	18	18	19	21	22	22
Kingdom Bank AL	1	1	1	1	1	1
Stanbic	9	11	10	11	11	11
Stanchart	13	13	14	15	15	15
TOTAL	91	95	97	107	114	113

* this does not include ABN AMRO(domestic operation) as it did not have branches in 2010 and 2011

Source: Banking Supervision Annual Report of Botswana, 2011 & 2014

The commercial banks continuously offer convenient services to customers such as automated teller machines (ATMs), internet services, customer service centres and mobile banking services. The total number of branches in the industry has increased from 91 in 2009 to 113 in 2014 illustrating a sluggish growth of the access in banking facilities across the country. The number of ATMs also increased from 346 in 2009 to 420 in 2014. In summary, table 1 and 2 illustrate the expansion of banking business distribution channels in the industry from 2009 to 2014.

Table 2: Automated Teller Machines (ATMs) across the country

Banks	2009	2010	2011	2012	2013	2014
ABN AMRO	0	0	0	0	0	0
Banc ABC	0	0	4	7	10	10
Bank Gaborone	0	0	0	19	27	18
Bank of India	-	-	-	-	-	-
Barclays	100	99	103	104	112	116
Baroda	2	3	4	4	6	6
Capital Bank	0	2	2	4	4	4
FNBB	185	201	157	159	141	172
Kingdom Bank AL	-	-	-	-	-	-
Stanbic	16	18	18	25	26	26
Stanchart	43	46	54	57	65	68
TOTAL	346	369	342	379	391	420

Source: Banking Supervision Annual Report of Botswana, 2011 & 2014

Table 3 below depicts the growth of total assets of commercial banks in the industry. Total assets have grown by approximately 30% in the last ten years from P17760.58 million in 2005 to P66232.27 million in 2014. This illustrates that the gradual increase in assets over the years shows a significant growth of the industry. However, despite this growth, according to the Banking Supervision Annual Report, (2014), in recent years the level of competition in Botswana's banking sector has declined due to the oligopolistic nature of the industry, characterized by a few dominant players. The next section examines the credit risk assessment of the industry.

Table 3: Total assets (commercial banks)

Year	Total assets (P million)	Year	Total assets (P million)
2005	17760.58	2010	48072.45
2006	29251.94	2011	51311.20
2007	36077.15	2012	55480.04
2008	41440.16	2013	59736.11
2009	42734.70	2014	66232.27

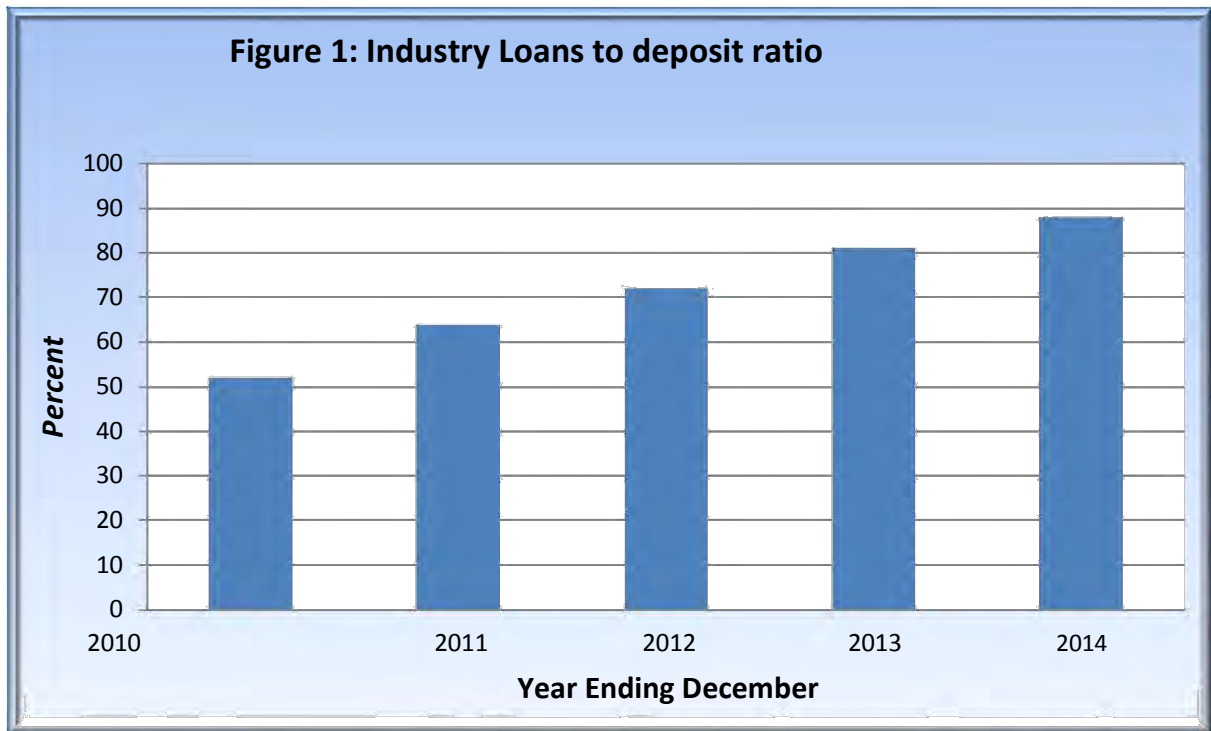
Source: Bank of Botswana

2.1. Credit Risk Assessment

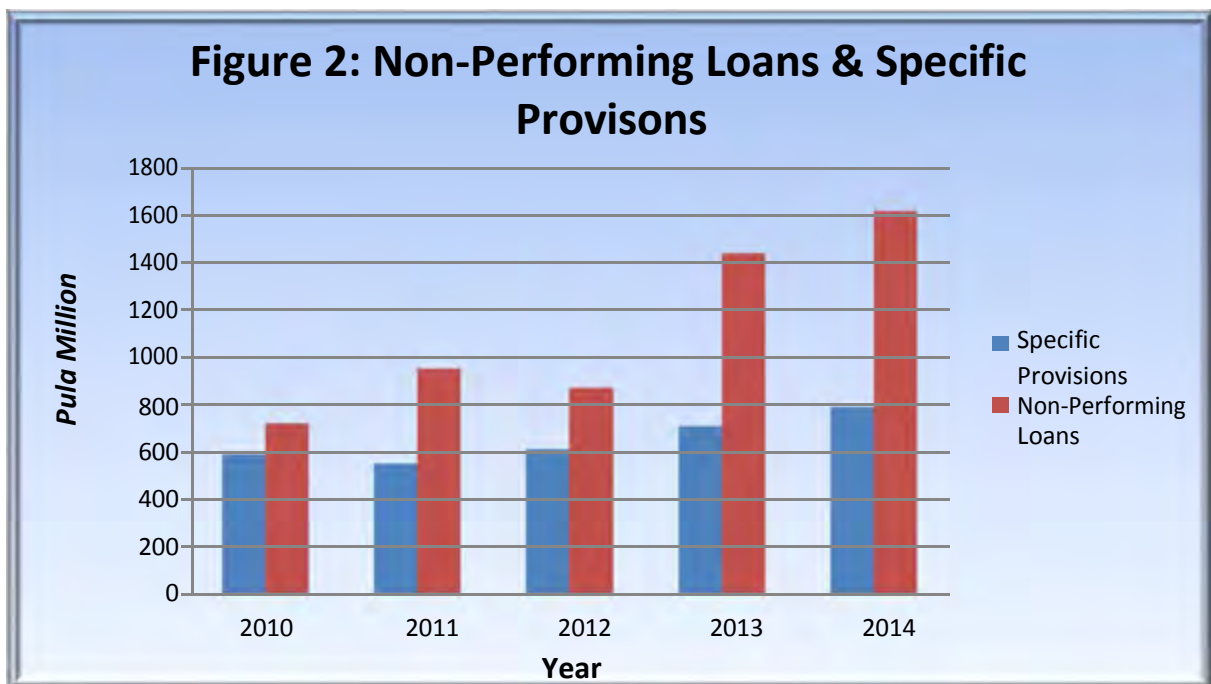
The major suppliers of formal credit in Botswana are commercial banks, which issue credit to households and private businesses. Through short-term and long-term loans, credit facilities have become more accessible to the economy. Nonetheless, these numerous credit services provided by the banks have led to an increase in NPLs, as a result of customers failing to meet their loan payment obligations. This is detrimental to the banks' balance sheet and has the prospective of threatening the performance and stability of the sector.

As at 31 December 2014, the loans and advances in the banking sector have increased by 14.2 per cent from the previous year while total industry deposits grew at a slower rate of 6 per cent. Thus, the loans to deposits ratio, i.e. the financial intermediation ratio extended to a high of 87.6 per cent in December 2014. This ratio continued above the recommended range of 50-80 per cent set by the central bank thereby triggering liquidity pressures in the industry (Banking Supervision Annual Report, 2014:14). These loans increased primarily as a result of the central bank cutting its policy rate by 200 basis points in December 2013, with efforts aimed at stimulating the economy. Subsequently, this led to a high growth in credit to the private sector, driven predominantly by the increase of mortgages and personal loans by individuals (African Economic Outlook Botswana, 2015:6).

Figure 1 below depicts the financial intermediation ratio in the past 5 years, showing a gradual increase over the years. In the last 10 years NPLs in Botswana have gradually increased upwards. This increase has adversely affected the profitability of commercial banks in the industry. As of December 2014 the industry recorded a 52.9 per cent increase in total loans and a 12.1 per cent increase in NPLs from the previous year (Banking Supervision Annual Report, 2014:14).



Source: Bank of Botswana

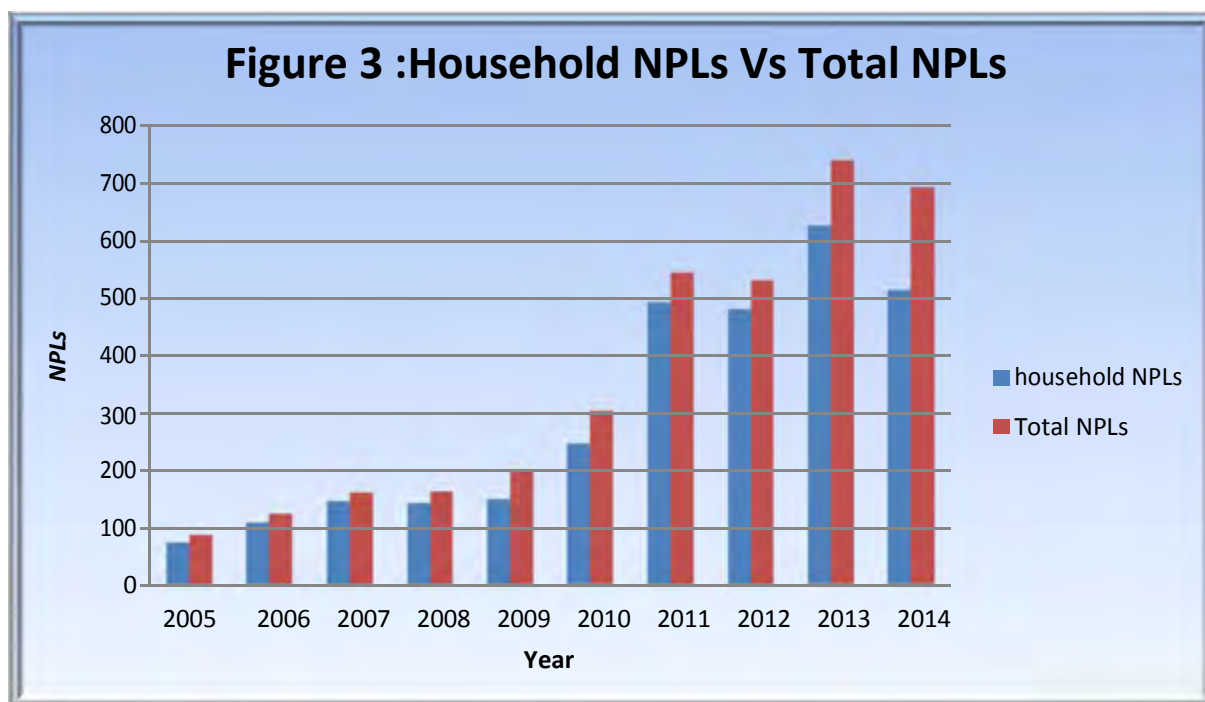


Source: Bank of Botswana

Figure 2 above illustrates the NPLs and specific provision in the banking sector over a period of 5 years. As at December 31, 2014, the specific provisions were approximately P771.5

million and were insufficient to cover the available NPLs. This therefore indicates that the growing NPLs could negatively impact capital levels in the industry.

Figure 3 below illustrates a comparison between household NPLs and the total NPLs. The significant increase observed from 2010 to 2011 was primarily as a result of the aggressive introduction of innovative products and services by commercial banks such as the Small Medium and Micro Enterprises (SMMEs) quick loans. This product was launched in the banking industry in 2011 and led to a substantial increase in the credit base (Banking Supervision Annual Report (2011:4). According to the African Economic Outlook Botswana (2015:6), the increase in NPLs from 2012 to 2013 was a reflection of an upsurge in past due loans (PDLs). This increase was driven by the deterioration in the asset quality of banks' loans to corporate borrowers in the industry (IMF Article IV Consultation Botswana Report, 2014:20). From 2011 to 2012, the NPL ratio declined marginally despite the increase of unsecured household debt (African Economic Outlook Botswana, 2014:9). This highlights that household NPLs have accounted for a large share of the total NPLs during the last 10 years. Commercial banks should therefore carefully monitor the household loan portfolio in Botswana.



Source: Researchers compilation via Bank of Botswana

The African Economic Outlook Botswana (2014:9) also highlighted the following; *“The banks’ lending to households and the accelerated growth of unsecured lending are potential vulnerabilities. This underscores the need for the authorities to enhance surveillance to temper the rate of growth of household borrowing”*.

Credit to households continued to grow at approximately 24% as at December 2013 which is among the highest growth in the region (Namibia, South Africa, Lesotho, Mauritius and Cabo Verde), (IMF Article IV Consultation Botswana Report, 2014:20). Additionally, a deterioration of the credit portfolio of unsecured lending could weaken the soundness of Botswana’s banking system because the bulk of household credit, which counts for more than 55% of banks’ total loans, is unsecured loans. In addition, this shock could easily spread through to the non-banking sector given their strong linkages (IMF Article IV Consultation Botswana Report, 2014:20).

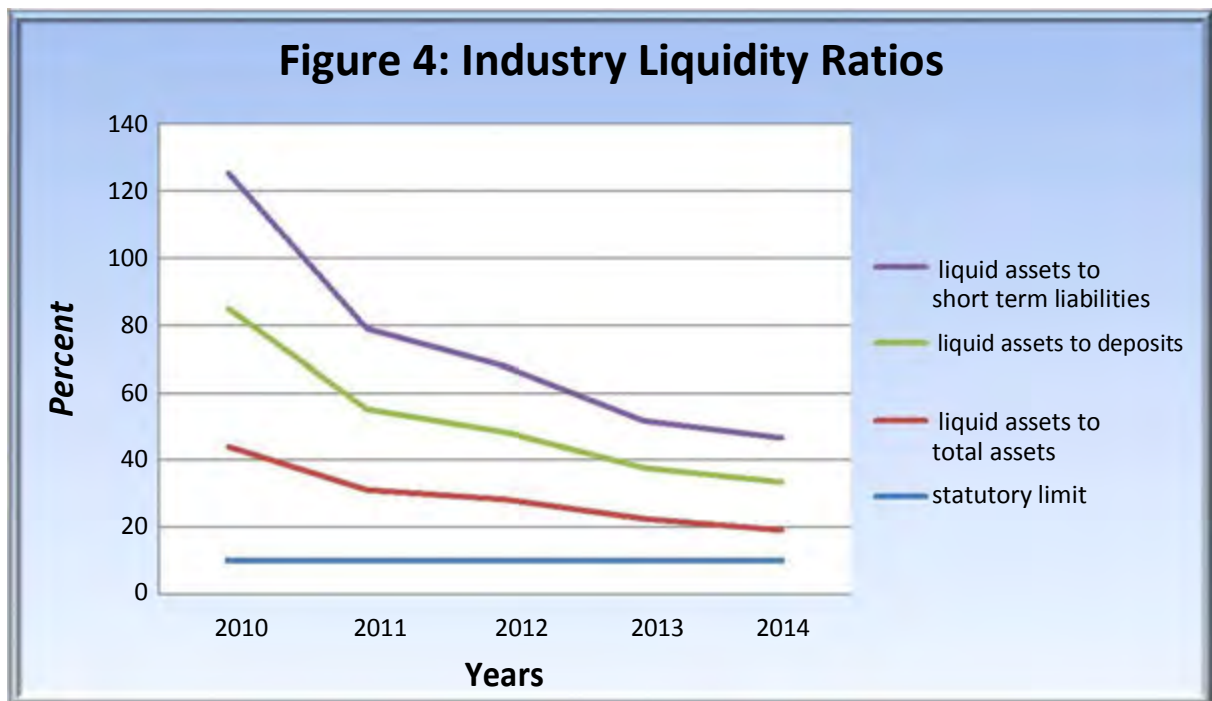
In the next section, an overview of the industries liquidity risk is evaluated.

2.2. Liquidity Risk

In 2014, liquidity reduced significantly due to an inconsistent upswing in lending contrary to the slow growth of bank deposits. Short-term liquidity issues were experienced by some commercial banks, such that the liquid assets to deposits ratio dropped below the 10 per cent statutory limit. According to the Banking Supervision Annual Report (2014:16), all non-compliant banks were penalized by a fee of P892 263. During this time, banks experienced a decline in asset quality as NPLs continued to increase (Banking Supervision Annual Report, 2014:17).

Figure 4 below depicts the industry liquidity ratios in the past five years. All three ratios, (the liquid assets to total deposits, the liquid assets to total assets and liquid assets to short-term liabilities ratios) continued to decline though out the five years. The industry liquid assets to total deposits ratio reached a low of 14.5 per cent in December 2014 but was however above the statutory prescribed limit, despite some banks falling short of this limit. According to the Banking Supervision Annual Report (2014:17) the decline in these ratios was caused mainly by a continued decline in the Bank of Botswana certificate holdings by commercial banks, which traditionally held up a large share of the banks liquid assets. These funds which were initially invested in these certificates were instead channelled to loans and advances and other

investment assets, which do not qualify as liquid assets (Banking Supervision Annual Report, 2014:17).

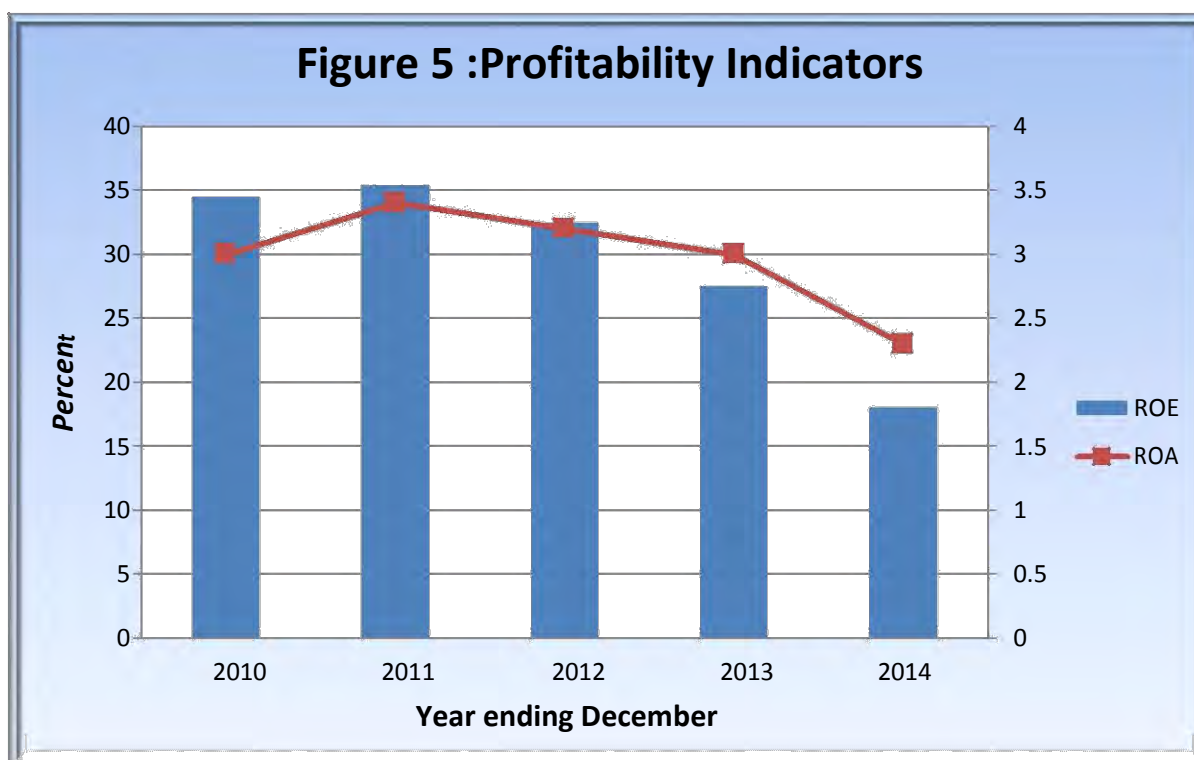


Source: Researchers compilation via Bank of Botswana

The next section evaluates the profitability indicators of the banking industry over the past 5 years.

2.3. Profitability Indicators

The figure below depicts the profitability stance of commercial banks in Botswana for the past 5 years. Both indicators (ROA and ROE) experienced a downward trend. Although worrisome that these profitability ratios continue to decline, they remain strong and above international standards for comparable sized banks (Banking Supervision Annual Report, 2014:13).



Source: Bank of Botswana

In conclusion, an overview of the financial performance ratios in the past 5 years is examined in the next section.

2.4. Financial Performance Ratios

The table below depicts the financial performance ratio in percentage from the year 2010 to 2014.

Table 4: Annual Financial Performance Ratios

Ratios	2010	2011	2012	2013	2014
Non-Interest Income to Total Income	34.3	37.3	35.1	36.4	39.6
Return on Equity (ROE)	34.6	35.2	31.9	27.4	19.1
Interest Income to Average Earning Assets	11.2	11.5	11.9	11.8	8.8
Non-Interest Income to Average Total Assets	2.8	3.2	3.2	3.4	3.4
Interest Expense to Average Total Assets	3.8	3.3	2.7	2.7	2.6
Earnings Retention	57.1	48	92.8	69.9	70.1
Interest Income on Loans to Average Total Assets	6.2	6.6	7.5	7.7	6.9
Non-Interest Expense to Average Total Assets	3.6	4.1	4.3	4.6	4.3

Source: Bank of Botswana

In conclusion it can be observed that the banking system in Botswana is sound, stable, well-capitalized and still profitable (exceeding international standards) despite the downward profit

trends over the years. However, the industry faces a few challenges. The asset quality has deteriorated over the years, which has resulted in recent short-term liquidity issues while operating risk needs constant monitoring by bank authorities. Furthermore, NPLs continue to increase over the years with a large share attributed to household credit. According to the IMF Article IV Consultation Botswana Report, 2014, the banks high exposure to household credit and the acceleration in the growth of unsecured lending are potential vulnerabilities. This report serves to further explore the factors impacting these NPLs. The next section evaluates available literature that will assist in answering the set objectives of the study.

3. Literature Review

The recent global financial crisis indeed sparked an interest in understanding the drivers of NPLs in different regions of the world. Over the years, various literature extensively examined NPLs. The first stance of literature explains the determinants of NPLs while the other highlights the role that they have played in creating banking and financial crises, further emphasizing a positive relationship between the two variables (Nkusu, 2011:5).

3.1. Determinants of Non-performing Loans

Two key categories of NPL determinants are evaluated in this report. These are macroeconomic factors and industry level factors.

Keeton and Morris (1987:3) investigate the factors causing NPLs in the US banking sector. Using data from 1979-85, the authors show that macroeconomic factors play a vital role in explaining differences in loan losses as documented by banks. Additionally, the study highlights that the risk taking behaviour of banks also leads to higher loss ratios. Salas and Saurina (2002:1) examine both macroeconomic and firm specific factors to investigate the aggregate NPLs of Spanish Commercial and Savings Banks from 1985–1997. They conclude that firm specific factors can serve as an early warning signal for changes in NPLs. Bercoff, Giovanni and Grimard (2002) examine the instability of the Argentinean Banking system from 1993–1996. The study also discovered that both industry level and macroeconomic factors have a significant impact on NPLs.

Similarly, Espinoza and Prasad (2010) examine data from 80 banks in the Gulf Cooperation Council, i.e. Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates, for the period 1998-2008. The study confirms that in these countries, both industry level factors and macroeconomic factors determine the NPL ratio. Furthermore, Klein (2013) investigates NPLs in 16 Central, Eastern and South- Eastern Europe (CESEE) nations during the period 1998– 2011, and also reveals that both industry level factors as well as macroeconomic factors influence NPLs. In East Africa, Warue (2013) investigates the relationship between NPLs, industry level factors and macroeconomic factors in Kenya. The study also establishes the degree to which the variables affect the occurrence of NPLs. Industry level variables include bank structures, credit risk management techniques and quality management. On the other hand, macroeconomic factors include among others real GDP, GDP per capita, inflation,

dollar-shilling exchange rate and the lending interest rates. This study concludes that Industry level factors greatly impact NPLs (Warue, 2013:136).

Makri, Tsagkanos and Bellas (2014) examine the factors affecting NPLs in the Eurozone's banking systems from 2000-2008. Both the dynamic panel regression method and a Generalized Method of the Moments (GMM difference) technique were applied for analysis. Using industry level and macroeconomic variables, the study finds a strong influence of both categories of variables on NPLs. Last but not least, Amuakwa-Mensah and Boakye-Adjei (2015) examine the determinants of NPLs in the banking industry in Ghana. Using a panel regression model, the study finds that both bank specific and macroeconomic variables significantly affect the NPL rate. From the above literature, it is therefore imperative that this study also investigates both macroeconomic and industry level factors that affect NPLs.

3.2. Macroeconomic Determinants of Nonperforming loans

According to Ghosh (2015:94), the 'financial accelerator theory' as discussed in Bernanke and Gertler (1989), and Kiyotaki & Moore (1997), is a commonly used theoretical framework that relates NPLs to a country's macroeconomic environment. Macroeconomic determinants of NPLs can also be linked to early literature on the 'life-cycle consumption' models such as one highlighted by Lawrence (1995:944), which presented the 'probability of default'. This model specifies that low income borrowers have a higher chance of default because of their increased risk of unemployment and their inability to pay their debt obligations.

Fofack (2005) who examines some countries in Sub-Saharan Africa concluded that real interest rate, economic growth, and the exchange rate are significant determinants of NPLs.

The study links the strong relationship between macroeconomic factors and NPLs to the undiversified nature of several African countries. In a study on Indian banks covering the period of 1998-2009, Dash and Kabra (2010) conclude that real income is negatively related to NPLs while high interest rates and the real effective exchange rate lead to higher levels of NPLs.

Louzis, Vouldis and Metaxas (2012) use dynamic panel data methods to highlight the determinants of NPLs in the Greek banking sector from 2003 to 2009. The study concludes that macroeconomic variables such as the unemployment rate, the real GDP growth rate, public

debt and lending rates have a significant impact on NPLs. Buncic and Melecky (2012) examine macroeconomic determinants of NPLs in the period from 1994 to 2004. These variables included the inflation rate, real GDP growth, real interest rates, and the nominal exchange rate.

Messai and Jouini (2013) analyses the determinants of NPLs on 85 banks in Italy, Greece, and Spain for the period 2004-2008, using panel data. They find that NPLs vary negatively with real GDP growth and positively with the unemployment rate and the real interest rate. Likewise, Beck, Jakubik and Piloiu (2013) use a data panel set covering 75 advanced and emerging economies over ten years (2000-2010). The results show that share prices, real GDP growth, bank lending interest rate and the nominal effective exchange rate, have a significant effect on changes in the NPL ratios. According to Akinlo and Emmanuel (2014:22), the study by Hoggarth, Sorensen and Zicchino (2005) for the United Kingdom over the period 1988-2004 finds inflation and interest rates to be the main determinants of non-performing loans in UK. Turning to studies in Sub-Saharan Africa, Amuakwa-Mensah and Boakye-Adjei (2015) examine the macroeconomic determinants of NPLs and conclude that the real GDP per capita growth, the previous year's inflation and the real effective exchange rate are the only macroeconomic factors which significantly affect NPLs in the Ghanaian banking industry.

This study finds it appropriate to select five recurring macroeconomic factors based on the aforementioned literature to assist in answering the research question. Furthermore, these factors are selected as they are relevant to Botswana's economy and are considered the main macroeconomic drivers in the country. These include the inflation rate, real interest rate, real GDP growth, unemployment rate, and the real effective exchange rates.

3.2.1. Inflation

According to Nkusu (2011:7) and Klein (2013:6), the impact of inflation on the NPL ratio can be ambiguous as it can either be negative or positive. Higher levels of inflation can increase the loan payment capacity of borrowers by decreasing their real value of outstanding debt (Klein, 2013:6). Ghosh (2015:96) supports this by adding that theoretically, for constant nominal interest rates, inflation should reduce the real value of debt and hence make debt servicing easier, in turn lowering NPLs. Additionally, numerous studies also confirm that inflation is negatively related to NPLs (Shu, 2002; Ahmad & Bashir, 2013; Touny & Shehab, 2015).

On the contrary, increased inflation can also erode the loan payment capacity of the borrowers by decreasing the real income when salaries or wages are sticky (Farhan *et al.*, 2012:91). This is supported by Fofack (2005:11) who adds that inflation increases NPLs in countries in Sub-Saharan African. Additionally, numerous studies also find support for a positive relationship between NPLs and the inflation rate (Baboucek & Jancar, 2005; Fofack, 2005; Hoggarth, Sorensen & Zicchino, 2005; Khemraj & Pasha, 2009; Farhan *et al.*, 2012; Skarica, 2014; Abid, Ouertani & Zouari-Ghorbel, 2014; Ghosh 2015). Lastly, a few studies such as Quagliariello (2007), Akinlo and Emmanuel (2014) and Tanasković and Jandrić (2014) find an insignificant relationship.

Therefore according to this literature the relationship between inflation and NPLs can either be positive or negative.

3.2.2. Exchange Rate

The international competitiveness of an economy also has an impact on NPLs. Literature provides mixed reviews. Fofack (2005:19) reveals that the real effective exchange rate has a positive impact on NPLs in several Sub-Saharan African countries with fixed exchange rates. The study discussed that currency appreciation increases the value of goods and services produced in a country thus reducing the competitiveness of export-oriented firms and negatively affecting their ability to service their debt (Fofack, 2005:19). This is further supported by Khemraj and Pasha (2009:2) who also finds a significant positive relationship between the real effective exchange rate and NPLs.

Farhan *et al.*, (2012) also find that Pakistani bankers perceive that an appreciation in exchange rate has a positive significant relationship with NPLs. Similarly, Jakubik and Reininger (2013) also find the same result in 7 European Countries. Moving to Sub-Saharan Africa, the findings of Akinlo and Emmanuel (2014:26) also support that an appreciation of the exchange rate worsens the performance of export-oriented sectors, contributing to a deterioration of bank portfolios.

Currency depreciation can cause adverse effects, especially if there is a large share of foreign currency loans in total loans (Tanasković & Jandrić, 2014:53). Badar, Javid and Zulfiqar

(2013:13809) and Beck, Jakubik and PiloIU (2013:2) suggest that exchange rate depreciations might lead to a higher level of NPLs in countries with un-hedged borrowers who lend more in foreign currencies. Similarly, a study by De Bock and Demyanets (2012:19) examining 25 emerging markets from the period 1996-2010, reveals that currency depreciation against the US dollar leads to higher levels of the NPL ratio. In such a situation, currency depreciations increase the debt servicing costs in local currency terms for borrowers who have loans denominated in foreign currency (Touny & Shehab, 2015:13). Therefore, since their incomes are usually in local currency, borrowers face more difficulties in paying their debts. A study focusing on CESEE economies by Jakubik and Reininger (2013:11) also finds that depreciation of a local currency can have a sizeable negative impact on the quality of the bank assets. On the contrary, Tanasković and Jandrić, (2014:53) highlight that in relatively open countries with no currency mismatches, depreciation could lead to an increase in export volumes, thus improving the financial position in the corporate sector and further reducing NPLs.

3.2.3. Real interest rates

Generally, a rise in real lending rates increases the real value of borrower's debt and makes debt servicing more expensive. Banks with higher interest rate would reasonably be exposed to a higher chance default or higher NPLs. Additionally, a greater interest rate uncertainty affects banks' source of funds which in turn influences loans growth and hence NPLs (Brewer III, Deshmukh & Opiela, 2014; Ghosh, 2015:96).

There are several studies that highlight a positive relationship between interest rate and NPLs. Viswanadham (2015:78) suggests that banks charge high interest rates when they perceive a higher risk of default thereby attracting bad borrowers to borrow, in turn, increasing chances of loan default. Waweru and Kalini (2009) who study the commercial banks in Kenya also indicate that high interest rates charged by banks lead to a high occurrence of NPLs. Similarly, Khemraj and Pasha (2009:3) suggest a positive relationship between the lending rate and NPLs which is emphasized by aggressive banks that charge higher interest rates. As cited in Nkusu (2011:5), Dash and Kabra (2010) find further support for this and add that banks with aggressive lending policies that charge higher interest rates incur greater NPLs.

Espinoza and Prasad (2010), who investigate 80 banks of the Gulf Cooperation Council, conclude a positive relationship between interest rates and NPLs. Likewise, Farhan *et al.*, (2012), add that according to the perception of Pakistani bankers, there is a significant positive

association between interest and NPLs. Tanasković and Jandrić (2014:53) also add that interest rate hikes can weaken borrower's repayment capacity, especially in the case of variable rate contracts. Touny and Shehab (2015) conduct a study in selected Arab countries and find a positive and significant effect of interest rates on NPLs in both petroleum and non-petroleum countries. Adebola, Wan Yusoff, and Dahalan (2011) investigate the determinants of NPLs in the Islamic banking sector of Malaysia from 2007-2009. Similarly, they too find that interest rates have a positive significant relationship with NPLs.

Bloem and Gorter (2001) examine the causes and treatments of NPLs, and conclude that frequent fluctuations in the interest rate policy cause increases in NPLs. Berge and Boye (2007) conduct a study in the Nordic banking system from 1993–2005, and find that bad loans are highly sensitive to the real interest rates.

3.2.4. Economic activity: Real GDP and Unemployment

According to Abid, Ouertani and Zouari-Ghorbel (2014:60), based on theory of 'life cycle consumption' models of Modigliani and Miller (1967) and the business cycle theory, Hayek (1940) and Salas and Saurina (2002) suggest that GDP is negatively related to NPLs while unemployment has a positive impact on NPL.

Salas and Saurina (2002) find a negative relationship between GDP growth and the NPL ratio while unemployment has a positive impact on NPLs in the Spanish banking industry over the period 1985-1997. Khemraj and Pasha (2009) investigate the determinants of NPLs in Guyana from 1994 and 2004; find an inverse relationship between GDP and the volume of NPLs. In a study covering the period 2003-2009, Louzis, Vouldis and Metaxas (2012) also find that an increase in the real GDP growth rate and a decrease in the unemployment rate contributes considerably to a decrease in NPLs of the Greek banking sector. According to Farhan *et al.*, (2012), Pakistani bankers perceive that growth in GDP has a significant negative relationship with NPLs while unemployment has a significant positive relationship with these loans. Similarly, Jakubik and Reininger (2013) examine the determinants of NPLs in 9 CESEE countries. Using GMM estimations with quarterly data from 2004 to 2012, the authors find real GDP growth reduces NPLs. Another support is provided by Tanasković and Jandrić (2014) who find a negative relationship between GDP and the NPL ratio. Skarica (2014) uses quarterly data from the period 2007-2012 for 7 Central and East European countries, to explore the

macro-economic determinants of NPLs, and find unemployment to increase the growth of NPLs while real GDP growth has a negative effect.

A study in Nigeria by Akinlo and Emmanuel (2014:23) also shows that GDP growth is negatively related to NPLs while unemployment has a positive relationship. The authors suggest that this result could mean that the increase in unemployment negatively affects an individual's income henceforth increasing their debt burden. Additionally, an increase in unemployment adversely affects the demand for products in the economy which ultimately affects the production and sales in firms, in turn leading to a decline in revenues and fragile debt conditions (Akinlo & Emmanuel, 2014:23). In Tunisia, Abid, Ouertani and Zouari-Ghorbel (2014:66) also find that a sluggish economic growth negatively affects NPLs.

In more recent studies, Ghosh (2015) concludes that higher state real GDP reduces NPLs while state unemployment rates significantly increase NPLs in the United States. Additionally, Viswanadham (2015:90) also concludes a negative relationship between GDP and the NPL rate and established that the results were consistent with the principal-agent problem model. This means that with an improvement in GDP it is expected to see a drop in NPLs. Results from the study indicated that a strong positive GDP growth translates into more income for individual and an improvement in the debt serving capacity of borrowers which in turn lowers the level of NPL. However, this situation may cause bank managers to become overconfident about the health of the economy. This wrong perception would tempt them to give cheaper loans to their customers, in exchange for some incentives. Such kind of temptation attracts bad borrowers thereby increasing the chances of loan default. This is consistent with the principal – agent problem model (Viswanadham, 2015:90).

In conclusion, macroeconomic determinates can be viewed as exogenous factors influencing the banking industry. Additionally, there are also internal factors that affect this industry. The following section seeks to review available literature that evaluates industry level factors that impact NPLs.

3.3. Industry Level Determinants of Nonperforming loans

A significant amount of literature has examined the relationship between industry level factors and NPLs.

Berger and DeYoung (1997:32) focus on the relationship between industry level variables and NPLs. They form possible mechanisms, namely 'bad luck', 'bad management', 'skimping' and 'moral hazard', relating efficiency, capital adequacy and test the derived hypotheses for a sample of US commercial banks for the period 1985-1994. Keeton (1999:68) also examines the relationship between industry level determinants and NPLs in a study covering commercial banks in the United States for the period 1982-1996. The study supports the hypothesis that bad loans are associated with rapid credit growth. Salas and Saurina (2002) draw attention to Spanish banks and conclude that rapid credit expansion, industry size, capital ratio and market power are the industry level determinants that explain variations in NPLs. Bercoff, Giovanni and Grimard (2002) show that asset growth, operating efficiency and exposure to local loans also assisted in explaining NPLs.

Dimitrios, Angelos and Vasilios (2011) analyse the determinants of NPLs in Greece, separating the different loan categories. The study concludes that industry level variable such as performance and the quality of management lead to variations in NPLs. Geletta (2012) identified the following industry level determinants, namely, rapid loan growth, lenient credit terms, credit orientation, industry size, cost efficiency, ownership structure, poor loan monitoring, poor risk assessment and lack of strict admittance exit policies. Messai and Jouini (2013) evaluate the following variables and their impact on NPLs; return on assets, the change in loans and the loan loss reserves to total loans.

In recent studies, Hue (2015) analyses determinates of NPLs in Vietnam's banking system from 2009-2012. The study examines the relationship between NPLs and industry level factors such as the lag of NPLs in the last year, total assets and the loans-to-asset ratio. The results show that in recent years, all factors stimulated the growth of NPLs. Sheefeni (2015) assesses the industry level determinants of NPLs in commercial banks in Namibia covering the period 2001-2014. The results reveal that return on assets, return on equity, loan to total asset ratio, and log of total assets are the main determinants of NPLs. Last but not least, Ghosh (2015) examines state-level industry specific determinants of NPLs for all commercial banks and savings institutions across 50 US states and the District of Columbia from 1984–2013. The study finds that capitalization, liquidity risks, poor credit quality, greater cost inefficiency and banking industry size significantly increase NPLs, while bank profitability lowers NPLs.

On the basis of the above aforementioned literature, the most recurrent industry specific indicators have been identified to assist in adequately answering the research question for this report. Furthermore, these variables were selected on the basis that there are more relevant to the banking industry of Botswana. These include: credit growth, diversification, capitalization, profitability and industry size.

3.3.1. Credit Growth

In the US, Keeton (1999:58) examines the effect of credit growth on NPLs. The author establishes evidence of a significant relationship between industry credit growth and NPLs. In this situation, when banks increase their supply of loans, they reduce the interest rates charged on loans and lower their minimum credit standards. This reduction in credit standards increases the chances of loan defaults by borrowers in turn increasing the volume of NPLs. Bercoff, Giovanni and Grimard (2002) examined the Argentine banking system and demonstrated that credit growth has an impact on the impaired loans. Furthermore, Salas and Saurina (2002) found a positive association of the two variables.

In a recent study, Ghosh (2015:95) finds that for savings institutions, credit growth has a statistically insignificant relationship with NPLs. This implies that NPLs of savings institutions are less affected by credit growth. Sheefeni (2015:1536) shows a positive relationship between NPLs and the loan to total asset ratio, suggesting that the quality of assets plays a role in the case of Namibia. Also, this means that the lower the quality of assets the banks possess, the higher the NPL. Contrary to the bulk of international evidence, Khemraj and Pasha (2009:21) find a negative significant relationship between credit growth and NPLs. This result suggests that industries which extend moderate high levels of credit are likely to incur lower NPLs.

3.3.2. Capitalization

According to Ghosh (2015:95), the effect of capitalization on NPLs can be ambiguous. Firstly, managers in banks with low capital bases have a moral hazard incentive to participate in risky lending practices along with poor credit scores. The “moral hazard” hypothesis was first highlighted by Keeton and Morris (1987:17), who argue that banks with relatively low capital levels respond to moral hazard incentives by increasing the riskiness of their loan portfolio, which in turn results in higher NPLs. Keeton and Morris (1987:17) further illustrate that excess loss rates are prominent among industries that have relatively low equity to assets ratio.

Therefore the “moral hazard” hypothesis implies banks’ low capitalization causes an increase in the volume of NPLs hence an inverse relationship between equity capital and NPLs (Ghosh, 2015:95).

Berger and DeYoung (1997) find a negative relationship between industry capital ratios and the level of NPLs. Similarly, Salas and Saurina (2002) also find a negative relationship between the two variables. On the contrary, Ghosh (2015:95) highlights that managers in banks that are highly capitalized may opt for a liberal credit policy under the notion of “too big to fail” discussed in Rajan, (1994), which implies a positive relationship between capital and NPLs. Additionally, Louzis, Vouldis and Metaxas (2012:1015) state that there may be a policy concern with “too big to fail” banks as they may choose to undertake unnecessary risk with the expectation that government will protect them in case of a bank failure. Accordingly, large banks may increase their leverage unnecessarily and in turn offer loans to lower quality borrowers. Furthermore, industries with high capital adequacy ratios are also involved in high risk activities and risky loan portfolios thereby leading to higher levels of NPL (Makri, Tsagkanos & Bellas, 2014:203).

3.3.3. Industry Size

The impact of the industry size on NPLs can be ambiguous in its direction as it can be either negative or positive.

Ghosh (2015:95) conducts a study in the US and reveals that in states with large-sized banking industries, banks may increase their leverage too much and extend loans to low quality borrowers. Additionally, in larger sized markets, banks often resort to excessive risk taking since it is difficult to impose market discipline by regulators and banks expect government protection in the case of failures. This is in line with the notion of “too big to fail” therefore suggesting NPLs may be positively impacted by the industry size (Ghosh (2015:95).

Amuakwa-Mensah and Boakye-Adjei (2015:47) examine the determinants of NPLs in the banking industry in Ghana and reveal that the industry size has a positive effect on NPLs. They suggest that as the banking industry increases there is a high tendency for banks to expand their credit base meaning that with a greater credit expansion there is a possibility of more clients defaulting, hence leading to an increase in NPLs. Similarly Peyavali and Sheefeni (2015:1539)

reveal a positive relationship between NPLs and log of total assets suggesting that the banking industry size plays a role in determining NPLs in Namibia.

On the contrary, there are studies that observed a negative association between the two variables. This negative relationship may mean that larger banking industries adopt better risk management strategies than smaller ones. Hu et al., (2006) as cited in Amuakwa-Mensah and Boakye-Adjei (2015), examine NPLs and ownership structure of commercial banks in Taiwan from 1996-1999. They find a negative relationship between industry size and the NPL rate. Additionally, Abid, Ouertani, and Zouari-Ghorbel (2014:62) also find a negative relation between the two variables. The authors uphold that larger banking industries translate to more diversification opportunities.

3.3.4. Diversification

Banks' income or earning streams can be categorized into interest and non-interest incomes. Interest income includes traditional commercial bank activities such as interest earned from different types of loans, and investment securities. Non-interest income includes investment banking, asset management, insurance underwriting, commission-paying services, trading and derivatives. Recently, in the Botswana banking industry, there has been an increase in the latter's share as banks opt for other means of increasing their earnings streams.

Louzis, Vouldis and Metaxas (2012) find that diversification in the banking industry decreases credit risk. Accordingly, Abid, Ouertani and Zouari-Ghorbel (2014:62) also find a statistically negative significant relationship between industry diversification and NPLs. Furthermore, Ghosh (2015:95) highlights that more diversification in the banks' business model improves loan quality and reduces credit risk therefore implying a negative impact of diversification on NPLs.

3.3.5. Profitability

Ghosh (2015:95) suggests that highly profitable industries have lower incentives to participate in high-risk activities thus profitability is expected to negatively impact NPLs. Godlewski (2004) uses return on assets (ROA) as a profitability indicator and finds a negative relationship between ROA and the NPL ratio. Louzis, Vouldis, and Metaxas (2012:1018) also identify a significant negative association between NPLs and profitability ratios. Similarly, Warue

(2013:136) finds evidence that ROA is negatively and significantly related to NPLs in large banks and small banks but insignificant in medium banks. In addition the study finds that ROA is negative and significant in local banks and government banks but not in foreign banks.

Messai and Jouini (2013) examine the banking industries in Italy, Greece and Spain and deduce that profitability reduces NPLs.

Makri, Tsagkanos and Bellas (2014:199) investigate the ROA and ROE, and reveal that profitability is associated with the risk-taking conduct of banks. The authors determine that highly profitable industries have fewer incentives to engage in high-risk activities, thus ROA and ROE are expected to display a negative sign. In conclusion, they identify a negative relationship between NPLs and ROA as well as ROE indicating that a deterioration of profitability ratios leads to an increase in NPLs, thus confirming the risk-taking behaviour of banks. Furthermore, the study suggests that the negative relationship is also in line with the argument that bad management leads to riskier activities and weak performance (Makri, Tsagkanos & Bellas, 2014:203).

Abid, Ouertani, Zouari-Ghorbel (2014:66) find a negative relationship between ROE and NPLs for consumer loans and suggests that poor performance may indicate low skill sets or poor quality of management which can be linked to the 'bad management' hypothesis. This therefore signals a possibility were the quality of management affects the performance. Similarly, Ghosh (2015:95) also reveals that profitability lowers NPLs. Last but not least, Sheefeni (2015:1536) finds a negative relationship between NPLs and ROA as well as ROE suggesting that industries with higher profitability are less constrained to participate in risky activities of giving out risky loans.

On the contrary, higher profits can also increase NPLs. Ghosh (2015:95) suggests that this possibility is shown in the model of Rajan (1994). This model highlights that credit policy is determined by the banks' emphasis on the short term reputation, and not merely by the maximization of earnings. Accordingly, bank managers may attempt to manipulate current earnings. In this instance, banks improve their profitability figures by increasing current earnings at the expense of rising NPLs in the future (Ghosh, 2015:95).

Garcia-Marco and Robles-Fernandez (2008) argues that high ROE levels are preceded by a higher future risk. Additionally, the study argues that profit maximization is accompanied by higher levels of risk therefore leading to high loan portfolios thus higher chances of default.

In conclusion, from the available literature it is evident that both macroeconomic and industry level factors significantly impact NPLs. The next sector seeks to review the main research question of this study along with the numerous hypotheses formulated.

3.4. Research Question and Hypotheses

3.4.1. Research Question

The aim of this research report is to examine and investigate the determinants of NPLs in Botswana's banking industry.

3.4.2. Research Hypotheses

In this section the researcher developed testable hypotheses to examine the relationship between the aforementioned industry level and macroeconomic variables with NPLs in Botswana's banking industry. Thus, based on the above reviewed literature, the following null hypotheses were formulated.

- **H1:** Inflation rate (INF) has a negative relationship with Nonperforming loans (NPLs). However, conflicting theoretical views are provided by the literature. Klein (2013:6) suggests that higher levels of inflation can increase the loan payment capacity of borrowers by reducing their real value of outstanding debt, thereby emphasizing a negative relationship between the two variables. In the contrary, increased inflation can also erode the loan payment capacity of borrowers by decreasing their real income when salaries or wages are sticky (Farhan *et al.*, 2012:91). This hypothesis is however based on the former.
- **H2:** Exchange rate (EXCH) has a positive relationship with Nonperforming loans (NPLs). Nonetheless, empirical evidence also has mixed views. Fofack (2005:19) discusses that currency appreciation increases the value of goods and services produced in a country thus reducing the competitiveness of export-oriented firms and negatively affecting their ability to service their debt. On the contrary, exchange rate depreciations might lead to a higher level of NPLs in countries with un-hedged borrowers who lend more in foreign currencies (Beck, Jakubik and PiloIU, 2013:2). In such a situation, currency depreciations increase the debt servicing costs in local

currency terms for borrowers who have loans denominated in foreign currency (Touny & Shehab, 2015:13). Therefore, since their incomes are usually in local currency, borrowers face more difficulties in paying their debts. This hypothesis is however based on the former.

- **H3:** Real interest rates (RIR) have a positive relationship with Nonperforming loans (NPLs). This hypothesis is based on the notion that a rise in real lending rates increases the real value of borrowers' debt and makes debt servicing more expensive. Therefore an industry with higher interest rate would reasonably face higher chances of default.
- **H4:** Real GDP rate (GDP) has a negative relationship with Nonperforming loans (NPLs). However, literature provides mixed views. A negative relationship between the two variables is based on the notion that a strong positive GDP growth translates into more income for individual and an improvement in the debt serving capacity of borrowers which in turn lowers the level of NPL. On the contrary, this situation may cause bank managers to become overconfident about the health of the economy. This wrong perception would tempt them to give cheaper loans to their customers, in exchange for some incentives. In turn, this would attract bad borrowers thereby increasing the chances of loan default (Viswanadham, 2015:90). This hypothesis is however based on the former.
- **H5:** Unemployment rate (UNEMP) has a positive relationship with Nonperforming loans (NPLs). This hypothesis is based on the assumption that as unemployment increases, individuals are unable to pay their debts as they have no source of income, resulting in an increase in NPLs.
- **H6:** Credit Growth (CREDIT) has a positive relationship with Nonperforming loans (NPLs). In this case, literature also provides mixed views. Keeton (1999:58) suggests that when banks increase their supply of loans, they reduce the interest rates charged on loans and lower their minimum credit standard. This reduction in credit standards increases the chances of loan defaults by borrowers in turn increasing the volume of NPLs. On the contrary, Khemraj and Pasha (2009:21) suggest a negative relationship between the two variables highlighting that banks which extend moderate high levels of credit are likely to incur lower NPLs. This hypothesis is however based on the former.

- **H7:** Capitalization (CAP) has a negative relationship with Nonperforming loans (NPLs). However, literature provides conflicting theoretical views. A negative relationship between the two variables is highlighted by the “moral hazard” hypothesis which implies that managers in banks with low capital bases have a moral hazard incentive to participate in risky lending practices along with poor credit scores, which leads to higher NPLs. On the contrary, managers in banks that are highly capitalized may opt for a liberal credit policy under the notion of “too big to fail” which therefore implies a positive relationship between the two variables. In this case banks may choose to undertake unnecessary risk with the expectation that government will protect them in case of a bank failure. This hypothesis is however based on the former.
- **H8:** Industry Size has a positive relationship with Nonperforming loans (NPLs). However, literature provides conflicting theoretical opinions. A negative relationship may mean that a larger banking industry is able to adopt better risk management strategies than a smaller one. On the contrary, in larger sized industries, banks may often resort to excessive risk taking since it is difficult to impose market discipline by regulators and thus they also expect government protection in the case of failures. This is in line with the notion of “too big to fail” therefore suggesting a positive relationship between the two variables (Ghosh (2015:95). This hypothesis is therefore based on latter.
- **H9:** Diversification (DIVER) has a negative relationship with Nonperforming loans (NPLs). This hypothesis is based on the notion that with more diversification in the industry, the banks’ business models expand, thereby improving loan quality and reducing credit risk.
- **H10:** Profitability (PROF) has a negative relationship with Nonperforming loans (NPLs). However, literature provides mixed opinions. In highly profitable industries, banks have lower incentives to participate in high-risk activities thus profitability is expected to negatively impact NPLs (Ghosh, 2015:95). On the contrary, higher profits can also increase NPLs. In this case, the credit policy can be determined by the banks’ emphasis on their short term reputation, and not merely by the maximization of earnings. Accordingly, bank managers may attempt to manipulate current earnings in turn improving their profitability figures by increasing current earnings at the expense of rising NPLs in the future (Ghosh, 2015:95). This hypothesis is however based on the former.

4. Research Approach

This section discusses how the data was collected, processed and analysed. Additionally, the variables of the model and the model specification are presented.

The research approach represents techniques used to acquire and analyse data (Petty, Thomson and Stew, 2012). It specifies the various methods used for collecting and analysing the required data. The study consists of a multi-variate regression analysis including five macroeconomic and five industry level variables as independent variables used to explain the variation in NPLs in Botswana. The use of a multi-variate regression analysis is appropriate as the data set comprises of time series data.

The next session highlights the data collection process by assessing how the relevant data was acquired and the specific instruments employed.

4.1. Data Collection

Data was collected from Statistics Botswana and Bank of Botswana websites. Both industry level and macroeconomic variables were collected from the Bank of Botswana and Statistics Botswana respectively. The population of the study is Botswana's banking industry which is made up of all commercial banks operating within the industry from the period 2005 to 2014. The data used for analysis is quarterly data and the average quarterly figures were calculated from monthly data obtained from the Bank of Botswana. This resulted in 40 observations used for the study. The initial intention was to use monthly data however the Bank of Botswana only had monthly data available from 2011.

A secondary data collection technique was used in this research. Working papers, academic books, academic journals, publications, academic reviews, and various academic websites were consulted for the purpose of this study. Internet sources used included Google Scholar and numerous data bases available at the University of Cape Town.

4.2. Data Analysis

Data analysis is a statistical process in which raw data is prepared and structured so that valuable information can be extracted from it (Trochim, 2000). STATA version 13 software package was employed to analyse the data and the researcher had the full responsibility of

analysing the data. Firstly, the data series was tested for stationarity. A regression analysis was then conducted and since a multi-variable regression analysis was to be employed, the researcher conducted numerous diagnostic tests needed to decide whether the model fulfilled the assumptions of a multiple linear regression model. The following diagnostic tests were conducted; test for linearity, test for normality, test for heteroscedasticity, test for multicollinearity, and an autocorrelation test. Lastly descriptive statistics analysis were conducted.

4.2.1. A Test for Stationarity (Unit root test)

This report employs time series data which is subject to non-stationarity issues. A stationary variable has a constant mean and variance over time. When the variables in a regression model are non-stationary, the t-statistics and R-square values tend to be overstated. In this analysis it is imperative to therefore conduct stationarity tests to determine the stationarity properties of the variables. This report uses the Augmented Dickey Fuller (ADF) Test for stationarity. The results of the test concluded that all variables except INFL, RIR and PROF are stationary (See Appendix). As the final regression residuals were stationary, the researcher made the assumption that cointegration solved the stationarity issues observed.

4.2.2. Testing for Multiple Linear Regression Model Assumptions

The objective of the model is to predict the strength and direction of association among the dependent and independent variables. Therefore, in order to maintain the validity and robustness of the regression result of the research, basic assumptions of the multiple linear regression models must be tested.

4.2.2.1. A Test for Linearity

A standard linear regression analysis can accurately estimate the relationship between the dependent and independent variables if the relationships are linear in nature. If the relationships are not linear, the results of the regression analysis will under-estimate the true relationship. A Ramsey Regression Equation Specification Error Test (RESET), which is a statistical test for linearity was conducted using STATA13. The table below depicts the results of the test.

Table 5: Ramsey reset test for Linearity

Ho: model has no omitted variables	
F(3, 26) =	1.28
Prob > F =	0.2140

The above results indicate a p-value of 0.2140 which is higher than the threshold of 0.01, 0.05 and 0.1 (99%, 95% and 90% significance). Therefore it can be concluded that the model is well specified.

4.2.2.2. A Test for Normality

The calculation of p-values is usually based on the assumption that the sample distribution is normal; therefore a test of the normality must be conducted. There are various statistical tests used to determine normality and in this study a Skewness-Kurtosis Jarque-Bera test was conducted using STATA13. Table 8 below depicts the results of the test.

Table 6: The Skewness-Kurtosis (Jarque-Bera) Test for Normality

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
myResiduals	40	0.1655	0.0136	6.88	0.2215

Source: Researchers compilation via STATA13

Highly skewed or kurtosis variables can distort relationships and significance tests. Skewness measures how symmetric the observations are about the mean while Kurtosis gives a measure of the thickness in the tails of a probability density function. The rule of thumb was observed which states that a variable is reasonably close to normal if its skewness and kurtosis have values between -1.0 and $+1.0$. According to the table above, skewness is 0.1655 and kurtosis is 0.0136. Both these values are between -1.0 and $+1.0$, satisfying the rule of thumb.

4.2.2.3. A Test for Autocorrelation

Autocorrelation also known as serial correlation is present when the error terms of any pair of observations are not independent of one another, i.e. they are correlated. Autocorrelation may be due to numerous factors including ignoring non-linearities in a model and omitted variables. The Durbin Watson test is the most widely used test to detect autocorrelation in a model. If the Durbin Watson Statistic (d) is close to 2, it can be concluded that there is no autocorrelation in the model. In this report a Durbin-Watson test was run on STATA13. The below results were obtained which illustrate a d-statistic of 1.891725(close to 2). It can therefore be concluded that there is no autocorrelation in the model.

Table 7: The Durbin-Watson Test for Autocorrelation

Durbin-Watson d-statistic (11, 40) = 1.891725

Source: Researchers compilation via STATA13

4.2.2.4. A Test for Heteroscedasticity

In the classical linear regression model, one of the basic assumptions is Homoscedasticity. This means that the variance of errors is the same for all values of the explanatory variables. However, if the disturbance terms do not have the same variance, this condition of non-homogeneity of the variance is known as heteroscedasticity. In order to detect heteroscedasticity, a Breusch-Pagan or Cook-Weisberg test was utilized in this report. Table 8 below depicts the result of the test carried out through STATA 13.

Table 8: Breusch-Pagan / Cook-Weisberg test for Heteroscedasticity

Ho: Constant variance
Variables: fitted values of NPL
chi2(1) = 1.48
Prob > chi2 = 0.3844

Source: Researchers compilation via STATA13

The above results indicate a p-value of 0.3844 which is higher than the threshold of 0.01, 0.05 and 0.1 (99%, 95% and 90% significance level). Therefore, this result verifies that there are no heteroscedasticity issues in this model.

4.2.2.5. A Test for Multicollinearity

The term Multicollinearity indicates the existence of high correlations or linear associations between two or more independent variables in the regression model. If there is multicollinearity in the model, the regression coefficients of the independent variables may be undetermined with immeasurable standard errors (Gujarati, 2004). This makes significant variables insignificant by increasing their p-values hence producing low t-statistics values. Therefore, regression results with multicollinearity may depict significant variables as insignificant variables. The multicollinearity problem is solved by dropping highly correlated variables

(Ahmad & Bashir, 2013). Thereafter the results should provide more significant variables than before.

4.2.2.5.1. Causes of Multicollinearity

There are several issues that may cause multicollinearity in a regression model. These include, among others, data that is 100% observational, insufficient data, the inclusion of a variable in the regression that is actually a combination of two other variables and lastly the inclusion of two variables that are almost identical.

4.2.2.5.2. Detecting Multicollinearity

In this study, the Pearson correlation matrix and Variance inflation factor (VIF) are used to test for multicollinearity. A Pearson correlation matrix is used for testing multicollinearity of the independent variables by investigating their relationship and also measuring the propensity of how much these variables influence the dependent variable (Ahmad & Bashir, 2013). The VIF quantifies how much the variance is inflated and is also another test used to confirm multicollinearity in a model.

Pearson Correlation Matrix

In the Pearson correlation matrix, the values of the correlation coefficient range between -1 and +1. A correlation coefficient of +1 indicates that the two variables have a perfect positive relationship while a correlation coefficient of -1 indicates a perfect negative relationship. A correlation coefficient of 0, on the other hand indicates that there is no linear relationship.

The Pearson correlation matrix is presented by table 9 in the appendix section. According to Gujarati (2004), a problem of multicollinearity can be observed if the presence of large correlations (0.8 or larger) among pairs of independent variables is observed. In table 9, the correlation between exchange rate and bank profitability is 0.8208 which is above 0.8 thereby prompting further investigation by applying the VIF test.

Variance Inflation Factors (VIF)

The rule of thumb is that if VIF of a variable exceeds 10, the variable is said to be highly collinear (O'brien, 2007). Table 10 below depicts the variance inflation factor test. Based on

the results, a multicollinearity problem can be observed in this study. Two variables in the model have VIFs higher than 10; Exchange rate and Size.

Table 10: Variance Inflation Factors (VIF)

Variable	VIF	1/VIF
EXCH	19.33	0.051729
SIZE	16.91	0.059124
PROF	7.03	0.142293
CREDIT	5.39	0.185388
INFL	2.54	0.393064
INTEREST	2.46	0.406736
DIVER	2.33	0.429852
UNEMP	2.09	0.477386
GDP	1.43	0.699781
BCAP	1.07	0.930237
Mean VIF	6.06	
* Above 10		

Source: Researchers compilation via STATA13

4.2.2.5.3. Solving Multicollinearity Issues

To solve for multicollinearity, the fewest possible number of variables that demonstrate multicollinearity should be removed from the model until the problem is resolved. In this report, the first variable to be eliminated is the exchange rate and thereafter a new Pearson Correlation Matrix and VIF test are conducted to observe if the problem has been resolved. This variable was selected first as it depicted a VIF of 16.91 and also had a correlation higher than 0.8 with one of the variables. The table 11 in the Appendix illustrates the new correlation matrix after removing the exchange rate. In this table it can be observed that no correlation coefficient is now above 0.8.

Table 12: Variance Inflation Factors (VIF) after eliminating Exchange Rate

Variable	VIF	1/VIF
PROF	6.86	0.145849
CREDIT	5.04	0.198308
SIZE	4.68	0.2139
INFL	2.34	0.427868
DIVER	2.32	0.430251
RIR	2.19	0.456602

UNEMP	1.59	0.627229
GDP	1.18	0.847701
BCAP	1.05	0.955321
Mean VIF	3.03	

Source: Researchers compilation via STATA13

As noted by table 12 above, after eliminating the exchange rate, all individual VIF values decrease significantly and were below the threshold of 10. The mean VIF is now 3.03 which further confirms that there are no multicollinearity issues in the model.

4.2.3. Regression Analysis

In this study, a multiple linear regression model analysis was conducted using STATA version 13 software package. The regression analysis results are discussed in detail in the next chapter. The next section evaluates the data analysis process conducted for this study.

4.2.4. Descriptive Statistics

This section presents the descriptive statistics of dependent and independent variables used in this study. Table 13 depicts the mean, maximum, minimum, standard deviation and number of observation for each variables used in this study.

Table 13: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
NPL	40	6.410748	1.928338	3.8287	11.7579
GDP	40	5.302145	5.846917	-14.8288	18.2089
INFL	40	8.134167	2.746525	4.1333	14.7
RIR	40	4.590653	1.726318	1.7729	8.442
UNEMP	40	19.2007	1.696345	17.0125	22.9854
PROF	40	0.592835	0.2970638	0.1326	1.1447
DIVER	40	0.7957775	0.2097964	0.5624	1.7425
CREDIT	40	0.4784425	0.1060734	0.3192	0.6561
SIZE	40	4.62493	0.1644062	4.1925	4.834
BCAP	40	1.999645	0.0225874	1.9301	2.0718

Source: Researchers computation from STATA 13

The NPL ratio ranges from 3.8287 to 11.7579 per cent having a mean value of 6.41%.

Botswana's GDP has the lowest minimum of -14.8% and a maximum of 18.2%. The inflation rate has also reached a concerning maximum level of 14.7%. Unemployment figures in

Botswana continue to increase at alarming levels reaching a minimum of 17% and a maximum of 23% in the period of study. Profitability as measured by ROA ranges from a minimum of 0.13% to 1.1447% having a mean of 0.6 %.

4.3. Variables

The NPL ratio is the dependent variable used in this study. It is measured by the ratio of non-performing loans to gross loans. On the other hand, explanatory variables included in this report are real interest rates, real gross domestic product(both adjusted for inflation), unemployment rate, inflation rate, credit growth, profitability, capitalization, industry size, and diversification. Table below illustrates both the dependent and independent variables. The first half of the table depicts the macroeconomic variables while the next half represents the industry level variables.

Table 14: Presentation of Variables

Variable	Explanation	Expected Sign
NPL	Aggregate non-performing loans to total gross loans	
GDP	Percentage growth rate of GDP	(-)
UNEMP	% of unemployment	(+)
INFL	Average inflation rate	(+ / -)
RIR	Real interest rates: Bank prime rates	(+)
CREDIT	Credit growth as measured by the loans-to-assets ratio	(+)
CAP	Capitalization measured by total equity capital to total assets	(+ / -)
SIZE	Industry Size as measured by the log of total assets	(+ / -)
DIVER	Diversification measured by non-interest income to total income	(-)
PROF	Profit measured by Return on assets	(-)

Source: Researchers compilations from Literature review

The Inflation rate (INF) is calculated as the annual average inflation rate and is expected to have a negative or positive relationship with the dependent variable as discussed in the literature review of this report. Real interest rate (RIR) is expected to have a positive relationship with NPLs. This report uses the bank prime loan rate to measure the real interest rates similar to Ghosh (2015:96). The Real GDP rate (GDP) as measured by the percentage growth rate of GDP is expected to have a negative relationship with NPLs. The unemployment rate (UNEMP) is expected to have a positive relationship with NPLs.

Moving on to industry level variables, Credit Growth (CREDIT) is expected to have a positive relationship with NPLs. This report measures credit growth by the loans-to-assets ratio as carried out by Klein (2013) and Ghosh (2015:95). According to the authors, this measure also reflects the liquidity risk. Capitalization (Cap) is expected to have either a negative or positive relationship with NPLs. In this report capitalization will be measured by total equity capital to total assets, similar to Klein (2013), Louzis, Vouldis and Metaxas (2012), Macit (2012), Makri, Tsagkanos and Bellas (2014) and Ghosh (2015:95). The industry size (Size) is expected to have either a negative or positive relationship with NPLs. This is measured by computing the log of total assets as measured by Sheefeni (2015).

Additionally, diversification (DIVER) is expected to have a negative relationship with NPLs. This report measures diversification by the share of non-interest income to total income similar to Louzis, Vouldis and Metaxas (2012) and Ghosh (2015). Lastly, Profitability (PROF) as measured by the Return on Assets (ROA) is expected to have a negative relationship with NPLs. The next section below depicts the model specification of the report.

4.4. Model Specification

The aim of this study is to examine the determinants of NPLs in Botswana. In line with available literature, this study used the NPL ratio as the dependent variable while independent variables included; inflation rate, real interest rates, real gross domestic product, unemployment rate, credit growth, profitability, capitalization, industry size and diversification.

The Regression model is presented as follows:

$$\text{NPL}_t = \beta_0 + \beta_1(\text{GDP})_t + \beta_2(\text{INFL})_t + \beta_3(\text{RIR})_t + \beta_4(\text{UNEMP})_t + \beta_5 \log(\text{SIZE})_t + \beta_6(\text{CAP})_t + \beta_7(\text{CREDIT})_t + \beta_8(\text{PROF})_t + \beta_9(\text{DIVER})_t + \varepsilon_t$$

Where;

- β_0 is a constant
- $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8$ and β_9 represent the estimated coefficients at time t
- GDP, INFL, RIR, UNEMP, SIZE, CAP, CREDIT, PROF, DIVER, represent real GDP, inflation rate, real interest rates, unemployment, size, capitalization, credit growth, profitability and diversification respectively.
- ε_t represents the error term.

5. Results

In this chapter an analysis of the findings and discussion of results is compiled in order to help achieve the established research objectives and set a base for the conclusion. The data was analysed using a multiple linear regression model with STATA version 13 software. The first section of this chapter presents the regression analysis results as well as the discussion of results. The chapter is concluded by the discussion of outliers, limitations of the study and opportunities for further research.

5.1. Regression Results

The results of the regression analysis are presented in the table below.

Table 15: Regression analysis results

NPL	Coef.	Std. Err.	P>t
GDP	-0.0631173	0.036338	0.083***
INFL	-0.2678987	0.1088858	0.022**
RIR	0.4285369	0.167695	0.016**
UNEMP	0.4372267	0.145607	0.005*
PROF	-6.584071	1.724279	0.011*
DIVER	-0.6998716	1.421513	0.626
CREDIT	4.340988	2.141269	0.071***
SIZE	10.12178	2.572685	0.001*
BCAP	-1.946054	8.860736	0.828
cons	-38.62351	20.75767	0.073***

Number of obs = 40

R² = 0.7901

Prob > F = 0.0001

Source: Researchers compilation via STATA13

Note: significant at 1% -*, 5% -** and 10% -**

5.2. Discussion of Results

Based on table 15 above, the following model can be deduced to examine the determinants of NPLs in this study.

$$\text{NPL} = -38.62 - 0.06(\text{GDP}) - 0.27(\text{INFL}) + 0.43(\text{RIR}) + 0.44(\text{UNEMP}) + 10.12 \log(\text{SIZE}) - 1.95(\text{BCAP}) + 4.34(\text{CREDIT}) - 6.58(\text{PROF}) - 0.70(\text{DIVER}) + \varepsilon$$

As shown in the above table, R^2 (coefficient of determination) is 79.01% revealing that 79.01% of the variation in the NPL ratio is explained by the independent variables.

Through the examination of coefficients for industry level variables, it is observed that credit growth and bank size have a positive impact on the NPL rate, having coefficients of 4.34 and 10.12 respectively. This indicates that one unit change (increase/decrease) in these variables (credit growth and bank size) can result in a change in the NPL rate by 4.34 and 10.12 unit's respectively in the same direction.

The examination of coefficients for macroeconomic variables reveals that the real interest rates and the unemployment rate have a positive impact on the level of NPLs having coefficients of 0.43 and 0.44 respectively. This indicates that one unit increase or decrease in the real interest rates and unemployment rate can result in a change in the NPL rate by 0.43 and 0.44 units respectively, in the same direction. On the other hand GDP and inflation rate revealed a negative impact on the level of NPLs having coefficients of 0.06 and 0.27 respectively. This indicates that a one unit increase or decrease in these variables (GDP and inflation) can result in a change in the NPL rate by 0.06 and 0.27 units respectively, in the opposite direction.

Examining the significance level of the variables (corresponding p-value), it can be noted that all independent variables except diversification and capitalization had p-values of less than the selected significance levels (10%, 5% and 1%). It can therefore be concluded that diversification and capitalization have a statistically insignificant relationship with the NPL rate. The table below depicts a summary of the results.

Table 16: Summary of results

Source: Researchers compilation

Proposed relationship hypothesis	Hypo- Thesis	Relation found	P- Value	Accept/ Rejected
Inflation rate (INF) has a negative relationship with NPLs	H ₁	(-)	0.022	Accept
Real interest rates (RIR) have a positive relationship with NPLs	H ₃	(+)	0.016	Accept
Real GDP rate (GDP) has a negative relationship with NPLs	H ₄	(-)	0.083	Accept
Unemployment rate (UNEMP) has a positive relationship with NPLs	H ₅	(+)	0.005	Accept
Credit Growth (CREDIT) has a positive relationship with NPLs	H ₆	(+)	0.071	Accept

Capitalization (CAP) has a negative relationship with NPLs	H ₇	(-)	0.828	Reject
Size (Size) has a positive relationship with NPLs	H ₈	(+)	0.001	Accept
Diversification (DIVER) has a negative relationship with NPLs	H ₉	(-)	0.626	Reject
Profitability (PROF) has a negative relationship with NPLs	H ₁₀	(-)	0.011	Accept

The above summary table indicates that there is a negative relationship between inflation and the level of NPLs. The study therefore accepts hypothesis H₁ which is consistent with Shu (2002), Ahmad and Bashir (2013), and Touny and Shehab (2015). With real interest rates, a positive significant relationship with NPLs was confirmed, leading to a support of the hypothesis H₃. This is consistent with Brewer III, Deshmukh & Opiela (2014) and Ghosh (2015).

Real GDP rate has a negative significant relationship with NPLs thereby leading to a support of hypothesis H₄ which is consistent with Louzis, Vouldis and Metaxas (2012), Farhan *et al.*, (2012), Akinlo and Emmanuel (2014), Abid, Ouertani, Zouari-Ghorbel (2014) and Ghosh (2015). Additionally, the unemployment rate has a positive significant relationship with NPLs leading to a support of hypothesis H₅ which is consistent with Louzis, Vouldis and Metaxas (2012), Farhan *et al.*, (2012), Akinlo and Emmanuel (2014), Abid, Ouertani, Zouari-Ghorbel (2014) and Ghosh (2015).

With industry level variables, the study observed that Credit growth has a positive significant relationship with NPLs leading to acceptance of hypothesis H₆. This result is similar to Salas and Saurina (2002) and Sheefeni (2015). Furthermore, bank size has a positive significant relationship with NPLs thereby accepting hypothesis H₈. This result is similar to Amuakwa-Mensah and Boakye-Adjei (2015), Peyavali and Sheefeni (2015) and Ghosh (2015). Additionally, profitability has a negative significant relationship with NPLs thereby leading to acceptance of hypothesis H₁₀. This result is similar to Godlewski (2004), Louzis, Vouldis, and Metaxas (2012), Warue (2013), Messai and Jouini (2013), Abid, Ouertani, Zouari-Ghorbel (2014), Sheefeni (2015) and Ghosh (2015). Last but not least, diversification and capitalization have a statistically insignificant relationship with the NPL rate leading to the rejection of hypotheses H₇ and H₉.

5.3. Outliers

An outlier is an observation that lies far away from most or all other observations (Ghosh & Vogt, 2012:3455). Hawkins (1980) defines an outlier as “*an observation that deviates so much from other observations as to arouse suspicion that it was generated by a different mechanism*”. In this report the presence of outliers was not detected in the collected data.

5.4. Limitations of the Study

The data used in this study was quarterly data which was a small sample size (40 observations) due to the unavailability of monthly data in the period of study. Monthly data was only available from July 2011 onwards, which limited the research to focus only on quarterly data for the 10 year period of study. Prior to this date, data was recorded only four times a year; January, March, June and December. From July 2011, quarterly data was populated manually by calculating the figures from the average monthly data.

5.5. Opportunities for Further Research

This study examined both industry level and macroeconomic determinants of NPLs in Botswana using selected variables. However, there are many variables that can be included. Future researchers may be interested in validating the consistency of the result and provide supplementary results for this study by including other variables such as Government expenditure, Loan loss provision, Return on Equity, Average Lending Rate and the Effective tax rate and many more. Furthermore, an investigation of NPLs across loan-types (Household NPL, Corporate NPLs, and SMME NPLs) can be evaluated. Additionally, an extensive review of household NPLs can be examined in isolation, as these loans account for a large share of the loan portfolio in commercial banks. Lastly, NPLs in the Non-Banking sector can also be investigated.

6. Conclusion and Recommendation

6.1. Conclusion

The NPL rate is a key factor that reflects the soundness of a banking sector. The objective of this study was to identify macroeconomic and industry level determinants of NPLs in Botswana's banking industry. This study covered the period 2005-2014 using a linear multiple regression analysis model. The study concluded that inflation, real interest rates, real GDP, unemployment, profitability, industry size and credit growth have a statistically significant effect on the level of NPLs. However, the results of the regression model also revealed that there is an insignificant effect of capitalization and diversification on the level of NPLs in Botswana for the period under consideration.

In this study, the outcome suggests that the inflation rate has a negative impact on NPLs. As expected, Real GDP and Unemployment rates significantly affect NPLs concluding that an improvement in the economic health of the country is vital for the reduction of NPLs. Additionally, with real interest rates, as measured by the prime lending rate, a positive significant relationship with NPLs was found concluding that a rise in real lending rates increases the real value of borrowers' debt making debt servicing more expensive.

Moving on to industry level variables, Results provide evidence of 'too big to fail' hypothesis behaviour on the part of banks. This is because a positive relationship between NPLs and the industry size was found. This means that banks may sometimes resort to excessive risk taking since they expect government protection in the case of failures. Furthermore, a positive relationship between NPLs and credit growth as measured by the loan to total asset ratio of the industry, implies that the quality of assets plays a role in the case of Botswana. Rapid credit growth, which can be associated with lower credit standards and poor monitoring increases the chances of loan defaults by borrowers.

The study also found a negative relationship between NPLs and profitability as measured by the ROA which may suggest that high profits experienced in the industry, tend to lead to more prudent and cautious lending by banks. Lastly, capitalization and diversification both had a statistically insignificant relationship with NPLs.

To conclude, while NPLs remain a permanent feature of the banks' balance sheets, policies and reforms should be geared to avoiding sharp increases that set into motion adverse effects that may harm the banking industry as well as the economy.

6.2. Recommendation

Firstly, this study recommends that commercial banks should consider the impact of macroeconomic factors when giving out loans. More precautionary measures should be adopted in periods of low economic growths.

Maintaining high credit standards to reduce NPLs while sustaining profits should be top priority for a bank. Continual monitoring of the determinants should be practiced to detect any early warnings of potential credit risk in the future. Furthermore, the authorities in Botswana should continue to enhance their surveillance capacity on the growth rate of household borrowing. Additionally, In order to improve the bank's asset quality, specifically loans, it is strongly recommended that bank management, credit analysts and loan officers should always give serious attention to the loan portfolio performance, so as to help curb loans loss. Also, credit analysts and loan officers should provide financial counselling to borrowers.

Furthermore, banks are encouraged to diversify more by adopting more non-interest income activities. Within the bank, stress tests of banks' loan quality and liquidity risk must be conducted on a regular basis. Regulators should also focus on a continual managerial performance evaluation in order to improve the stability of the financial system. Lastly, the government of Botswana can also assist in reducing the level of NPLs by stimulating the economy through the improvement of infrastructure, foreign investments, and economic growth so as to curb unemployment.

7. Reference List

- Abid, L., Ouertani, M. N. & Zouari-Ghorbel, S. 2014. Macroeconomic and bank-specific determinants of household's non-performing loans in Tunisia: A dynamic panel data. *Procedia Economics and Finance*. 13:58-68.
- Abiola, I. & Olausi, A. S. 2014. The impact of credit risk management on the commercial banks performance in Nigeria. *International Journal of Management and Sustainability*. 3(5):295-306.
- Adebola, S. S., Wan Yusoff, S. B. & Dahalan, D. J. 2011. An Ardl approach to the determinants of non-performing loans. *Arabian Journal of Business and Management Review*. 1(2).
- African Economic Outlook Botswana. 2014. Available: http://www.africaneconomicoutlook.org/sites/default/files/201605/Botswana_GB_2014_WEB.pdf [2016, January 10].
- African Economic Outlook Botswana. 2015. Available: http://www.africaneconomicoutlook.org/sites/default/files/201605/Botswana_GB_2015_WEB.pdf [2016, January 10].
- Ahmad, F. & Bashir, T. 2013. Explanatory power of macroeconomic variables as determinants of nonperforming loans: Evidence from Pakistan. *World Applied Science Journal*. 22:243-255.
- Akinlo, O. & Emmanuel, M. 2014. Determinants of non-performing loans in Nigeria. *Accounting & Taxation*. 6(2):21-28.
- Amuakwa-Mensah, F. & Boakye-Adjei, A. 2015. Determinants of non-performing loans in Ghana banking industry. *International Journal of Computational Economics and Econometrics*. 5(1):35-54.
- Baboucek, I. & Jancar, M. 2005. Effects of macroeconomic shocks to the quality of the aggregate loan portfolio. *Czech National Bank. Working Paper*. No.1.

- Badar, M., Javid, A.Y. & Zulfiqar, S. 2013. Impact of macroeconomic forces on nonperforming loans an empirical study of commercial banks in Pakistan. *Elixir International Journal*. 56(A):13807-13814.
- Bank of Botswana. 2011. Banking supervision annual report. Available: <http://www.bankofbotswana.bw/assets/uploaded/BoB%20BSAR%202011%20web.pdf> [2015, December 8].
- Bank of Botswana. 2014. Banking supervision annual report. Available: <http://www.bankofbotswana.bw/assets/uploaded/bob-bsar-2014-web.pdf> [2015, December 8]
- Beck, R., Jakubik, P. & Piliu, A. 2013. Non-performing loans: what matters in addition to the economic cycle? *European Central Bank Working Paper*. No. 1515.
- Bercoff, J.J., Giovanni, J.D. & Grimard, F. 2002. Argentinean banks, credit growth and the Tequila crisis: A duration analysis. *Journal of Finance*. 14: 6-12.
- Berge, T.O. & Boye, K.G. 2007. An analysis of bank's problem loans. *Norges Bank Economic Bulletin*. 78: 65-76.
- Berger, A. & DeYoung, R. 1997. Problem loans and cost efficiency in commercial banks. *Journal of Banking and Finance*. 21:849–870.
- Bloem, A.M. & Gorter, C.N.2001. The treatment of nonperforming loans in macroeconomic statistics. *International Monetary Fund Working Paper*. No.01/209.
- Brewer III, E., Deshmukh, S. & Opiela, T. P. 2014. Interest-rate uncertainty, derivatives usage, and loan growth in bank holding companies. *Journal of Financial Stability*. 15: 230-240.
- Bucur, I. A. & Dragomirescu, S. E. 2014. The influence of macroeconomic conditions on credit risk: Case of Romanian banking system. *Studies and Scientific Researches. Economics Edition*. 19:84-95
- Budiman, S. & Wijaya, T. 2014. Purchase intention of counterfeit products: The role of subjective norm. *International Journal of Marketing Studies*. 6(2):145-152.

- Buncic, D. & Melecky, M. 2013. Macroprudential stress testing of credit risk: A practical approach for policy makers. *Journal of Financial Stability*. 9(3):347-370.
- Castro, V.2013. Macroeconomic determinants of the credit risk in the banking system: The case of the GIPSI. *Economic Modelling*. 31:672–683
- Chakrabarti, M. 2015. Risk analysis and management in Indian banking sector: An overview. *International Journal of Informative & Futuristic Research*. 2(7): 2133-2143.
- Dash, K. M. & Kabra, G. 2010.The determinants of non-performing assets in Indian commercial bank an econometric study. *Middle Eastern Finance and Economics*. 7: 94-106.
- Das, A. & Ghosh, S. 2007. Determinants of credit risk in Indian state-owned banks: An empirical investigation. *Economic Issues*. 12(2):27-46.
- De Bock, R. & Demyanets, A. 2012. Bank asset quality in emerging markets: Determinants and spill overs. *International Monetary Fund Working Paper*. No.12/71.
- De Grauwe, P., 2008. The banking crisis: Causes, consequences and remedies. *CEPS Policy Brief*. Centre for European Policy studies. No.178.
- Delgado, J. & Saurina, J. 2004.Credit risk and loan loss provisions. An analysis with macroeconomic variables. *Banco de Espana Working Paper*. No. 12.
- Demirguç-Kunt, A. & Detragiache, E.1998. The determinants of banking crises and developed countries. *International Monetary Fund Staff Papers*. 45(1): 81–109.
- Dimitrios, P., Angelos, L. T. V. & Vasilios, L. M. 2011. Macroeconomic and bank specific determinates of non-performing loans in Greece's, comparative study of mortgage, business and consumer loan portfolios. *Bank of Greece Working Paper*. No.118.
- Espinoza, R. & Prasad, A. 2010. Nonperforming loans in the GCC banking system and their macroeconomic effects. *International Monetary Fund Staff Paper*. No.10/224.

- 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.
- Fawad, A. & Taqadus, B. 2013. Explanatory power of macroeconomic variables as determinants of non-performing loans: Evidence from Pakistan. *World Applied Sciences Journal*. 22 (2): 243-255.
- Fofack, H. (2005). Non-performing loans in Sub-Sahara Africa: Casual analysis and macroeconomic implications. *World Bank Policy Research Working Paper*. No.3769.
- Garcia-Marco, T. & Robles-Fernandez, M. D. 2008. Risk-taking behaviour and ownership in the banking industry: The Spanish evidence. *Journal of Economics and Business*. 60(4):332-354.
- Geletta, W. N. 2012. Determinants of non-performing loans: The case of Ethiopian Banks. Master's Thesis. University of South Africa.
- Gezu, G. 2014. Determinants of non-performing loans: Empirical study in case of commercial banks in Ethiopia. Master's Thesis. Jima University Business and Economic College.
- Ghosh, D., & Vogt, A. 2012. Outliers: An evaluation of methodologies. *Survey Research Methods Section- JSM*. 3455-3460.
- Ghosh, A. 2015. Banking-industry specific and regional economic determinants of non-performing loans: Evidence from US states. *Journal of Financial Stability*. 20: 93-104.
- Godlewski, C. J.2004. Capital regulation and credit risk taking: Empirical evidence from banks in emerging market economies. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1477712 SSRN 1477712[2015, September 5].
- Golafshani, N. 2003. Understanding reliability and validity in qualitative research. *The Qualitative Report*. 8(4): 597-606.

- Gujarati, D.N.2004. Basic Econometrics. Rev. 4th Ed. New York: Tata McGraw-Hill. Available:https://www.academia.edu/10126125/GUJARATI_2004_BASIC_ECONOMETRICS [2015, September, 10].
- Hawkins, D. 1980. Identification of Outliers. *Chapman and Hall*.
- Hoggarth, G., Sorensen, S. & Zicchino, L. 2005. Stress tests of UK banks using a VAR Approach. *Bank of England Working Paper*.No.882.
- Hue, N.T.M.2015. Non-performing loans: Affecting factor for the sustainability of Vietnam commercial banks. *Journal of Economics and Development*. 17(1):93-106.
- Ikhide, S. & Yinusa, O. 2012. Why is the cost of financial intermediation rising in Botswana? *The Journal of Developing Areas*. 46(1):183-209
- International Monetary Fund. 2009. Initial lessons of the crisis. *International Monetary Fund Working Paper Staff Paper*. No. 09/37a.
- International Monetary Fund. 2009. Lessons of the global crisis for macroeconomic policy. *International Monetary Fund Working Paper Staff Paper*.No.09/37b.
- International Monetary Fund. 2013. Botswana Article IV Consultation. IMF Country Report No. 13/296. Available:<https://www.imf.org/external/pubs/ft/scr/2013/cr13296.pdf> [2015, December 2]
- International Monetary Fund. 2014. Botswana Article IV Consultation- staff report; and press release. IMF Country Report. No. 14/204. Available: <https://www.imf.org/external/pubs/ft/scr/2014/cr14204.pdf> [2015, December 2]
- Jakubík, P. 2007. Macroeconomic environment and credit risk. *Czech Journal of Economics and Finance*. 57(1–2):60–78.
- Jakubik, P. & Reininger, T. 2013. Determinants of nonperforming loans in Central, Eastern and Southeastern Europe, focus on European economic integration. *Oesterreichische National bank*. 3: 48–66.

- Kapunda, S.M. & Molosiwa, T.K. 2012. Economic performance of commercial banks in Botswana: A structure–conduct–performance approach. *International Journal of Economics and Business Studies*. 2(1):3-12
- Keeton, W.R. & Morris, C.S. 1987. Why do banks' loan losses differ? *Federal Reserve Bank of Kansas City. Economic Review*. 3-21.
- Keeton, W.R. 1999. Does faster loan growth lead to higher loan losses? *Federal Reserve Bank of Kansas City, Economic Review*. 84(2):57–75.
- Khemraj, T. & Pasha, S. 2011. The determinants of non-performing loans: an econometric case study of Guyana. *Financial Stability Unit of the Bank of Guyana Working Paper*. No. 53128
- Klein, N. 2013. Non-performing loans in CESEE: Determinants and impact on macroeconomic performance. *International Monetary Fund Working Paper*. No.13/72.
- Laeven, L., & Valencia, F. 2008. Systemic Banking Crises Database: An Update. *International Monetary Fund Working Paper*. No.08/224.
- Lawrence, E.C. 1995. Default and the life cycle model. *Journal of Money, Credit and Banking*. 27(4): 939-954
- Louzis, D., Vouldis, A. & Metaxas, V. 2012. Macroeconomic and bank-specific determinants of non-performing loans in Greece: a comparative study of mortgage, business and consumer loan portfolios. *Journal of Banking and Finance*. 36(4):1012–1027.
- Makri, V., Tsagkanos, A. & Bellas, A. 2014. Determinants of non-performing loans: the case of Eurozone. *Panaeconomicus*. 2:193–206.
- Malhotra, N. K. & Birks, D. F. (2007) *Marketing Research: An applied Approach*. 3rd Ed. European. London: Prentice Hall, Incorporated.
- Messai, A.S. & Jouini, F. 2013. Micro and macro determinants of non-performing loans. *International Journal of Economics and Financial Issues*. 3(4):852-860.

- Moinescu, B.G. 2012. Determinants of nonperforming loans in Central and Eastern European Countries: Macroeconomic indicators and credit discipline. *The Review of Economic Studies*. 5: 47-58.
- Nkusu, M. 2011. Nonperforming loans and macrofinancial vulnerabilities in advanced economies. *International Monetary Fund Working Paper*. No.11/161.
- O'Brien, R.M. 2007. A caution regarding rules of thumb for Variance Inflation Factors. *Quality and Quantity*. 41:673–690
- Ombaba, M.K.B. 2013. Assessing the factors contributing to non-performance loans in Kenyan banks. *European Journal of Business and Management*. 5(32): 2222-2839.
- Petty, N.J. Thomson, O.P. & Stew, G. 2012. Ready for a paradigm shift? Part 2: Introducing qualitative research methodologies and methods. *Manual therapy*. 17 (5):378-384.
- Podpiera, J. Weill, L. 2008. Bad luck or bad management? Emerging banking market experience. *Journal of Financial Stability*. 4(2): 135–148.
- Polit, D.F. & Hungler, B.P. 1995. Nursing research: Principles and methods. Rev. 5th ed. Philadelphia: Lippincott.
- Poll, R. 1998. The house that Jack built: the consequences of measuring. Proceedings of the 2nd Northumbria International Conference on Performance Measurement in Library & Information Services. 7-11 September 1997. Newcastle: Information North. 39-45.
- Quagliariello, M. 2007. Macroeconomic uncertainty and banks' lending decisions: The case of Italy. *Bank of Italy. Economic Working Paper*. No. 615.
- Rajan, R. 1994. Why bank policies fluctuate: a theory and some evidence. *The Quarterly Journal of Economics*. 109(2): 399-441.
- Reinhart, C.M & Rogoff, K.S. 2010. From financial crash to debt crisis. *National Bureau of Economic Research Working Paper*. No.15795.

- Rinaldi, L. & Sanchis-Arellano, A. 2006. Household debt sustainability: What explains household non-performing loans? An empirical analysis. *European Central Bank Working Paper*. No.570.
- Rossi, S., Schwaiger, M. & Winkler, G.2005. Managerial behaviour and cost/profit efficiency in the banking sectors of Central and Eastern European countries. *Austrian National Bank Working Paper*. No. 96.
- Saba, I., Kouser, R. & Azeem, M. 2012. Determinants of non-performing loans: Case of US banking sector. *The Romanian Economic Journal*. 15(44):125-136.
- Salas, V. & Saurina, J. 2002. Credit risk in two institutional regimes Spanish commercial and savings banks. *Journal of Financial Services Research*. 5: 43-59.
- Sheefeni, J.P.S. 2015. Evaluating the impact of bank specific determinants of non-performing loans in Namibia. *Journal of Emerging Issues in Economics, Finance and Banking*. 4(2):1525-1541.
- Shu, C., 2002. The impact of macroeconomic environment on the asset quality of Hong Kong's banking sector. *Hong Kong Monetary Authority Research Memorandums*.
- Siraj, K.K. & Sudarsanan, P. 2012. Comparative study on performance of Islamic banks and conventional banks in GCC region. *Journal of Applied Finance & Banking*. 2(3):123-161.
- Skarica, B. 2014. Determinants of non-performing loans in Central and Eastern European countries. *Financial theory and practice*. 38(1): 37-59.
- Tanasković, S. & Jandrić, M. 2014. Macroeconomic and institutional determinants of non-performing loans. *Journal of Central Banking Theory and Practice*. 1: 47-62
- Touny, M.A. & Shehab, M.A. 2015. Macroeconomic determinants of non-performing loans: An empirical study of some Arab countries. *American Journal of Economics and Business Administration*. 7(1): 11.22.
- Trochim, W. 2000. The research methods knowledge base. 2nd ed. Cincinnati, Ohio: Atomic Dog Publishing. Available: <http://www.socialresearchmethods.net/kb/contents.php> [2015, September, 10].

- Viswanadham, N. 2015. Determinants of non-performing loans in commercial banks: A study of NBC bank Dodoma Tanzania. *International Journal of Finance and Banking Studies*. 4(1): 2147-4486
- Vogiazas, S.D. & Nikolaidou, E. 2011. Investigating the determinants of nonperforming loans in the Romanian banking system: An empirical study with reference to the Greek crisis. *Economics Research International*. 214689: 1–13
- 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, N. & Kalini, M. 2009. Commercial banking crises in Kenya: Causes and remedies. *Global Journal of Finance and Banking*. 3(3):23-43
- Wilckens, T. 2010. Securing reliability and validity in biomedical research: an essential task. *Drug Discovery Today*. 15(23-24): 991-996.
- Williams, J. 2004. Determining management behaviour in European banking. *Journal of Banking and Finance*. 28: 2427–2460.
- Yang, Z., Wang, X. & Su, C. 2006. A review of research methodologies in international business. *International Business Review*. 15: 601-617.

8. Appendix

Table 9: Pearson Correlation Matrix

Variables	GDP	INFL	RIR	EXCH	UNEMP	PROF	DIVER	CREDIT	SIZE	BCAP
GDP	1									
INFL	-0.0606	1								
RIR	0.0996	-0.0592	1							
EXCH	0.0789	0.397	0.3541	1						
UNEMP	0.0313	0.1099	-0.1952	0.1251	1					
PROF	-0.1651	0.5133	0.296	*0.8208	0.2438	1				
DIVER	-0.011	-0.5152	-0.2272	-0.5738	0.1351	-0.6167	1			
CREDIT	0.0157	-0.5861	-0.4861	-0.5475	0.1674	-0.6761	0.6763	1		
SIZE	0.0112	-0.4109	-0.3493	-0.9404	-0.3005	-0.6289	0.498	0.458	1	
BCAP	-0.0526	0.0499	0.0065	-0.0496	0.0558	0.0043	-0.0113	-0.0124	0.0757	1

*Above the 0.8 threshold

Source: Researchers own compilation from STATA

Table 11: Pearson Correlation Matrix after solving for Multicollinearity

Variables	GDP	INFL	RIR	UNEMP	PROF	DIVER	CREDIT	SIZE	BCAP
GDP	1								
INFL	-0.0606	1							
RIR	0.0996	-0.0592	1						
UNEMP	0.0313	0.1099	-0.1952	1					
PROF	-0.1651	0.5133	0.296	0.2438	1				
DIVER	-0.011	-0.5152	-0.2272	0.1351	-0.6167	1			
CREDIT	0.0157	-0.5861	-0.4861	0.1674	-0.6761	0.6763	1		
SIZE	0.0112	-0.4109	-0.3493	-0.3005	-0.6289	0.498	0.458	1	
BCAP	-0.0526	0.0499	0.0065	0.0558	0.0043	-0.0113	-0.0124	0.0757	1

*Above the 0.8 threshold

Table 17: Test for Stationarity –ADF Unit root test

Variable	T-statistic	Critical Value 1%	Critical Value 5%	Critical Value 10%	MacKinnon Approximate P-value
NPL	-3.855	-3.655	-2.961	-2.613	0.0028
GDP	-4.819	-3.655	-2.961	-2.613	0.0001
UNEMP	-6.066	-3.655	-2.961	-2.613	0.0000
INFL	-1.348*	-3.655	-2.961	-2.613	0.6069
RIR	-1.904*	-3.655	-2.961	-2.613	0.3300
EXCH	-3.912	-3.655	-2.961	-2.613	0.0003
CGRWTH	-3.821	-3.655	-2.961	-2.613	0.0002
BCAP	-6.633	-3.655	-2.961	-2.613	0.0000
SIZE	-4.380	-3.655	-2.961	-2.613	0.0003
DIVER	-7.396	-3.655	-2.961	-2.613	0.0000
PROF	-2.808 *	-3.655	-2.961	-2.613	0.0848

Source: Researchers compilation via STATA13

