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Credit Risk and Profitability of the Banking Sector in Zimbabwe (2009Q1 to 2015Q4)

By

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DECLARATION

I, the undersigned, do hereby declare that this Dissertation is a result of my own original research and that no part of it has been presented for examination in any other University.

Signed_____ Date_____

Gabriel Gowere

Reg No. R123805K

DEDICATION

This is to my beloved “Gowere family” especially my parents “VaGowere and Amurozvi”, may God shower you with His everlasting blessings and grant you the desires of your heart.

ACKNOWLEDGEMENTS

My success is credited to God for without His amazing grace and love, I would have not attained this MSc Degree in Economics. Words cannot be enough to express my inner most joy and gratitude, but all I can say is thank you, your name is worthy to be praised.

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ABSTRACT

The main aim of this study was to empirically examine the impact of credit risk on profitability of the banking sector in Zimbabwe. In so doing, panel data collected from financial statements of five listed banks for the period 2009 Q1 to 2015 Q4 were used. STATA version 12 was used for the estimations. The study adopted the Random Effects Model and found that there is no significant relationship between credit risk (as measured by non-performing loan ratio and loan advance ratio) and profitability (as measured by return on assets). As expected, the coefficient of non-performing loan ratio had a negative but statistically insignificant relationship with profitability while the coefficient of loan advance ratio had a positive but statistically insignificant relationship with profitability. Bank age was found to have a negative impact on bank profitability whilst economic growth positively affects bank profitability. Coefficients of variables such as bank size, market share and inflation were found to be statistically insignificant. The study found that coefficients of some variables other than nonperforming loans, and loans and advances impact on profits, for instance bank age and economic growth were significant at 5% level of significance. Hence, banks should do away with old business methods and ideas that are cost inefficient. Also banks that are keen on making high profits should concentrate on other factors for example trading financial instruments such as stocks, bonds, options, futures and swaps than focusing more on the amount of nonperforming loans and loans and advances. Fiscal and monetary policies that are aimed at promoting output stability and sustainable growth should be formulated as they are good for financial intermediation.

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LIST OF ACRONYMS

CRB	Credit Reference Bureau
FEM	Fixed Effects Model
GDP	Gross Domestic Product
IDBZ	Infrastructure Development Bank of Zimbabwe
LAR	Loan Advance Ratio
MCIB	Mauritius Credit Information Bureau
MFIs	Micro-Finance institutions
NBR	National Bank of Rwanda
NIM	Net Interest Margin
NPLs	Non-performing Loans
OLS	Ordinary Least Squares
RBZ	Reserve Bank of Zimbabwe
REM	Random Effects Model
ROA	Return on Assets
ROE	Return on Equity
SMEDCO	Small and Medium Enterprises Development Corporation

CHAPTER ONE

INTRODUCTION AND BACKGROUND

1.0 Introduction

Banks play a critical intermediation role of transferring funds from the surplus units to deficit units. In the process they are exposed to different kinds of risks. Therefore, monitoring their performance and factors that influence the performance of banks is of paramount importance for policy formulation and thus to the growth of an economy (Chinoda, 2014).Since a large amount of banks revenue comes from loans, credit risk is a major risk that banks face and plays a vital role on their profitability[1](Kolapo*et al*, 2012).

Many researchers and organizations have defined credit risk from different perspectives. But however,the most agreed definition is from Basel Committee on Banking Supervision (2001) who defines it as the loss faced by the bank when the borrower defaults in honoring the debt obligation on due date or on maturity (Abbas *et al*, 2014).

Credit risk mainly arises due to lack of institutional capacity, in appropriation of credit policies, interest rate volatility, poor quality of management, lapses of laws and regulations, liquidity constraints and inappropriate credit assessment, inefficient lending practices and interference of government by central bank (Kithinji, 2010). Hence, it is crucial for banks to effectively manage credit risk because if not appropriately managed it may lead banks to bankruptcy and the collapse of an economy. The major measure[2] of credit risk is non-performing loans (NPLs).

The key challenge that banks face is that of having their customers pay back the borrowed funds in accordance with the terms and conditions of the loan agreement. Banks generally rely on the goodwill of their borrowers to service their loans which in turn aid the required circulation of funds in the economy.

However, many borrowers in Zimbabwe since dollarization, have been failing to honor their loan obligations and this resulted in increasing credit risk for banks (RBZ Annual Banking Sector

[1] Profitability is an indicator of banks' capacity to carry risk and/or increase their capital. It indicates banks' competitiveness and measures the quality of management (Li and Zou, 2014).

[2] Other measures include loans and advances ratio and loan loss provision ratio.

Report, 2013). Profitability as measured by the average return on assets (ROA) and return on equity (ROE) deteriorated from 2.7% and 17.58% in 2011 to 1.21% and 5.45% in 2012 and then a further sharp decline to 0.14% and 1.12% in 2013,respectively (RBZ Annual Banking Sector Report, 2013).The problem has also contributed to decline in economic growth for Zimbabwe as businesses have faced difficulties in accessing affordable financing that is appropriately tenured to fund their operations (Sandada and Kanhukamwe, 2016). Hence, there is need for a robust credit risk management system for the betterment of loan quality, followed by performance of banks as well as the economy at large.

Conversely there has been literature pointing out that credit risk has a positive effect on profitability. For instance, Boahene*et al*. (2012) in the case of Ghana found a positive relationship between credit risk measures and profitability of banks. Complicating the issue further was Kithinji (2010) who found no significant relationship between credit risk and profitability of banks. Hence on this note, it is difficult to make a conclusion on the subject matter particularly in the case of Zimbabwe as the results are mixed.

However, the aim of this study is to explore how credit risk affects the performance of the banking sector in Zimbabwe covering the period 2009 Q1 to 2015 Q4, which is hoped to provide managerial and policy implications to the Zimbabwean banking industry.

1.1 Background of the Study

From the time when the multiple currency regime was introduced in 2009, the Zimbabwean banking sector has been highly unstable. Over the years, the number of banks in the sector decreased from 26 registered banks in 2011 to 20 registered banks in 2016[3] (RBZ Annual and Quarterly Banking Sector Reports, 2011,2016). This could have been attributed to a number of factors which include lack of minimum capital requirements, liquidity risk and credit risk among others. However, chief among them is credit risk (Sandada and Kanhukamwe, 2016). Ever since 2009, there has been absence of a functional credit reference system and the Reserve Bank has ever encouraged sound credit management systems among banks (Ibid, 2013). The Reserve Bank

[3] The sector comprises of 13 Commercial Banks, 4 Building Societies, 1 Savings Bank, 162 Micro-Finance institutions (MFIs) and 2 Development Institutions-Small and Medium Enterprises Development Corporation (SMEDCO) and Infrastructure Development Bank of Zimbabwe (IDBZ) (RBZ Quarterly Banking Sector Report, 31 March 2016).

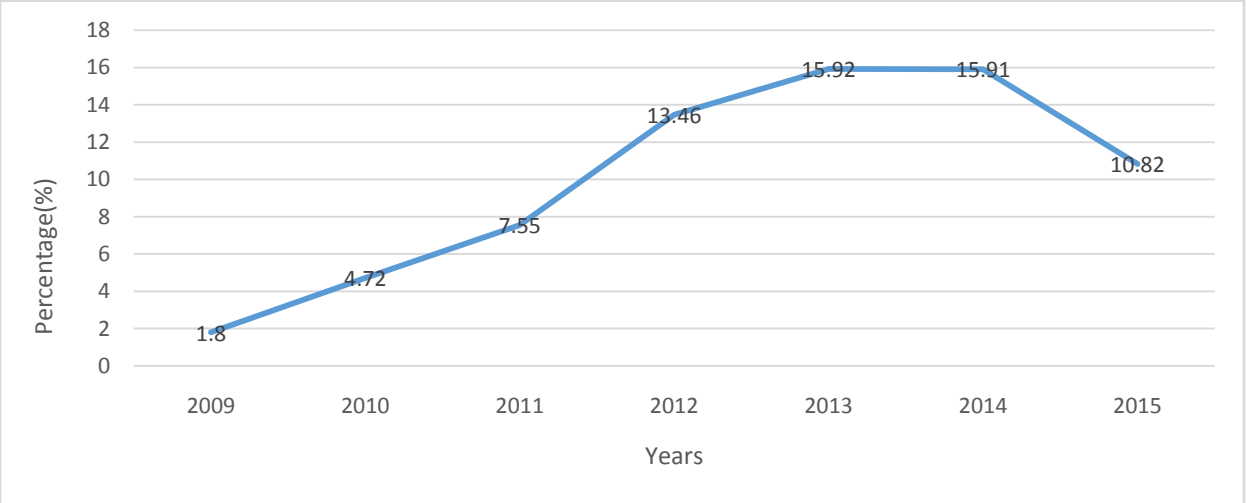
together with banks have been coming up with strategies to reduce credit risk down to the internationally accepted benchmark of 5%.

1.1.1 Architecture of the Zimbabwean Banking Sector

Non-Performing loans

The banking sector faced increasing exposure to credit risk as reflected by the upward trend in NPL/TL from 2009 to 2013. The surge in the level of NPLs largely mirrors the general macroeconomic environment which constraints the borrowers' capacity to repay, as well as institution specific weaknesses. From 2013 to 2015 there has been improvement in the level of NPLs in the sector. This may be largely attributable to enhanced credit risk management strategies including intensified collections and workout plans as well as disposal of qualifying non-performing loans to Zimbabwe Asset Management Company[4] (ZAMCO). However, this level is still above the internationally accepted benchmark of 5%. The trend of NPL/TL of the sector from 2009 to 2015 is shown by figure 1 below.

Figure 1: Trend of total NPL/TL of the sector



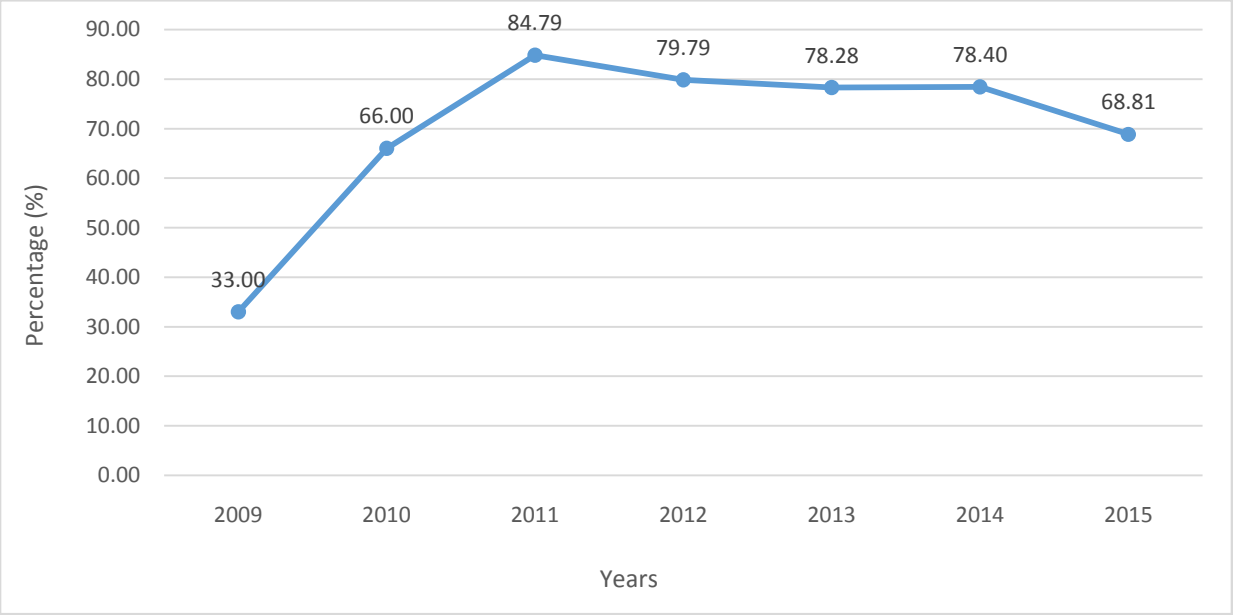
Source; RBZ Annual Banking Sector Reports (2013,2015)

Loans and Advances

[4] It was formed in 2014 in order to address the problem of NPLs.

There has been an upward trend of the loan advances ratio from 2009 to 2011. The growth in loans and advances could have been attributed to increased funding and banks' aggressive lending strategy(RBZ Annual Banking Sector Reports, 2012). However, the loan advance ratiohas ever since been on a downward trend, registering 68.81% in 2015 from 84.79% in 2011. Could this decrease be somehow linked to the upward trend of nonperforming loans, as during that time borrowers have been struggling to repay their debts. Figure 2 below shows the trend in loans and advance ratio of the banking sector from 2009 to 2015.

Figure 2: Trend of Loan and Advance ratio (LAR)

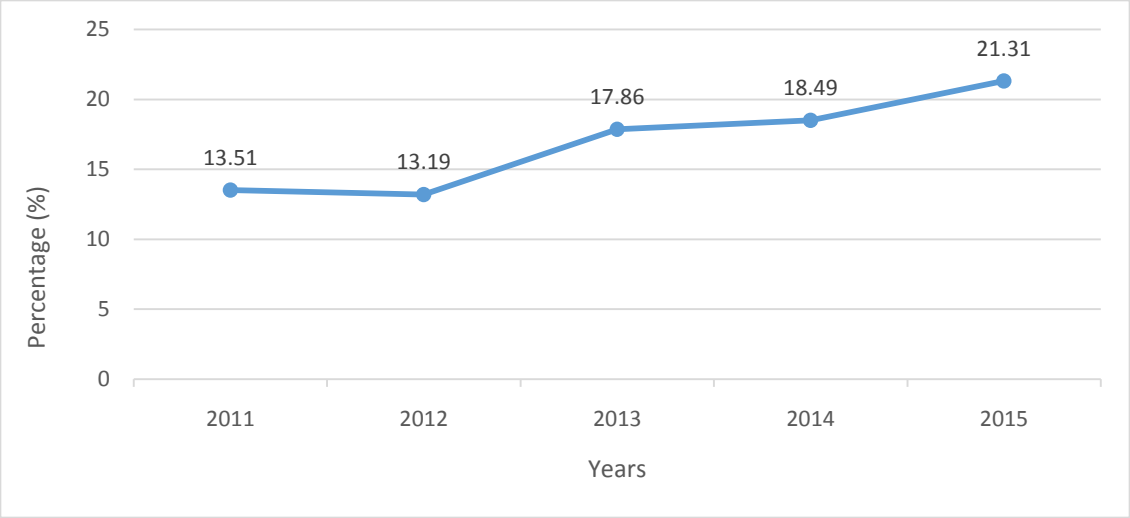


Source; RBZ Annual Banking Sector Reports (2013,2015)

Capital Adequacy ratio (CAR)

The losses recorded by some banking institutions and the increasing NPLs in the sector continued to pose a threat to the banking sector's capital levels. This is shown by a decline in CAR from 13.51% to 13.19% in 2011 and 2012 respectively. The banking sector remained adequately capitalized as all banks complied with the minimum required CAR of 12%. The banking industry average CAR was 21.31% as at 31 December 2015 from 18.49% as at 31 December 2014. The trend in CAR is shown by figure 2 below.

Figure 3: Trend of CAR from 2011 to 2015



Source; RBZ Annual Banking Sector Reports (2013,2015)

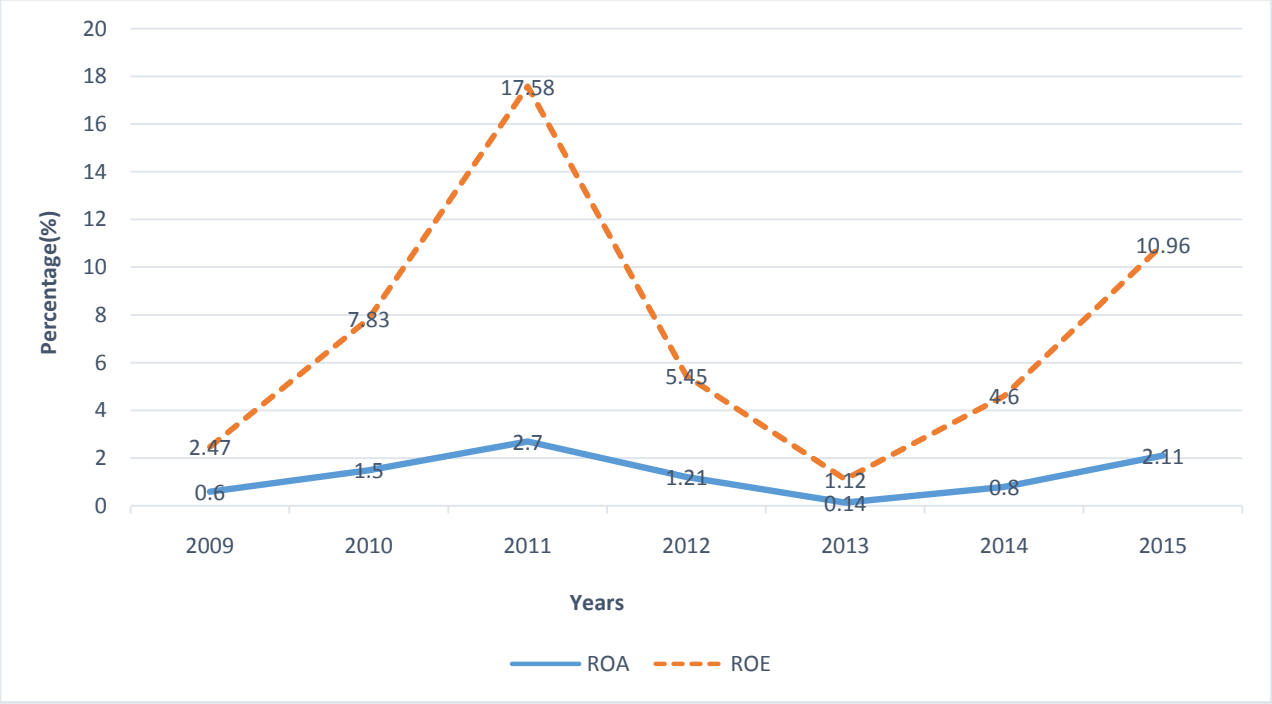
Banking Sector Profitability

Since 2009 to 2011, the total banking sector profitability indicators (ROE and ROA) have been on an upward trend which was then followed by a downward trend from 2011 to 2015.The decline in profitability could have been attributable to the total loan loss provisions for the banking sector which increased by 76.66% from US$64.64 million in 2011 to US$114.14 million in 2012 (RBZ Annual Banking Sector Reports, 2012). Also the decline could be due to high NPLs which still remain above the internationally accepted benchmark of 5%. However, the challenge of NPLs can be partly addressed by the introduction of a credit reference bureau[5]. In Rwanda**,** after experiencing high levels of non-performing loans in the banking sector, the National Bank of Rwanda (NBR) spear headed the formation of a credit reference bureau, CRB Africa, in 2010. All financial institutions signed agreements to provide CRB Africa with relevant credit information of their clients. Resultantly, non-performing loans fell by 10% over the year December 2011 to December 2012 (RBZ Annual Banking Sector Reports, 2012). The same can be said for Mauritius**.**The Mauritius Credit Information Bureau (MCIB) was set up under the

[5] It is an organization providing information on individuals' borrowing and paying habits. Credit information such as a person's previous loan performance is a powerful tool to predict his future behavior. Such credit information institutions reduce the effect of asymmetric information between borrowers and lenders, and alleviate problems of adverse selection and moral hazard. Thus, credit bureaus help lenders make faster and more accurate credit decisions". It also supports the central role played by banks and other financial institutions in extending financial services within an economy (RBZ Annual Banking Sector Reports, 2012).

Bank of Mauritius Act 2004 and came into operation on 1 December 2005. MCIB is fully owned and operated by the Bank of Mauritius from within its premises. Prior to the establishment of the MCIB the average NPLs ratio was around 18%. When the MCIB was introduced in 2005 the ratio came down gradually to the current levels of 2%(RBZ Annual Banking Sector Reports, 2012). NPLs are no longer a problem in Mauritius.The trend in profitability indicators is depicted by figure 3 below.

Figure 4: Trend of Profitability Indicators



Source; RBZ Annual Banking Sector Reports (2013,2015)

Against this background, a comparison of figures 1 to 3 which show somehow different trends between credit risk and profitability, which over the period between 2009 to 2015 show a divergence from what is expected from theory and literature, give rise to this study. The study seeks to explore into how credit risk affects the profitability of the banking sector in Zimbabwe from 2009 Q1 to 2015 Q4.

1.2 Problem Statement

The relationship between credit risk and banks' performance has been the concern of various studies that prove that credit risk is among the major factors affecting profitability performance

of banks' (Tefera, 2011; Boahene*et al*., 2012). However, results from these studies are mixed. There are those that found a negative relationship between credit risk and profitability such as Kolapo*et al*. (2012) and Tefera (2011). On the contrary,Boahene*et al*. (2012) found a positive relationship whilst Kithinji (2010) found no significant relationship between credit risk and profitability. This makes it difficult to conclude on the subject matter.

On another confusing note, profitability indicators (ROA and ROE) and credit risk in the Zimbabwean banking sector have been moving in different trends from 2009 to 2015. ROA and ROE increased to 2.7% and 17.58% in 2011 from 0.6% and 2.47% in 2009 respectively (RBZ Bank Supervision Annual Report, 2013).The ratio of non-performing loans to total loans (NPL/TL) however, moved in a different trend from 2009 to 2011 as it increased from 1.8% in 2009 to 7.55% in 2011, which is different from what is expected.Literature on Zimbabwean banking sector documented that credit risk has been a major challenge of bank performance in Zimbabwe (Sandada and Kanhukamwe, 2016; RBZ Bank Supervision Annual Reports, 2012,2015). This implies that the expected relationship between credit risk and profitability is negative, but somehow the relationship is not clear. On this note, this study seeks to explore how credit risk affects the profitability of the banking sector in Zimbabwe from 2009 Q1 to 2015 Q4.

1.3 Objectiveof the Study

The main objective of this study is to analyze how credit risk affects profitability of the banking sector in Zimbabwe over the period 2009 Q1 to 2015 Q4.

Specifically, the study seeks to:

> Determine whether there is a significant relationship between non-performing loans ratio (NPLR), loan and advance ratio (LAR) and profitability of the banking sector in Zimbabwe measured by ROA.

1.4 Research Question

In relation to the above stated objectives, the following question is asked:

> Is there a statistically significant relationship between NPLR, LAR and profitability of the banking sector in Zimbabwe?

1.5 Hypotheses of the study

In line with the above research objective, the following hypotheses were formulated:

i. There is a negative relationship between NPLR and profitability of the banking sector in Zimbabwe.
ii. There is a positive relationship between LAR and profitability of the banking sector in Zimbabwe.

1.6 Justification of the Study

There has been a growing stock of literature on credit risk management. Success of bank performance depends on effectiveness of credit risk management. Thus this study is motivated to fill the literature gap that exists between credit risk and profitability. Moreover, most of the studies on credit risk and profitability of banks have been carried out in the advanced economies, Western and Eastern parts of Africa(Kolapo*et al*, 2012; Li and Zou 2014; Tefera ,2011). It is difficult to infer the results of these studies to the context of the banking sector in Zimbabwe. Thusthis study will provide a clearer picture by making specific reference to the Zimbabwean banking sector since the results of existing literature are inconclusive.Also the current study will provide relevant policy implications and recommendations to the banking sector of Zimbabwe as well as to its custodian, the Reserve Bank of Zimbabwe (RBZ).

1.7 Organization of the rest of the Study

The remainder of the paper is outlined as follows- Chapter two reviews related literature on the subject matter, chapter three discusses the methodology, chapter four focuses on data analysis and interpretation of findings and chapter five presents the conclusion and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

Banks do not only exist to accept deposits, but also to extend credit to economic agents for a profit. They borrow money at a low interest rate and then lend it at a higher interest rate. The difference is their profit. However, in the process they are inevitably exposed to credit risk, which is chief among all risks that banks face. Thus there is need for strong and prudential measures to guarantee the highest return possible for banks given such a risk. However, there can be other factors that affect profitability other than credit risk. Thus in this chapter the study first looks at theories of performance from which other control variables are drawn from, then takes a closer look at the theories relating credit risk to profitability. This is hoped to be of paramount importance for policy formulation and recommendations. Secondly, in order to deepen our understanding of credit risk and profitability of the banking sector in Zimbabwe empirical literature is then reviewed. The literature reviewed in this chapter makes it possible to identify other important factors that affect profitability and as well as, credit risk and profitability issues that are relevant to this study. The literature also provides an appropriate empirical model specification for the study.

2.1 Theoretical Literature Review

2.1.1 Theories of Performance

Embedded in these theories is the Economic Model Firm Performance and the Organizational Model of Firm Performance. The formeremphasizes the importance of external market factors in determining the success of a firm. The latteris based upon the behavioral and sociological paradigm. It stresses the importance of organizational factors as the major determinants of firm profitability(Hansen and Wernerfelt ,1989).

Economic Model of Firm Performance

The major determinants of firm-level profitability include: characteristics of the industry in which the firm competes; the firm's position relative to its competitors; and the quality or

quantity of the resources at the firm's disposal. Nevertheless, this model recognizes industrial variables, variables relating the firm to its competitors and firm variables as explanatory variables that affect firm performance(Hansen and Wernerfelt ,1989).

With respect to industrial variables, growth, concentration, capital intensity and advertising intensity are regarded as fundamental properties of industries contributing to above-average profitability (Bain, 1956).The way industrial variables affect performance can be seen through average industry profits. Also the differences between industries is measured by average industry return on assets which accounts for almost all the explained variance in performance individual firms (Schmalensee, 1985).

Animportant member of variables relating the firm to its competitors is relative market share, a variable which has been widely used in strategy (Hansen and Wernerfelt ,1989). Originally perceived as the source of market power, relative market share serves as a representation for some firm-specific relative competitive advantage that comes from experience in the industry and other firm specific resources.

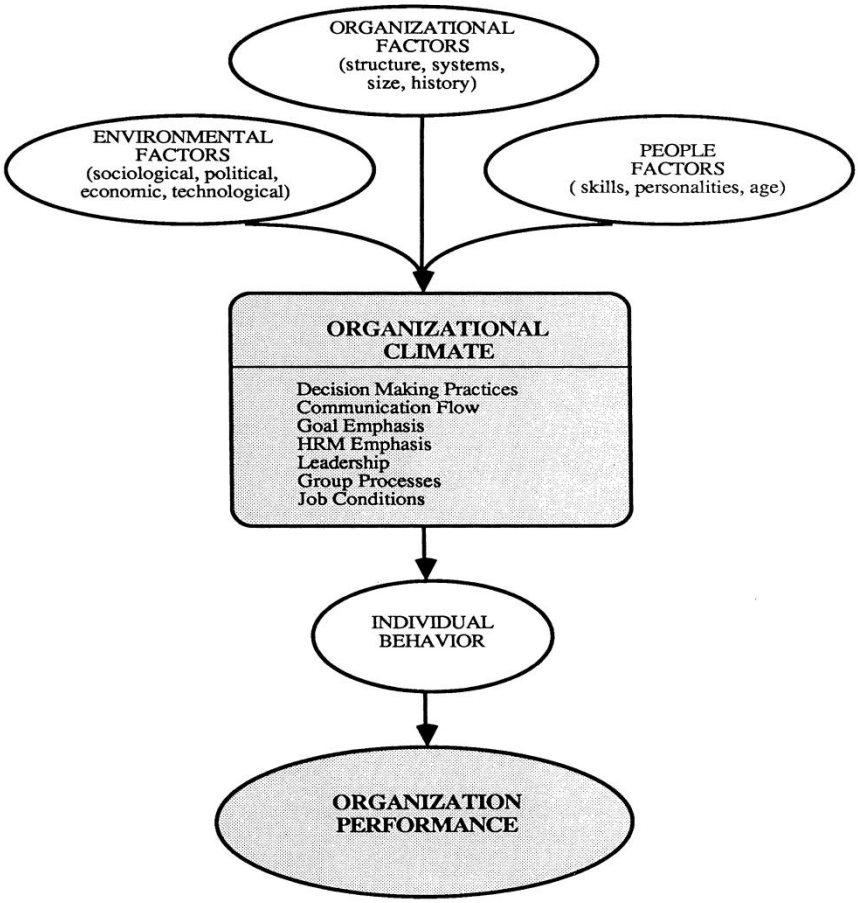
Firm size is the most important variable that explains firm profitability. As specified under firm variables, it is often interpreted as a source of structural expenditures (Leibenstein, 1976). From a strategy perspective it can be noted that firm size may also be an indicator of diversification, which has been found to have a negative effect on profitability (Wernerfelt and Montgomery, 1988).

Organizational Model of Firm Performance

This theory is centered on the fact that managers play a major role towards the performance of their employees (thus the performance of the firm) by consideringfactors such as the formal and informal structure, the planning, reward, control and information systems, their skills and personalities, and the relate them to theirwork place(Hansen and Wernerfelt ,1989). This imply that managers shape organizational outcomes by using psychological, sociological and physical factors that affect employees. However, it is difficult to measure these factors (Bonoma, 1985;

Bower, 1982). This complex significant organizational phenomena[6]has been tried to be captured by the organizational climate[7].

Figure 5: Traditional Model of Organizational Climate



Source: Hansen and Wernerfelt (1989)

[6]The effects of structure, motivation, group dynamics, job enrichment, decision-making, leadership, goal setting and planning.

[7]The concept of climate provides a useful bridge between theories of individual motivation and behavior, on one hand, and organizational theories, on the other. Organizational climate refers to the perceived, subjective effects of the formal system, the informal style of the managers, and other important environmental factors on the attitudes, beliefs, values and motivations of the people who work in a particular organization (Litwin and Stringer, 1968).

2.1.2 Theories of Credit Risk

Firm Characteristics Theories

These theories predict that nonperforming loans are the number one cause of failed banks and not poor operating efficiency (Misker ,2015). According DeYoung and Whalen (1994), nonperforming loansare accompanied byregional macroeconomic challenges. Afriyie and Akotey (2010) also observed that NPLs, an indicator of credit risk, can reduce the value of a bank and destabilizes the credit system. As a result, the cost of managing overdue loans tends to be very high and this can reduce banks profitability levels. High levels of NPLs drive up expenses, so in order to lower credit risk, a bank needs to have high and sufficient CAR (DeYoung and Whalen, 1994).

However, a 1988 study of bank failure that was carried out by the Office of the Comptroller of the Currency also found that the difference between the failed banks and those that remained profitable or recovered from problems was the quality of management by which the banks were run(DeYoung and Whalen, 1994). Competentmangers not only run their banks in a most efficient manner, and thus generate high profits relative to their peers, but also impose better loan underwriting and monitoring standards than their peers which result in a better and sound credit risk management system. Hence, we should observe high (low) levels of cost efficiency, and low (high) levels of NPLs, in the same banks (DeYoung and Whalen, 1994).

Agency Theory

The theory is sometimes referred to as principal-agent theory. It explains the conflict of interest between the shareholders who are referred to as the principals and the managers who are referred to as the agents (Jensen and Meckling, 1976). According to the theory, agency relationship is defined as a contract where the principal engages the agent to perform some duties on their behalf. Moreover, this theory states that the credit risk situation of a bank can be exacerbated by inefficient managers who put in place inefficient credit guidelines (Kithinji, 2010). This then reduces profitability of the firm which then brings about the issue of conflict of interest between shareholders who want the performance of the firm to increase and the manager. All things equal, banks that are operated inefficiently should be more likely to fail than are operated efficiently (DeYoung and Whalen, 1994). The agency theory mirrors the issue of poor quality

insider lending that have been the major reason for demise of some of the financial institutions in the Zimbabwe banking sector (Sandada and Kanhukamwe, 2016).

Loan Pricing Theory

The major causes of credit risk in the banking industry are adverse selection and moral hazard due to the information asymmetry gap that exist between banks and borrowers (Stiglitz and Weiss, 1981; Afriyie and Akotey, 2010). This implies that as adverse selection and moral hazard increase, credit risk increases and the profitability of the banking industry decreases. Hence Banks cannot always set high interest rates. This will increase the number of NPLs and in turn decrease profitability of the banking sector. It is perceived that once these borrowers receive the loans, they may develop moral hazard behavior or so called borrower moral hazard since they are likely to take on highly risky projects or investments with low payoffs (Afriyie and Akotey, 2010).

2.2 Empirical Literature Review

The relationship between credit risk and bank performance has been the concern of emerging studies in both developed and developing economies. It can be noted that the findings on the subject matter are inconclusive. In other words, the findings are mixed. There are some studies that found a negative relationship between credit risk and profitability. As postulated in theoretical literature above, this is consistent with the Firm Characteristics Theories, Agency Theory and the Loan Pricing Theory. Several other papers found positive relationship between credit risk and profitability of banks which does not tally with the aforementioned theories. The prevailing findings on the subject matter is further complicated by a few studies that found that there is no relationship between credit risk and profitability. In viewof this inconsistency, the present study also joins the ongoing debate by using Zimbabwe's Banking Sector as a case study. The study will divide the empirical literature into three different empirical findings. First it will look at those studies that found a negative relationship between credit risk and profitability then those that found a positive relationship. Lastly the study will look at those studies that found no significant relationship between credit risk and profitability.

Kolapo*et al*. (2012) in the case of Nigeria empirically investigatedthe effect of credit risk on profitability of commercial banks over the period 2000 to 2010. By employing panel data

regression model (both constant effect model and fixed effect model) in the analysis, it was found that the effect of credit risk (measured by non-performing loan ratio, loan and advances ratio and loan loss provision ratio) is the same across banks in Nigeria. However, the methodology used by the study fails to capture the degree to which individual banks are affected. It was found that NPL/LA and LLP/LA are inversely related to profitability (measured by ROA) while LA/TD increase profitability.

Nawaz *et al.* (2012) also assessed the impact of credit risk on the profitability of Nigerian banks. Bank performance was measured by return on assets (ROA) while credit risk was measured by nonperforming loan ratio, and loans and advances ratio. The study used descriptive, correlation and regression techniques, and found that there is a negative relationship between credit risk and profitability. The study further advised that there is need for management to put in place a robust credit risk management system that positively affect bank profitability.

Under the same country case, Ebenezer and Omar (2015) also investigated the effect of credit risk on profitability of commercial banks in Nigeria. A total 8 commercial banks were selected for the study, from the period 2011 to 2014. The random effects model (REM)was employed and revealed that there is a negative relationship between credit risk (measured by NPLR) and profitability. In general, the study findings proposed that banks need to refocus on the effective management of their inherent risk which often affects their profitability and financial viability.

Tefera (2011) also found similar results as the above studies for Nigeria. The study examined the impact level of credit risk management towards the profitability of commercial banks in Ethiopia. Multiple regression models were used and it was found that both CAR and NPLR have a negative impact on profitability (measured by ROE). The study concluded that credit risk management of commercial banks in Ethiopia is poor and suggested the need for banks to hire experts in the field of credit risk management.

Obtaining similar results to the studies above was Abbas *et al*. (2014). The study took into account the impact of credit risk on performance of the banking system of Pakistan. Results of the fixed effectsmodel (FEM) on panel data for the period of 2006 to 2011 revealed that credit risk measured by NPL/TL and LLP to NPL negatively affect performance (measured by ROA and ROE). Hence the more a bank is facing credit risk the more deterioration in performance it

experiences. The ratio of total loan to deposits was found to be positively related to bank performance.

Similarly, Asare (2015) analyzed the impact of credit risk on profitability of some selected banks in Ghana. A balanced panel data from seven selected banks from the period between 2005 to 2013 was analyzed within the fixed and random effects techniques. Two key measures of profitability employed in the study comprised ROA and ROE while the credit risk measures included NPLR, LLPR and LAR. In addition, some internal and external determinants of profitability like bank age were captured in model. The results showed that, NPLs are negatively related to profitability while LLPR and LAR are positively related to profitability. Also the study discovered that both capital adequacy and bank age have a positive relationship with profitability while bank size has an inverse relationship. The study suggested the need for management of the banks to put in effective measures in improving the credit risk management strategies to enhance their profitability.

Likewise, Norman *et al.* (2015) studied the effect of credit risk on profitability of the banking sector of Bangladesh. The study used an unbalanced panel data and 172 observations from 18 private commercial banks from 2003 to 2013. The study used the ratio of NPL to gross loan(NPLGL), loan loss revenue ratio (LLRGL), loan loss reserve to NPL ratio (LLRNPL) and CAR as credit risk indicators. Using OLS random effect model, GLS and system GMM the study found out that there is a negative relationship between credit risk and profitability.

Obtaining similar results as Norman *et al but* using a different methodology wasHosna*et al.* (2009). The study used a regression model to analyze how credit risk management affects profitability of banks in Sweden from 2000 to 2008. Credit risk was measured by NPLR while profitability was measured by ROE. CAR was found to be insignificant. The analysis on each bank level showed that the impact of credit risk management (CRM) on profitability is not the same.

Likewise, with a different methodology Olawale (2012) found the same results for Nigeria. The study used the ordinary least square (OLS) technique to analyze the impact of credit risk on commercial banks profitability for the period 2008 to 2012. Credit risk was also measured by NPLR while profitability was measured by ROA. LAR was found to have no significant relationship with ROA.

With the same methodology, Li and Zou (2014) supported the findings of Olawale but in the case of Europe from 2007 to 2012. However, the study incorporated ROE as another measure of profitability. As a control variable, bank size (total assets) had a negative but insignificant relationship with ROE but a negative and significant relationship with ROA. CAR had a negative and insignificant relationship with both ROE and ROE.

In the case of Zimbabwe, Abel and Le Roux (2016) analyzed the determinants of banking sector profitability for the period 2009 to 2014. Guided by theHausman Test, results obtained from the FEM showed that bank managers have a significant role in shaping the profitability of the Zimbabwean banking sector. Credit risk (measured by NPLR), size of the bank (total assets) and inflation had a negative relationship with profitability (measured by ROE and ROA). Gross domestic product (GDP) growth (measured by volume of manufacturing index) had no significant effect on profitability. However, the fact they only used NPLR as a measure of credit risk, thus makes this study more comprehensive by adding more measures of credit risk as suggested by Asare (2015) and Kolapo*et al.* (2012). The present study will also incorporate other control variables such as bank age and market share as suggested by the Economic Model of Firm Performance.

Mazadzi and Maseya (2015) also analyzed the factors that affect performance of commercial banks in Zimbabwe. Using the pooled OLS regression model it was found out that credit risk (measured by LLPR) and management efficiency are negatively related to profitability (measured by ROA). Capital adequacy and GDP growth rate were positively related to ROA while bank size (total assets) and inflation were not significantly related to ROA. However, the methodology does not take into account the heterogeneity of banks across time periods and as well as the nature of panel data. Because of the heterogeneity between the error term and profitability, the estimates obtained from this methodology are biased (Abel and Le Roux, 2016). Due to this inadequacy of the pooled OLS, the present study will use either the FEM or REM model as advised by the Hausman Test.

However, there are also a number of papers that found different results from the above empirical studies. This makes it difficult to conclude on the issue. For example, Boahene*et al*. (2012) obtained a positive and significant relationship between commercial banks performance and credit risk in the case Ghana covering a period of 2005 to 2009. Using a panel data analysis

model, the study found that credit riskwas positively related with profitability (ROE). The findings implied that Ghanaian commercial banks enjoy high profitability at the time when the level of credit risk is high.This might have been because of prohibitive lending or interest rate, fees and commissions.

Obtaining similar results as Boahene*et al* was Saed and Zahid (2016), who analyzed the impact of credit risk on profitability of five big United Kingdom (UK) commercial banks. ROE and ROA were used to measure profitability whilst net charge off (or impairments) and NPLs were used to measure credit risk. Using multiple statistical analyses on bank data from 2007 to 2015[8], it was found that credit risk indicators had a positive association with profitability of banks. This meant that even after the deep effects of credit crisis in 2008, the banks in UK were benefiting from credit risk through high interest rates and commissions. The results also reveal that bank size, leverage and growth were positively interlinked with each other, and banks achieved profitability after the financial crisis and learned how to tackle credit risk over the years.

In the same vein, Afriyie and Akotey (2010) examined the impact of CRM on profitability of rural and community banks in the BrongAhafo region of Ghana. The study used financial statements of ten rural banks from the period of 2006 to 2010 for the analysis. Employing the FEM, it was found that there is a positive relationship between credit risk (NPLR) and rural bank's profitability (measured by ROA and ROE). This indicated that rural banks did not have sound and effective CRM practices. CAR was found to be insignificant.

Likewise, Abiola and Olausi (2014) supported the findings of Afriyie and Akotey as they analyzed the impact of CRM on commercial bank performance of Nigeria from 2005 to 2011. Using FEM, it was found that there is a positive relationship between credit risk (measured by NPLR) and profitability (measured by ROA and ROE). CAR was found to be insignificant.

The prevailing relationship on the subject matter is further complicated by a group of studies who found that a no significant relationship exists between credit risk and profitability. Joining the debate was Kithinji (2010) who used a regression analysis on data collected from financial reports of commercial banks in Kenya for the period of 2004 to 2008. The study concluded that there is no significant relationship between credit risk (measured by NPLR and LAR) and

[8]The period covered the financial crisis.

profitability (measured by ROA).It was proposed that variables other than nonperforming loans and credit impact on profits.

In line with Kithinji was Duraj and Moci (2015) in the case of Albania. The study analyzed the factors influencing bank profitability from 1999 to 2014. Using multilinear regression analysis with secondary data it was found that credit risk (NPLR) did not have a significant relationship with profitability (ROE). Deposit to loans ratio and GDP were found to be positively related to ROE while inflation was negatively related to ROE. They concluded that profitability of banks cannot only be influenced by internal factors but also by changes in the external macroeconomic environment (for example GDP and inflation).

Joining the debate but with a different methodology was Bentum (2012) who analyzed the determinants of profitability of commercial banks in Ghana during the recent years of global financial crisis. Applying the FEM, it was found that in the pre-crisis period (2001 to 2005) there was no significant relationship between credit risk (measured by loans to deposit ratio), inflation and profitability (ROA). Market share had a negative relationship with ROA. In the post crisis period (2006 to 2011) it was found that there is no significant relationship between credit risk (measured by loans to deposit ratio), market share and ROA. Inflation had a positive impact on ROA while real GDP had a negative effect on ROA.

Also supporting the findings of the above studies was Veizi*et al.* (2016) in the case of Albania. Using both quantitative and qualitative methods the study analyzed the effect of credit risk on bank profitability for 16 commercial banks operating in Albania for the period 2008 to 2015. Quarterly data was used and it was found that there is no significant relationship between credit risk (measured by NPLR) and profitability (measured by ROA and ROE).

In order to draw some control variables, the present study looked at a previous study which was done by Chinoda (2014). The study looked at the determinants of commercial banks profitability in Zimbabwe from 2009 to 2014. Using OLS it was found that there is a positive relationship between size of the bank, GDP and profitability (measured by ROA and ROE). Using a second model it was found that inflation had a negative relationship with ROE.

2.3 Conclusion

From the discussion of both theoretical and empirical literature above it can be noted that the findings on the subject matter are inconclusive. In other words, the findings are mixed. There are notable inconsistencies between theoretical and empirical literature. Even in the same country different results were observed. Therefore, concluding on this issue is somewhat difficult. Hence, in viewof this inconsistency, this present study also joins the ongoing debate by using Zimbabwe's Banking Sector as a case study.

In light of prudential policy formulation and sound recommendations, the study acknowledged the fact that there are other factors that affect profitability other than credit risk.Thus in this chapter the study first looked at theories of performance from which other control variables were drawn from, then took a closer look at the theories relating credit risk to profitability. To this end, this chapter reviewed Firm Characteristics Theories, Agency Theory and Loan Pricing Theory. The literature reviewed in this chapter informed the study on the appropriate methodology to be adopted as well as allow the study to make necessary modifications on the methodology.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This section presents the methodology followed by the study. Therefore, this chapter outlines the research design and the study population, sampling procedure and sample used by the research. Also included is the empirical model, definition and justification of variables. Data sources as well as the estimation procedure used in the study are then presented at the end of the section.

3.1 Research Design

This study assesses the effect of credit risk on profitability of the Zimbabwean banking sector. The study is quantitative in nature and usesquarterly (2009 Q1 to 2015 Q4) panel data. The data were extracted from the financial statements of listed banks since it was easily accessible in terms of the availability of resources disposable to the researcher. The choice of panel data over other types of data is due to its strength and suitability to this current study. Panel data caters for both space and time dimensions of variables. it provides more information accompanied by less collinearity, more variability and more degrees of freedom for a given sample sizethan cross section and time series data. Most importantly, panel data takes into account the issue of heterogeneity among cross sectional units (banks). However, panel data has its own weaknesses which comes as a result of cross sectional data and time series data. As advised by the Hausman Test, the study uses either Fixed Effects Model (FEM) or Random Effects Model (REM), in order to curb the weaknesses of panel data Gujarati (2003).

3.1.1Study Population, Sampling Procedure and Sample

The study population includes all the banks in the Zimbabwean banking industry. These banks include Commercial, Savings and Merchant Banks and Building Societies in Zimbabwe for the period 2009Q1 to 2015Q4. The study used eighteen banks, which was the population as at 31 December 2015. The selection was premised on the following restrictions: the bank must have a large customer base in the industry, the bank must have a large percentage of the total deposit

liability in the industry and its financial statements should be available on its own web page. Five banks met the above restrictions and are presented in Table 1 below

Table 1: Sample of Banks in the Study

Bank	**Year Founded**	**Year Listed**
Barclays Bank of Zimbabwe	1912	1991
ZB Financial Holdings Limited	1951	1967
CBZ Holdings Limited	1980	1998
NMBZ Holdings Limited	1992	1997
FBC Holdings Limited	1997	2001

Source, Zimbabwe Stock Exchange Website

3.1.2 Data Sources

The study used quarterly data from 2009 Q1 to 2015 Q4 which were collected from the Reserve Bank of Zimbabwe, Zimbabwe National Statistical Agency, Zimbabwe Stock Exchange and annual reports for the listed bank.

3.2Model Specification

According to Asare (2015), credit risk is measured by NPLR, LAR and LLPR, hence the study adopted a panel data model previously used by Kolapo*et al*. (2012). However, the study improved on the model by incorporating control variables (internal and external determinants of profitability) which include bank age (BA), bank size (BS), market share (MS), inflation (INFL) and volume of manufacturing index (VMI). The model for this study functionally becomes:

$$ROA = f(NPLR, LAR, BA, BS, MS, INFL, VMI) \dots\dots\dots\dots\dots\dots\dots (1)$$

The econometric equation for the model is specified as:

$$ROA_{it} = \alpha_0 + \alpha_1 NPLR_{it} + \alpha_2 LAR_{it} + \alpha_3 BA_{it} + \alpha_4 BS_{it} + \alpha_5 MS_{it} + \alpha_6 LNINFL_{it} + \alpha_7 LNVMI_{it} + \epsilon_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

where α_0 is the intercept, $\alpha_1$to α_7 are coefficients of independent variables, $LNINFL_{it}$represents the natural logarithm of consumer price index, $LNVMI_{it}$ is the natural logarithm of volume of

manufacturing index and ϵ_{it} is the error term to account for unexplained change on profitability by credit risk measures and the control variables.

3.3Definition and Justification of Variables

Profitability (ROA_{it})

ROA is found by dividing net income by total assets of the bank. The ratio measures the efficiency a bank's management in generating profit out of its limited resources, hence it is a better measure of profitability than return on equity (ROE), net interest margin (NIM) and return on capital employed (ROCE). ROA has also been empirically used by Kithinji (2010), Kolapo*et al.* (2012) and Nawaz *et al.* (2012).

Nonperforming Loan Ratio ($NPLR_{it}$)

This is the major indicator of credit risk faced by banks (Abel and Le Roux, 2016; Boahene*et al.* 2012). The ratio is found by dividing total Nonperforming Loans by Total Loans of a bank. As this ratio increases it sends a bad signal that the management is being less efficient in utilizing the most important asset of the bank. The variable is expected to negatively affect profitability as the Firm Characteristics Theories, Agency Theory and Loan Pricing Theory explains.

Loan Advance Ratio (LAR_{it})

To measure banks liquidity this study will employ LAR. This ratio indicates the ability of a banks to withstand deposit withdrawals and willingness of a bank to meet loan demand by reducing their available cash assets (Asare, 2015). When a bank is more liquid, it reduces the risk of insolvency, which avoids the collapse of the whole sector. LAR provides more information on the issued deposits because it takes into account the blend between time and demand deposits. It is expected to positively affect profitability.

Bank Age (BA_{it})

Age is a measure of the experience of the bank, that is the number of years since its formation. All other things equal, it is assumed that the older the bank, the more experience it has gained in devising measures to counter credit risk and therefore a positive impact on its profitability.

Therefore, a positive sign indicates that experience counts in the banking sector, whereas, a negative sign shows that younger banks are more efficient than the older ones (Asare, 2015).

Bank Size (BS_{it})

This is a control variable that captures the existence of economies of scale or diseconomies of scale among banks in the models (Katuka, 2015). Bank size is an essential determinant of financial performance which is drawn from the Economic Model of Firm Performance. Bank size is measured by the natural logarithm of bank total assets (Saed and Zahid (2016). All other things equal, it is assumed that large banks are more profitable than small banks due to their ability to diversify and reduce credit risk. Increase in bank size is expected to be accompanied by rise in profitability but, however, if size becomes extremely big, it could bring negative effects on bank performance (Asare, 2015). This variable was also used by Abel and Le Roux (2016) and Boahene*et al.* (2012).

Market Share (MS_{it})

As explained by the Economic Model of Firm Performance, market share indicates the firm's competitive position and shows the importance of customer loyalty on profitability of a bank. Thus the larger the market share, the more competitive the bank is. In this study, market share is defined as the ratio of a bank's deposits to total deposits in the banking sector as a whole at that particular time. Market share is expected to positively affect bank profits. This variable was also used by Bentum (2012).

Inflation ($LNINFL_{it}$) and Volume of Manufacturing Index ($LNVMI_{it}$)

The study used Inflation and Volume of Manufacturing Index (VMI) to capture the effect of macroeconomic variables on profitability of the Zimbabwean banking sector (Abel and Le Roux, 2016). All other things constant, inflation can lower the ability and willingness to save. This in turn reduces the demand for financial products specifically credit. Thus the expected relationship between inflation and bank profitability is negative. As output increases the demand for credit increases as well. Thus VMI was used as a measure for gross domestic product (GDP) and a positive relationship with banking profitability is expected. However, the relationship between national output and bank profitability is ambiguous(Abel and Le Roux, 2016).

Table 2: Variables and Expected Relationship

Dependent Variable	Independent Variables	Relationship
Profitability (ROA_{it})	Nonperforming Loan Ratio ($NPLR_{it}$)	Positive/Negative
	Loan Advance Ratio (LAR_{it})	Positive
	Bank Age (BA_{it})	Positive/Negative
	Bank Size (BS_{it})	Positive/Negative
	Market Share (MS_{it})	Positive
	Inflation ($LNINFL_{it}$)	Negative
	Volume of Manufacturing Index ($LNVMI_{it}$)	Positive

3.4Estimation Procedure

There is no one model that can be used for panel data analyses. These models include the Pooled Ordinary Least Squares (POLS), Fixed Effects Model (FEM) and Random Effects Model (REM) techniques. The POLS approach is considered as the less effective model among them all. This is simply because it does not take into account theheterogeneity of banksacross time periods and thus it does not consider the panel nature of the dataset. In addition, the estimates obtained by adopting this approach are biased because of the heterogeneity between the error term and profitability (the dependent variable). Due to the weaknesses of the POLS to capture the panel nature of the dataset that the FEM and the REM become handy.

The Fixed Effects Model (FEM)

This model is used when one wants to control omitted variables that differ between cases but are constant over time. The model helps to track changes in the variables over time to estimate the effect of independent variables on dependent variables. According to Gujarati (2003),the term fixed effects is means that although the intercept may differ across banks, it does not vary over time. Thus the intercept is time invariant. Assuming that$Cov(X_{it}, \partial_i) \neq 0$ the FEM can be written as:

$$Y_{it} = \beta_{1i} + \beta_2 X_{2it} + \beta_3 X_{3it} + \mu_{it}$$

where $\mu_{it} = \partial_i + u_{it}$

In the model $\partial_i$are treated as unknown parameters to be estimated and the combined time series and cross-section error component (u_{it}). Also ***i***and ***t*** denote the cross-section and the time respectively. Y_{it} is the dependent variable and β_{1i} are cross-section (bank) specific intercepts which are constant over time. X_{2it} and X_{3it} are theexplanatory variables which do not vary across cross-sections and β_2 and β_3 are the slope coefficients respectively. The downside of the model is that where ***T*** is small and ***N*** is large we cannot estimate ∂_i. However, the remaining parameters can still be estimated. The REM and POLS are contaminated by the omitted variables problem which is eliminated by the FEM (Johnston and Dinardo, 1997).

The Random Effects Model (REM)

The REM is appropriate in cases where both ***T*** and ***N*** can be considered small. REM which is defined as follows:

$$Y_{it} = \vartheta_0 + \vartheta_1 X_{1it} + \vartheta_2 X_{2it} + \varepsilon_{it}$$

In this model, the composite error term ε_{it} consists of the cross-section error component (∂_i) and the combined time series and cross-section error component (u_{it}). Hence $\mu_{it} = \partial_i + u_{it}$. In the model ***i***and ***t*** denote the cross-section identifier and the time identifier respectively. The dependent variable the mean intercept are represented by $Y_{it}$and ϑ_0, respectively. The mean intercept denotes the mean value of all cross-sectional intercepts whereas the random deviation of individual units from this intercept is represented by ∂_i. ϑ_0 and ϑ_2 are the slope coefficients of the explanatory variables X_{1it} and X_{2it} respectively. The REM assumes that the individual error components are not correlated with each other and are also not auto correlated across both cross-section and time series units (Gujarati, 2003). This follows that $E\ (\varepsilon_{it}) = 0$ and that $var(\varepsilon_{it}) = \sigma_{\partial}^2 + \sigma_u^2$ (which shows that the error term ε_{it} is homoscedastic). Since the Generalised Least Squares (GLS) is the weighted average of within-group and between-group estimators, this enables the extraction of information from the two.

3.4.1 Fixed Effects Model (FEM) versus Random Effects Model (REM)

Many researchers prefer the FEM to REM because it is unlikely that the fixed effects are uncorrelated with the regressors of interest (Johnston and Dinardo, 1997). Thus the basic

assumption for the FEM is that $Cov(X_{it}, \partial_i) \neq 0$while REM assumes that $Cov(X_{it}, \partial_i) = 0$. Gujarati (2003) stated that the FEM solves the omitted-variables problem by throwing away some of the variance that contaminates either the REM or the POLS estimator. Nevertheless, if ***T*** is small and ***N*** is large, and the assumptions underlying REM hold, the FEM is not as efficient as compared to the REM (Davidson and MacKinnon, 1999).

3.4.2 Hausman Test

This test is used in choosing between FEM and REM (Gujarati, 2003). It is based on the null hypothesis that the REM is valid against the alternative hypothesis that the FEM is valid. The test follows a Chi-square (χ^2) distribution. The test is shown as follows:

$$H = (\hat{\alpha}_{FE} - \hat{\alpha}_{RE})'[var(\hat{\alpha}_{FE}) - var(\hat{\alpha}_{RE})]^{-1}(\hat{\alpha}_{FE} - \hat{\alpha}_{RE}) \sim \chi^2_K$$

where ***K*** denotes the dimension of the slope vector α

Thus $H_0: Cov(X_{it}, \partial_i) = 0$

$$H_1: Cov(X_{it}, \partial_{i_i}) \neq 0$$

Given the five percent (0.05) level of significance, failure to accept the null hypothesis means that the FEM is more appropriate than the REM.

3.5Conclusion

This chapter highlighted the methodology used to collect data and examine how credit risk affects profitability of the banking sector in Zimbabwe (2009Q1 to 2015Q4). The research design, sample selection and model specification as well as tests to be outcarried were discussed. This chapter also includes definition and justification of variables.

CHAPTER FOUR

ESTIMATION, PRESENTATION AND INTERPRETATION OF RESULTS

4.0 Introduction

Included in this chapter is the estimation, presentation and interpretation of results. The summary of statistics is presented first. This isfollowed by correlation analysis. Lastly, the Hausman Specification Test and regression results as well as interpretation of results are then presented.The study used STATA version 12[9]for estimation of results.

4.1 Descriptive Statistics

To provide a clear picture of credit risk and profitability performance of the Zimbabwean Banking Sector, Table 3 with summary of statistics is summarized below. The summary statistics comprise of three different types of test statistics. These include the overall, between and within. While the between captures the cross-sectional dimension, the within captures time-series dimensions of the data. The study used 5 banks (n=5) and 28 time periods (T=28), and this gave a total of 140 observations (N=140). For purposes of this study, this summary is comprehensive enough to helps the research understand the structure of the data.

Profitability Performance of the Zimbabwean Banking Sector

To measure profitability performance, return on assets (***ROA***) was employed in the study. Results in Table 3 show that on average the banking sector in Zimbabwe earned a 1% return on assets with an overall variation of 2% for the period under study. According to Flamini*et al.* (2009), a 2% rate of return on assets found in their study of banks in Sub-Saharan African (SSA) countries was regarded as higher than that of banks in other parts of the world.

Table 3: Summary Statistics

Variable		Mean	Std. Dev.	Min	Max	Observations	
ID	overall	3.00	1.42	1.00	5.00	N =	140
	between		1.58	1.00	5.00	n =	5
	within		0.00	3.00	3.00	T =	28

[9] Full tables of the outputs are found in the Appendices.

*_YEAR_*	overall	14.50	8.11	1.00	28.00	N =	140
	between		0.00	14.50	14.50	n =	5
	within		8.11	1.00	28.00	T =	28
ROA	overall	0.01	0.02	-0.06	0.06	N =	140
	between		0.01	0.00	0.02	n =	5
	within		0.02	-0.05	0.06	T =	28
NPLR	overall	0.09	0.12	0.00	0.76	N =	140
	between		0.04	0.05	0.14	n =	5
	within		0.12	-0.05	0.76	T =	28
LAR	overall	0.82	0.43	0.00	2.17	N =	140
	between		0.22	0.53	1.01	n =	5
	within		0.39	-0.18	2.41	T =	28
BS	overall	19.33	1.01	15.46	21.40	N =	140
	between		0.50	18.79	20.13	n =	5
	within		0.91	14.66	20.60	T =	28
BA	overall	3.60	0.70	2.51	4.64	N =	140
	between		0.77	2.74	4.61	n =	5
	within		0.08	3.36	3.80	T =	28
MS	overall	0.08	0.08	0.00	0.29	N =	140
	between		0.07	0.04	0.21	n =	5
	within		0.04	-0.13	0.16	T =	28
LNVMI	overall	4.54	0.06	4.41	4.67	N =	140
	between		0.00	4.54	4.54	n =	5
	within		0.06	4.41	4.67	T =	28
LNINFL	overall	4.58	0.03	4.50	4.61	N =	140
	between		0.00	4.58	4.58	n =	5
	within		0.03	4.50	4.61	T =	28

Other things equal, it can be argued that the Zimbabwean banking sector has been less efficient enough to gain a higher rate of return out of their assets for the period under study. Flamini*et al.* (2009) suggested that the high profitability of banks in SSA, where Zimbabwe is located, may be due to larger bank size, activity diversification and private ownership.The overall minimum and

maximum values of ***ROA***are -0.06% and 0.06%, respectively. However, profits are more volatile within the sampled banks than they are across banks as shown by a larger within variation (2%) than the between variation (1%) of ***ROA***.

Credit Risk in the Zimbabwean Banking Sector

To measure credit risk, the study used non-performing loan ratio (***NPLR***) and loan advance ratio (***LAR***). Table 3 indicate that the average ***NPLR***in the Zimbabwean banking sector for the last five years was 9% with the overall variation of 12%. The difference between the overall minimum (0.00%) and maximum (0.76%) values and the variation demonstrate that there exists high variability with ***NPLR***. Other things equal, this implies that the accumulation of non-performing loans which was claimed as critical problem of the banking sector (Mazadzi and Maseya, 2015; Abel and Le Roux, 2016) is showing an improvement overtime. The high within variation in ***NPLR*** (12%) compared to between variation (4%) means that individual banks methods of dealing with non-performing loans over the years were not as effective as those strategies within the banking sector (between variations).This could be largely attributable to the disposal of qualifying non-performing loans to Zimbabwe Asset Management Company (ZAMCO). Also this could be due to the efforts of the Reserve Bank of Zimbabwe (RBZ) in trying to set up Credit Reference Bureaus (CRBs) which are aimed at reducing the asymmetric information gap between borrowers and lenders, and in the process, improving credit risk management of banks.

LARindicates how funds deposited in the banks are used in generating loans which is prone to default risk. The average ***LAR***of the Zimbabwean banking sector was 82% with an overall variation of 43%. The overall minimum and maximum values were 0.00% and 2.17% respectively, suggesting that the banks concentrate on lending business which is relatively riskier than other options to use deposits. The minimum value depicted how banks are reluctant to lend in excess of their total deposits due to the high risk (asymmetric information gap between them and the borrowers) involved in the lending process. This minimum value also shows that banks are using the deposits for other options to generate profits other than lending which is capitalized by default risk. The low within variation in ***LAR***(22%) compared to between variation (39%) means that the use of deposits to generate profits is different within individual banksand the same within the banking sector (between variations).

Bank-Specific and Macroeconomic Variables in Zimbabwe

Table 3 above shows that bank-specific variables like bank size (***BS***), bank age (***BA***) and market share (***MS***) have more between variations than within variations. The variables imply that, some banks have more assets, are more cost efficient and have more deposits in the market than other banks.Our macroeconomic variables, ***LNVMI***and***LNINFL*** are cross-section invariant variables thus the between variations for these variables are not different from zero.As such, the within-bank variations of these variables equal the overall variations. For example, the within-bank variation of ***LNVMI***is 0.06, which is equivalent to the overall variation of ***LNVMI***(0.06).

4.2 Correlation Analysis

This section focuses on uncovering the nature of relationship among variables. Correlation analysis is a test for multicollinearity and also indicates the predictive connection between the dependent variable (***ROA***) and independent variables (***NPLR***,***LAR***,***BS***, ***BA***,***MS***,***LNVMI*** and ***LNINFL***). Table 4 below shows that ***NPLR***and ***BA***are negatively related to bank profitability (measured by ***ROA***)while it is positively correlated to***LAR***, ***BS***, ***MS***and***LNINFL***. Correlation coefficients between ***ROA***and ***LNINFL***have unexpected positive signs.

Table 4: Correlation Matrix

	ROA	*NPLR*	*LAR*	*BS*	*BA*	*MS*	*LNVMI*	*LNINFL*
ROA	1.00							
NPLR	-0.07	1.00						
LAR	0.22	0.21	1.00					
BS	0.04	0.07	0.21	1.00				
BA	-0.29	0.12	-0.40	0.11	1.00			
MS	0.05	-0.20	0.02	0.69	0.01	1.00		
LNVMI	0.21	-0.15	0.10	0.13	0.01	-0.01	1.00	
LNINFL	0.08	0.40	0.49	0.38	0.08	-0.08	0.10	1.00

4.3 Hausman Test

The Hausman Test is a model specification test to choose the appropriate model between FEM and REM. It is performed under the null hypothesis that the REM is valid against the alternative

hypothesis that the FEM is valid. In other words, the null hypothesis emphasizes that there is no systematic difference between the FEM and REM coefficients against the alternative hypothesis that the FEM and REM estimators differ substantially.

Table 5: Hausman Test Results

	---Coefficients---			
	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
NPLR	-0.0012	-0.0049	0.0037	0.0020
LAR	0.0032	0.0031	0.0002	.
BS	0.0022	-0.0016	0.0038	0.0031
BA	-0.0582	-0.0058	-0.0524	0.0225
MS	-0.0302	0.0263	-0.0565	0.0781
LNVMI	0.0523	0.0542	-0.0019	.
LNINFL	0.0770	0.0528	0.0242	0.0494

$\chi^2(7) = 7.31$ *p-value* $= 0.3975$

According to Table 5 above, the χ^2value for the Hausman Test is 7.31 with a corresponding *p-value* of 0.3975 meaning that our estimations are significant. Given that [(*p-value*>χ^2) > 0.05], we may fail to reject the null hypothesis that the REM is valid at 5% level of significance. Thus the REM is the most suitable model as compared to the FEM.

4.4 The Random Effects Model

Following the outcome of the HausmanTest above, the study implements the REM. Thus the interpretations and conclusions will be based on the REM. From Table 6 below, the constant of the model has a negative value though statistically insignificant. The model is very strong in explaining the variation across banks in Zimbabwe since the within, between and overall R-squared values for this model are 6.81%, 75.19% and 14.70% respectively. This means that the random effects estimator can explain 6.81% of the within variation, 75.19%of the between variation and 14.70% of the overall variation of bank profitability (***ROA***).

The Impact of Non-Performing Loans (*NPLR*) on Profitability

The coefficient in Table 6 below show that ***NPLR***(as a measure of credit risk), is negatively related to bank profitability (measured by ***ROA***) as expected, though statistically insignificant.

The negative relationship tallies with the predictions of Firm Characteristics Theories and Loan Pricing Theory explained in Chapter 2, though the insignificance of the coefficient of ***NPLR***is inconsistent with the aforementioned theories. The results in this respect are consistent with the findings of Kithinji (2010); Duraj and Moci (2015) and Veizi*et al*. (2016) who suggested that other variables other than credit risk (NPLR) impact on profits. This imply that the profitability of Zimbabwean banksis determined by other variables other than credit risk (NPLR), ceteris paribus. However, this does not tally with the previous studies on Zimbabwe (Mazadzi and Maseya, 2015; Abel and Le Roux, 2016) who found a significant and negative relationship between ***NPLR*** and profitability.

Other things equal, the insignificance of the coefficient of***NPLR*** on profitability of banks in Zimbabwe could be largely attributable to the disposal of qualifying non-performing loans to Zimbabwe Asset Management Company (ZAMCO). Also this could be due to the efforts of the Reserve Bank of Zimbabwe (RBZ) in trying to set up Credit Reference Bureaus (CRBs) which are aimed at reducing the asymmetric information gap between borrowers and lenders, and in the process, improving credit risk management of banks.

Table 6: Estimation Results of the Random Effects Model

ROA	Coef.	Std. Err.	z	P>z	[95%Conf.	Interval]
NPLR	-0.0049	0.0123	-0.4000	0.6900	-0.0289	0.0192
LAR	0.0031	0.0040	0.7600	0.4450	-0.0048	0.0110
BS	-0.0016	0.0023	-0.7000	0.4860	-0.0061	0.0029
BA	-0.0058	0.0022	-2.6300	0.0090	-0.0101	-0.0015
MS	0.0263	0.0287	0.9200	0.3590	-0.0299	0.0826
LNVMI	0.0542	0.0222	2.4400	0.0150	0.0107	0.0977
LNINFL	0.0528	0.0614	0.8600	0.3900	-0.0676	0.1732
_CONS	-0.4302	0.2757	-1.5600	0.1190	-0.9705	0.1101

R-sq: within = 0.0681
between = 0.7519
overall = 0.1470

The Impact of Loan Advance Ratio (*LAR*) on Profitability

Consistent with the findings of Kithinji (2010), Bentum (2012) and Olawale (2012), this study also found out that the coefficient of***LAR***(measure of credit risk)is positively related to bank profitability (measured by ***ROA***) as expected, though statistically insignificant. For banks in

Zimbabwe the insignificance of the coefficient of ***LAR*** may be that banks are reluctant to lend in excess of their total deposits due to the high risk (asymmetric information gap between them and the borrowers) involved in the lending process. This is in line with the observations from the descriptive statistics above when the minimum value showed that banks are using the deposits for other options to generate profits other than lending which is capitalized by default risk. However, these findings do not tally with those of Kolapo*et al*.(2012); Abbas *et al*. (2014) and Asare (2015) who found that banks lend in excess of their deposits and enjoy more profitability despite the risk involved.

The Impact ofBank-Specific and Macroeconomic Variables on Profitability

At 5% level of significance, Bank age (***BA***) has a negative and significant effect on profitability (***ROA***).A unit increase in bank age results in 0.0058-unit decrease in its profitability. This result contradicts with the findings of Asare (2015) who found a positive relationship between bank age and profitability and concluded that the older the bank, the more experience it has in the industry and therefore knows the market trends better and takes advantage of that. For banks in Zimbabwe this could be that new banks have new methods of doing business than older banks and that they are investing in technology which may result in them providing services at low costs.

Consistent with the findings of Chinoda (2014); Mazadzi and Maseya (2015) and Duraj and Moci (2015), GDP (measured by ***LNVMI***) is positively related to bank profitability at 5% level of significance. A unit increase in ***LNVMI***will result in 0.0542units increase in a bank's profitability.As output increases, the demand for financial products increase as well which then transforms into high profitability for banks, ceteris paribus. However, this finding contradicts with that of Abel and Le Roux (2016) who found no significant relationship between GDP and bank profitability.

Though the negative and positive relationships with bank size (***BS***) and market share (***MS***) respectively are consistent with the Economic Model of Firm Performance, their coefficients were found to be statistically insignificant. This tallies with the findings of Bentum (2012) who found a no significant effect between market share and profitability in the post crisis period for commercial banks in Ghana. For bank size the results tally with those of Asare (2015). For banks

in Zimbabwe this means that neither bank size or market share play a role in increasing profitability.

Unexpectedly, the coefficient of inflation (***LNINFL***) was found to be positively related to profitability but statistically insignificant. A possible explanation for such a finding could be that for the period between 2009 and 2013, the Zimbabwean economy enjoyed the lowest inflation levels in its history (Jabangwe and Kadenge, 2015).This finding goes in line with that of Mazadzi and Maseya (2015) but contradicts with Chinoda (2014) who found a negative and significant relationship between inflation and profitability of banks in Zimbabwe.

4.5 Conclusion

Embedded in this chapter was the estimation, presentation and analysis of results. Based on the study findings, there is no significant relationship between credit riskand profitability of the Zimbabwean banking sector. Among the credit risk measures used in the study the coefficient of non-performing loans ratio (***NPLR***) had a negative relationship with profitability which confirmed with the Firms Characteristics Theories and Loan Pricing Theory, though statistically insignificant. On the other hand, the coefficient of loans and advance ratio (***LAR***), another measure of credit risk, had a positive relationship with profitability of banks, though statistically insignificant. At 5% level of significance, the study also found out that bank age and economic growth are important variables in explaining banking sector profitability. Economic growth was found to have positive impact on bank profitability whilst bank age negatively affects bank profitability. The coefficients of other variables such as bank size, market share and inflation were found to be statistically insignificant.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY RECOMMENDATIONS

5.0 Introduction

The following section is aimed at giving a detailed summary and comprehensive conclusions of the study. Policy recommendations are also included which are drawn from the study findings.Lastly, areas of further research are given.

5.1 Summary and Conclusions of the Study

The aim of this study was to analyze how credit risk, measured by non-performing loans ratio (NPLR) and loan and advance ratio (LAR),affects the performance of the banking sector in Zimbabwe covering the period 2009 Q1 to 2015 Q4. Specifically, the study aimed at determining whether there is a significant relationship between non-performing loans ratio (NPLR), loan and advance ratio (LAR) and profitability of the banking sector in Zimbabwe measured by ROA.

The relationship between credit risk and bank performance has been the concern of emerging studies in both developed and developing economies. However, the findings on the subject matter are inconclusive. In other words, the findings are mixed. There are some studies that found a negative relationship between credit risk and profitability. Several other papers found positive relationship between credit risk and profitability of banks. The prevailing findings on the subject matter is further complicated by a few studies that found that there is no relationship between credit risk and profitability. On another confusing note, profitability indicators and credit risk in the Zimbabwean banking sector have been moving in different trends for the period under study. In view of this inconsistency, this present study joined the ongoing debate by using Zimbabwe's Banking Sector as a case study.

The study used panel data collected from the annual financial reportsof the sampled five banks which are CBZ Holdings Limited, FBC Holdings Limited, ZB Financial Holdings Limited, Barclays Bank of Zimbabwe Limited and NMBZ Holdings Limited for the period 2009 Q1 to 2015 Q4. The sample comprised of banks listed on the Zimbabwe Stock Exchange (ZSE) only. Guided by theHausman Specification Test, the study used the Random Effects Model (REM). STATA version 12 was used for the estimation of results in the study. In a bid to include some

factors that capture profitability, the study borrowed other control variables from theories of performance in Chapter 2. These variables are bank size, market share, bank age, inflation and economic growth.The results show that there is no significant relationship between credit risk and profitability of the banking sector in Zimbabwe. While the coefficient ofnon-performing loans ratio had a negative and statistically insignificant relationship with profitability, the coefficient of loans and advance ratio had a positive and statistically insignificant relationship with profitability. Economic growth was found to have significant positive impact on bank profitability whilst bank age negatively affects bank profitability.The coefficients of variables such as bank size, market share and inflation were found to be statistically insignificant.

5.2 Policy Implications and Recommendations

Banks play a critical intermediation role of transferring funds fromthe surplus units to deficit units. In the process they are exposed to different kinds of risks. Therefore, monitoring their performance and factors thatinfluence the profitability banks is of paramount importance for policyformulation and thus to the economy of Zimbabwe.The policy recommendations in this study are drawn from specifically from the findings in Chapter 4.

The results show that there is no significant relationship between credit risk and profitability of the banking sector in Zimbabwe. While the coefficient of non-performing loans ratio had a negative and statistically insignificant relationship with profitability, the coefficient of loans and advance ratio had a positive and statistically insignificant relationship with profitability as well. The findings reveal that profits of banks are not influenced by the amount of nonperforming loans and loans and advances. This suggests that some variables other than nonperforming loans and loans and advances impact on profits. Banks that are keen on making high profits should concentrate on other factors for example charging customers fees in exchange of financial services[10] than focusing more on amount of nonperforming loans and loans and advances. If the objective is to maximize profit, banks should also consider trading financial instruments[11] in the financial markets.

[10] Safe keeping services like insured deposit accounts and safety deposit boxes, and insurance services like annuity contracts.
[11] Stocks, bonds, options, futures and swaps.

In addition to the above suggestion, the study draws some of its policy implications from control variables whose coefficients were found statistically significant.The results show a negative relationship between bank age and profitability. Thus, older banks should do away with old business methods and ideas that are cost inefficient. They should rather make an endless effort to invest in innovations that reduce costs and boost profits.

Since economic growth (measured by volume of manufacturing index) matters for bank profits, fiscal and monetary policies that are aimed at promoting output stability and sustainable growth should be designed as they are good for financial intermediation. This willstimulate production and consequently the demand for financial services offered by banks and thus increase their profits.

5.3 Limitations of the Study and Suggestions of Areas for Further Study

The study used quarterly data for analyses, other researches could also use annual data or semi-annual data for analyses. We only focused on five listed banks since it was easier to find data for listed entities than for unlisted ones. Resources permitting, future studies should consider all banks rather than only five used in this study.The research only looked on the effects of credit risk in post-crisis period (2009 Q1 to 2015 Q4). It will also be interesting to include structural breaks and cover periods in which Zimbabwe was using own currency (period before 2008) and this period of dollarization. Other than just studying for the Zimbabwean banking sector, researches regarding credit risk and bank profitability at regional levels like Southern African Development Community (SADC) can be done.

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APPENDICES

Appendix A: Summary Statistics

```
. xtsum id _year_ roa nplr lar bs ba ms lnvmi lninfl
```

Variable		Mean	Std. Dev.	Min	Max	Observations	
id	overall	3	1.419292	1	5	N =	140
	between		1.581139	1	5	n =	5
	within		0	3	3	T =	28
year	overall	14.5	8.106752	1	28	N =	140
	between		0	14.5	14.5	n =	5
	within		8.106752	1	28	T =	28
roa	overall	.0104646	.0162561	-.0604152	.0644421	N =	140
	between		.006157	.0040195	.0183812	n =	5
	within		.0152878	-.0544944	.0565254	T =	28
nplr	overall	.0929929	.1228002	0	.7599562	N =	140
	between		.0373956	.0456762	.1448924	n =	5
	within		.1181233	-.0518994	.7638865	T =	28
lar	overall	.8172588	.4328985	0	2.171976	N =	140
	between		.2184887	.5255365	1.005736	n =	5
	within		.385923	-.1842132	2.414896	T =	28
bs	overall	19.33234	1.012785	15.45834	21.39566	N =	140
	between		.5006986	18.78767	20.12698	n =	5
	within		.9075969	14.66371	20.60103	T =	28
ba	overall	3.595389	.6971263	2.505526	4.644391	N =	140
	between		.7714297	2.740392	4.611199	n =	5
	within		.0804798	3.360523	3.799436	T =	28
ms	overall	.0832664	.0753147	0	.2892327	N =	140
	between		.0729831	.0366696	.2124632	n =	5
	within		.0371541	-.1291968	.1600359	T =	28
lnvmi	overall	4.542969	.0616369	4.41409	4.668869	N =	140
	between		0	4.542969	4.542969	n =	5
	within		.0616369	4.41409	4.668869	T =	28
lninfl	overall	4.580446	.0310097	4.503563	4.614821	N =	140
	between		0	4.580446	4.580446	n =	5
	within		.0310097	4.503563	4.614821	T =	28

.

Appendix B: Correlation Matrix

```
. correlate roa nplr lar bs ba ms lnvmi lninfl
(obs=140)
```

	roa	nplr	lar	bs	ba	ms	lnvmi	lninfl
roa	1.0000							
nplr	-0.0726	1.0000						
lar	0.2246	0.2055	1.0000					
bs	0.0356	0.0739	0.2137	1.0000				
ba	-0.2862	0.1237	-0.3977	0.1135	1.0000			
ms	0.0502	-0.1972	0.0160	0.6872	0.0117	1.0000		
lnvmi	0.2138	-0.1481	0.1045	0.1261	0.0110	-0.0054	1.0000	
lninfl	0.0798	0.3981	0.4850	0.3842	0.0755	-0.0802	0.1010	1.0000

Appendix C: Hausman Specification Test

```
. quietly xtreg $ylist $xlist, fe

. estimates store fixed

. quietly xtreg $ylist $xlist, re

. estimates store random

. hausman fixed random
```

	——— Coefficients ———			
	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
nplr	-.0011862	-.0048947	.0037085	.0020148
lar	.0032331	.0030823	.0001508	.
bs	.0021794	-.0015944	.0037738	.0030721
ba	-.0582382	-.0058073	-.0524309	.0224731
ms	-.0301985	.0263241	-.0565226	.0780963
lnvmi	.0522808	.0542036	-.0019228	.
lninfl	.0769619	.0528101	.0241518	.0494068

```
                b = consistent under Ho and Ha; obtained from xtreg
     B = inconsistent under Ha, efficient under Ho; obtained from xtreg

  Test:  Ho:  difference in coefficients not systematic

              chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                      =        7.31
            Prob>chi2 =      0.3975
            (V_b-V_B is not positive definite)

.
```

Appendix D: Random Effects Model

```
. xtreg $ylist $xlist, re theta

Random-effects GLS regression                   Number of obs      =       140
Group variable: id                              Number of groups   =         5

R-sq:  within  = 0.0681                         Obs per group: min =        28
       between = 0.7519                                        avg =      28.0
       overall = 0.1470                                        max =        28

                                                Wald chi2(7)       =     22.74
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0019
theta          = 0
```

roa	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
nplr	-.0048947	.012272	-0.40	0.690	-.0289473	.0191578
lar	.0030823	.0040329	0.76	0.445	-.004822	.0109867
bs	-.0015944	.0022892	-0.70	0.486	-.0060812	.0028924
ba	-.0058073	.0022122	-2.63	0.009	-.0101432	-.0014714
ms	.0263241	.0286938	0.92	0.359	-.0299147	.0825629
lnvmi	.0542036	.0222082	2.44	0.015	.0106763	.0977309
lninfl	.0528101	.0614453	0.86	0.390	-.0676204	.1732407
_cons	-.4302272	.2756587	-1.56	0.119	-.9705084	.1100539
sigma_u	0					
sigma_e	.01505644					
rho	0	(fraction of variance due to u_i)				

Appendix E: Fixed Effects Model

```
. xtreg $ylist $xlist, fe

Fixed-effects (within) regression               Number of obs      =       140
Group variable: id                              Number of groups   =         5

R-sq:  within  = 0.1068                         Obs per group: min =        28
       between = 0.6567                                        avg =      28.0
       overall = 0.0966                                        max =        28

                                                F(7,128)           =      2.19
corr(u_i, Xb)  = -0.9887                        Prob > F           =    0.0396
```

roa	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
nplr	-.0011862	.0124362	-0.10	0.924	-.0257935	.023421
lar	.0032331	.0040007	0.81	0.421	-.0046829	.0111492
bs	.0021794	.0038312	0.57	0.570	-.0054013	.0097601
ba	-.0582382	.0225817	-2.58	0.011	-.10292	-.0135564
ms	-.0301985	.0832008	-0.36	0.717	-.1948255	.1344284
lnvmi	.0522808	.0220401	2.37	0.019	.0086707	.0958909
lninfl	.0769619	.0788451	0.98	0.331	-.0790467	.2329705
_cons	-.4123259	.3294863	-1.25	0.213	-1.064271	.2396191
sigma_u	.04068132					
sigma_e	.01505644					
rho	.87952352	(fraction of variance due to u_i)				

```
F test that all u_i=0:     F(4, 128) =     2.55                 Prob > F = 0.0420
```

Appendix F: Data Set

BANK	Year	ROA	NPLR	LAR	BS	BA	MS	LNVMI	LNINFL
BARCLAYS	2009q1	-0.0081	0.0051	0.0449	18.4541	4.5773	0.1182	4.5275	4.5503
BARCLAYS	2009q2	0.0063	0.2246	0.0277	18.6924	4.5799	0.1056	4.4141	4.5036
BARCLAYS	2009q3	-0.0031	0.0281	0.1428	18.8450	4.5824	0.1111	4.5151	4.5152
BARCLAYS	2009q4	0.0034	0.0079	0.1684	19.0475	4.5850	0.0888	4.5476	4.5225
BARCLAYS	2010q1	-0.0102	0.0072	0.1993	18.9636	4.5875	0.0673	4.4816	4.5429
BARCLAYS	2010q2	-0.0055	0.0063	0.2118	19.0209	4.5901	0.0645	4.4844	4.5560
BARCLAYS	2010q3	-0.0059	0.0042	0.2330	19.2283	4.5926	0.0778	4.5778	4.5543
BARCLAYS	2010q4	-0.0071	0.0000	0.2523	19.2608	4.5951	0.0698	4.6689	4.5584
BARCLAYS	2011q1	0.0015	0.0033	0.2699	19.3088	4.5976	0.0676	4.6181	4.5733
BARCLAYS	2011q2	0.0034	0.0030	0.2974	19.3355	4.6002	0.0614	4.5686	4.5822
BARCLAYS	2011q3	0.0031	0.0027	0.2695	19.5119	4.6027	0.0742	4.6530	4.5907
BARCLAYS	2011q4	0.0088	0.0027	0.2857	19.4560	4.6052	0.0666	4.6149	4.6022
BARCLAYS	2012q1	0.0031	0.0029	0.2913	19.4536	4.6077	0.0558	4.5351	4.5857
BARCLAYS	2012q2	0.0029	0.0107	0.3064	19.4675	4.6102	0.0547	4.5314	4.5932
BARCLAYS	2012q3	0.0028	0.0133	0.2807	19.6126	4.6126	0.0596	4.5419	4.5974
BARCLAYS	2012q4	0.0040	0.0104	0.4270	19.5972	4.6151	0.0527	4.5407	4.6039
BARCLAYS	2013q1	0.0027	0.0104	0.4225	19.5570	4.6176	0.0589	4.4841	4.6128
BARCLAYS	2013q2	0.0039	0.2293	2.0120	19.6141	4.6201	0.0550	4.4974	4.6148
BARCLAYS	2013q3	0.0049	0.1512	2.1232	19.7194	4.6225	0.0613	4.5203	4.6086
BARCLAYS	2013q4	0.0154	0.2025	1.8981	19.7006	4.6250	0.0581	4.5432	4.6087
BARCLAYS	2014q1	0.0034	0.6923	0.4916	19.6656	4.6274	0.0543	4.4168	4.6095
BARCLAYS	2014q2	0.0070	0.7600	0.4916	19.6767	4.6299	0.0689	4.4509	4.6130
BARCLAYS	2014q3	0.0183	0.0244	0.5850	19.6161	4.6323	0.0548	4.5570	4.6105
BARCLAYS	2014q4	0.0253	0.0187	0.6180	19.5905	4.6347	0.0593	4.6088	4.6034
BARCLAYS	2015q1	0.0031	0.0179	0.5686	19.7259	4.6372	0.0469	4.5602	4.5965
BARCLAYS	2015q2	0.0058	0.0192	0.5940	19.7585	4.6396	0.0449	4.5822	4.5853
BARCLAYS	2015q3	0.0080	0.0185	0.5615	19.8205	4.6420	0.0493	4.5706	4.5816
BARCLAYS	2015q4	0.0155	0.0171	0.6411	19.7320	4.6444	0.0438	4.5911	4.5757
CBZ	2009q1	0.0168	0.0000	0.3527	18.4293	3.3759	0.1760	4.5275	4.5503
CBZ	2009q2	0.0113	0.0000	0.4643	19.7489	3.3844	0.2627	4.4141	4.5036
CBZ	2009q3	0.0187	0.0000	0.5488	19.7506	3.3928	0.2712	4.5151	4.5152
CBZ	2009q4	0.0244	0.0111	0.7071	20.1203	3.4012	0.2625	4.5476	4.5225
CBZ	2010q1	0.0126	0.0012	0.8547	20.2385	3.4095	0.2739	4.4816	4.5429
CBZ	2010q2	0.0183	0.0017	0.7466	20.2889	3.4177	0.2459	4.4844	4.5560
CBZ	2010q3	0.0228	0.0121	0.7113	20.4828	3.4259	0.2767	4.5778	4.5543
CBZ	2010q4	0.0350	0.0042	0.9059	20.4585	3.4340	0.2297	4.6689	4.5584
CBZ	2011q1	0.0144	0.0030	1.0367	20.4407	3.4420	0.2342	4.6181	4.5733
CBZ	2011q2	0.0178	0.0135	0.9322	20.6408	3.4500	0.2424	4.5686	4.5822
CBZ	2011q3	0.0261	0.0362	1.1295	20.6479	3.4579	0.2216	4.6530	4.5907

CBZ	2011q4	0.0364	0.0108	1.1456	20.7166	3.4657	0.2130	4.6149	4.6022
CBZ	2012q1	0.0096	0.0640	1.1827	20.7451	3.4735	0.2141	4.5351	4.5857
CBZ	2012q2	0.0144	0.0589	1.1197	20.8160	3.4812	0.2141	4.5314	4.5932
CBZ	2012q3	0.0238	0.0543	1.2452	20.7960	3.4889	0.1990	4.5419	4.5974
CBZ	2012q4	0.0359	0.0512	1.1729	20.8565	3.4965	0.2349	4.5407	4.6039
CBZ	2013q1	0.0081	0.0535	1.4406	20.8790	3.5041	0.1946	4.4841	4.6128
CBZ	2013q2	0.0097	0.0104	0.4415	20.9476	3.5115	0.2090	4.4974	4.6148
CBZ	2013q3	0.0122	0.0085	0.4798	21.0918	3.5190	0.2242	4.5203	4.6086
CBZ	2013q4	0.0186	0.0091	0.4854	21.1833	3.5264	0.2368	4.5432	4.6087
CBZ	2014q1	0.0018	0.1238	1.0302	21.2351	3.5337	0.2448	4.4168	4.6095
CBZ	2014q2	0.0050	0.2519	1.0302	15.4583	3.5410	0.0000	4.4509	4.6130
CBZ	2014q3	0.0069	0.0820	1.0688	15.9399	3.5482	0.0000	4.5570	4.6105
CBZ	2014q4	0.0112	0.0834	1.0816	16.2435	3.5553	0.0000	4.6088	4.6034
CBZ	2015q1	-0.0133	0.0954	1.1032	21.2305	3.5625	0.2479	4.5602	4.5965
CBZ	2015q2	-0.0052	0.0781	0.9917	21.3918	3.5695	0.2729	4.5822	4.5853
CBZ	2015q3	-0.0119	0.0839	1.1274	21.3815	3.5766	0.2578	4.5706	4.5816
CBZ	2015q4	0.0050	0.0767	0.8160	21.3957	3.5835	0.2892	4.5911	4.5757
FBC	2009q1	0.0031	0.0000	0.3364	17.9063	2.5055	0.0143	4.5275	4.5503
FBC	2009q2	0.0079	0.0000	0.4002	18.2318	2.5257	0.0454	4.4141	4.5036
FBC	2009q3	0.0107	0.0021	0.2581	18.2780	2.5455	0.0455	4.5151	4.5152
FBC	2009q4	0.0068	0.0126	0.2256	18.8115	2.5649	0.0695	4.5476	4.5225
FBC	2010q1	0.0004	0.0126	0.3350	18.9900	2.5840	0.0724	4.4816	4.5429
FBC	2010q2	0.0036	0.0148	0.5860	18.7531	2.6027	0.0448	4.4844	4.5560
FBC	2010q3	-0.0076	0.0106	0.7669	18.8295	2.6210	0.0470	4.5778	4.5543
FBC	2010q4	0.0251	0.0000	0.8208	19.0396	2.6391	0.0470	4.6689	4.5584
FBC	2011q1	0.0057	0.0350	0.9756	19.0358	2.6568	0.0405	4.6181	4.5733
FBC	2011q2	0.0145	0.0435	1.0296	19.0412	2.6741	0.0431	4.5686	4.5822
FBC	2011q3	0.0254	0.0459	1.1369	19.1688	2.6912	0.0469	4.6530	4.5907
FBC	2011q4	0.0326	0.0376	1.4797	19.0942	2.7081	0.0414	4.6149	4.6022
FBC	2012q1	0.0067	0.0000	2.1720	19.5194	2.7246	0.0636	4.5351	4.5857
FBC	2012q2	0.0156	0.0592	1.2220	19.3226	2.7408	0.0499	4.5314	4.5932
FBC	2012q3	0.0204	0.1003	1.2423	19.3735	2.7568	0.0497	4.5419	4.5974
FBC	2012q4	0.0234	0.0920	0.7184	19.4671	2.7726	0.0494	4.5407	4.6039
FBC	2013q1	0.0037	0.1246	1.1952	19.5191	2.7881	0.0541	4.4841	4.6128
FBC	2013q2	0.0123	0.2457	1.1940	19.6391	2.8034	0.0595	4.4974	4.6148
FBC	2013q3	0.0173	0.2282	1.3346	19.6553	2.8184	0.0529	4.5203	4.6086
FBC	2013q4	0.0234	0.0809	1.1964	19.6132	2.8332	0.0515	4.5432	4.6087
FBC	2014q1	0.0043	0.0523	1.2243	19.6528	2.8478	0.0538	4.4168	4.6095
FBC	2014q2	0.0115	0.0660	1.2243	19.6866	2.8622	0.0769	4.4509	4.6130
FBC	2014q3	-0.0034	0.2223	1.3382	19.7347	2.8764	0.0707	4.5570	4.6105
FBC	2014q4	0.0056	0.1949	1.3817	19.7863	2.8904	0.0761	4.6088	4.6034

FBC	2015q1	0.0037	0.1695	1.3129	19.7757	2.9042	0.0554	4.5602	4.5965
FBC	2015q2	0.0104	0.1628	1.4497	19.8168	2.9178	0.0518	4.5822	4.5853
FBC	2015q3	0.0175	0.0000	1.4845	19.7021	2.9312	0.0458	4.5706	4.5816
FBC	2015q4	0.0235	0.0784	0.0000	19.7867	2.9444	0.0499	4.5911	4.5757
NMBZ	2009q1	-0.0018	0.0216	0.4366	16.4879	2.8478	0.0144	4.5275	4.5503
NMBZ	2009q2	0.0644	0.0000	0.7159	16.9918	2.8622	0.0170	4.4141	4.5036
NMBZ	2009q3	0.0616	0.0070	0.6772	17.2498	2.8764	0.0196	4.5151	4.5152
NMBZ	2009q4	0.0533	0.0193	0.6235	17.5281	2.8904	0.0208	4.5476	4.5225
NMBZ	2010q1	0.0118	0.0227	0.7362	17.6764	2.9042	0.0215	4.4816	4.5429
NMBZ	2010q2	0.0154	0.0199	0.9343	18.0816	2.9178	0.0288	4.4844	4.5560
NMBZ	2010q3	-0.0121	0.0516	1.2284	18.0246	2.9312	0.0217	4.5778	4.5543
NMBZ	2010q4	0.0070	0.1414	0.9794	18.4729	2.9444	0.0284	4.6689	4.5584
NMBZ	2011q1	0.0125	0.0768	1.0686	18.6800	2.9575	0.0339	4.6181	4.5733
NMBZ	2011q2	0.0229	0.1035	1.0871	18.6826	2.9704	0.0313	4.5686	4.5822
NMBZ	2011q3	0.0269	0.0398	1.0677	18.8592	2.9832	0.0373	4.6530	4.5907
NMBZ	2011q4	0.0329	0.0878	1.1038	18.9407	2.9957	0.0377	4.6149	4.6022
NMBZ	2012q1	0.0054	0.0000	0.3026	18.9301	3.0082	0.0335	4.5351	4.5857
NMBZ	2012q2	0.0170	0.1181	1.0956	19.0216	3.0204	0.0361	4.5314	4.5932
NMBZ	2012q3	0.0373	0.1140	1.0130	19.1454	3.0325	0.0395	4.5419	4.5974
NMBZ	2012q4	0.0420	0.1151	1.0067	19.2741	3.0445	0.0395	4.5407	4.6039
NMBZ	2013q1	0.0058	0.1345	1.1169	19.2995	3.0564	0.0437	4.4841	4.6128
NMBZ	2013q2	0.0122	0.2393	0.9680	19.4275	3.0681	0.0429	4.4974	4.6148
NMBZ	2013q3	0.0176	0.2235	1.5001	19.4373	3.0796	0.0388	4.5203	4.6086
NMBZ	2013q4	-0.0115	0.1969	1.2406	19.4083	3.0910	0.0425	4.5432	4.6087
NMBZ	2014q1	0.0043	0.2104	1.1835	19.3814	3.1023	0.0377	4.4168	4.6095
NMBZ	2014q2	0.0067	0.2001	1.1835	19.4390	3.1135	0.0508	4.4509	4.6130
NMBZ	2014q3	0.0055	0.1950	1.2205	19.5154	3.1246	0.0560	4.5570	4.6105
NMBZ	2014q4	0.0132	0.1702	1.2519	19.5073	3.1355	0.0586	4.6088	4.6034
NMBZ	2015q1	0.0079	0.1645	1.1636	19.6191	3.1463	0.0493	4.5602	4.5965
NMBZ	2015q2	0.0120	0.1490	1.0762	19.6842	3.1570	0.0500	4.5822	4.5853
NMBZ	2015q3	0.0200	0.1489	1.0454	19.6420	3.1676	0.0487	4.5706	4.5816
NMBZ	2015q4	0.0245	0.1268	1.1338	19.6470	3.1781	0.0470	4.5911	4.5757
ZB	2009q1	0.0101	0.0000	0.0811	17.4650	4.0647	0.0523	4.5275	4.5503
ZB	2009q2	-0.0534	0.0100	0.1723	17.4371	4.0690	0.0313	4.4141	4.5036
ZB	2009q3	-0.0409	0.0087	0.3736	18.0590	4.0733	0.0389	4.5151	4.5152
ZB	2009q4	-0.0604	0.0370	0.3919	18.1787	4.0775	0.0359	4.5476	4.5225
ZB	2010q1	0.0195	0.0250	0.6651	18.3748	4.0818	0.0353	4.4816	4.5429
ZB	2010q2	0.0165	0.0602	0.5616	18.6670	4.0860	0.0479	4.4844	4.5560
ZB	2010q3	0.0071	0.0510	0.7673	18.6886	4.0902	0.0429	4.5778	4.5543
ZB	2010q4	0.0228	0.0386	0.7661	18.8591	4.0943	0.0442	4.6689	4.5584
ZB	2011q1	0.0213	0.0402	0.9272	18.9542	4.0985	0.0443	4.6181	4.5733

ZB	2011q2	0.0333	0.0656	0.8806	19.0490	4.1026	0.0432	4.5686	4.5822
ZB	2011q3	0.0374	0.0456	0.8952	19.2031	4.1068	0.0473	4.6530	4.5907
ZB	2011q4	0.0365	0.0892	0.7625	19.2738	4.1109	0.0494	4.6149	4.6022
ZB	2012q1	0.0013	0.1350	0.8692	19.3474	4.1150	0.0513	4.5351	4.5857
ZB	2012q2	0.0095	0.3976	0.3661	19.3693	4.1190	0.0512	4.5314	4.5932
ZB	2012q3	0.0067	0.2096	0.7900	19.4479	4.1231	0.0520	4.5419	4.5974
ZB	2012q4	0.0209	0.2059	0.8609	19.4550	4.1271	0.0483	4.5407	4.6039
ZB	2013q1	0.0019	0.2010	0.8478	19.4664	4.1312	0.0525	4.4841	4.6128
ZB	2013q2	0.0042	0.2074	0.7686	19.5218	4.1352	0.0538	4.4974	4.6148
ZB	2013q3	0.0065	0.1594	1.0482	19.4567	4.1392	0.0495	4.5203	4.6086
ZB	2013q4	0.0047	0.0000	0.0000	19.4540	4.1431	0.0497	4.5432	4.6087
ZB	2014q1	0.0000	0.0000	0.6811	19.5054	4.1471	0.0513	4.4168	4.6095
ZB	2014q2	-0.0040	0.0000	0.6811	19.5586	4.1510	0.0705	4.4509	4.6130
ZB	2014q3	0.0013	0.2633	0.7529	19.5685	4.1550	0.0657	4.5570	4.6105
ZB	2014q4	-0.0007	0.4252	0.7789	19.5860	4.1589	0.0691	4.6088	4.6034
ZB	2015q1	0.0024	0.3194	0.7140	19.4804	4.1628	0.0474	4.5602	4.5965
ZB	2015q2	0.0069	0.3431	0.6804	19.5240	4.1667	0.0431	4.5822	4.5853
ZB	2015q3	0.0051	0.3889	0.5892	19.6403	4.1705	0.0498	4.5706	4.5816
ZB	2015q4	0.0108	0.3301	0.4743	19.6631	4.1744	0.0438	4.5911	4.5757