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DEDICATIONS

I dedicate this piece of work with gratitude and love to my parents, sisters (Joyce, Lucia, Esther, Patience and Rudo) and my only brother, Wilbert.

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I do not have enough words to thank my God for the gift of life that He has continuously given me up to this level to ensure the overall completion of this study. Had it not been for His love for me, this piece of work would not ever been done. The strength, good health, wisdom, revelation and understanding He has given me throughout this research are worth acknowledging.

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ABSTRACT

The study is an evaluation of capital adequacy ratios as indicators of bank performance with major focus on determining effectiveness of these capital adequacy ratios in indicating performance of banks. Twelve commercial banks formed the research population with secondary dataset obtained from end of year financial statements and annual reports for the period 2009 to 2012 based on judgemental technique. An explanatory research design was used in conjunction with an econometric panel regression model to establish the relationships between capital adequacy ratios and bank performance as well as to empirically investigate whether non-risk based capital ratios outperform their risk-weighted counterparts in indicating performance. Panel data obtained was presented in form of tables and was analyzed using regression analysis with the aid of an econometric statistical package. The GLS method used revealed that leverage ratio is more related to commercial bank performance than the risk-weighted ratio and gross revenue ratio is statistically insignificant in indicating bank performance. This relationship brought a revelation that simple measures of capital adequacy have better indicative power and provide useful financial information that regulators can use as a starting point in assessing financial condition of banks. For the period under investigation, non-risk based CARs; particularly leverage ratio outperformed the risk-weighted ratio in indicating bank performance in Zimbabwe. Bank regulators and commercial banks themselves can therefore derive substantial benefits from the use of simple capital ratios as a supplementary requirement. Overall, capital adequacy ratios alone were to a lesser extent effective in indicating bank performance pointing to the need to consider other variables that explain performance of banks. Therefore, policymakers should exercise great care not to too heavily rely on a single tool, but balance the benefits and costs of any indicator to leverage other policies at regulatory disposal.

LIST OF ACRONYMS

BCBS	Basel Committee on Banking Supervision
BIS	Bank for International Settlement
CAR	Capital Adequacy Ratio
EBA	European Banking Authority
ECB	European Central Bank
FDIC	Federal Deposit Insurance Corporation
FSI	Financial Soundness Indicators
GRR	Gross Revenue Ratio
IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
LVR	Leverage Ratio
POSB	People's Own Savings Bank
RBNZ	Reserve Bank of New Zealand
RBZ	Reserve Bank of Zimbabwe
ROA	Return on Assets
ROE	Return on Equity
RWA	Risk Weighted Assets
RWR	Risk Weighted Ratio

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CHAPTER ONE: INTRODUCTION

1.1 Introduction

This research will attempt to evaluate the use of capital adequacy ratios as one of the indicators of bank performance. In doing so, it will limit its focus to those aspects that directly address the determination of a bank's capital adequacy vis-à-vis the risk-weighted assets and total assets of banks in general and Zimbabwean commercial banks in particular. The research will try to look at the capital adequacy ratios of banks stretching from those well and adequately capitalized to critically capitalized banks for the period post dollarization. This chapter outlines the problem statement soon after a brief background of the study. Following problem statement are research objectives, research questions, significance of the study and scope of the study in that order. Finally, the chapter will close by a summary and organization of the study after assumptions; limitations and definition of terms have been presented.

1.2 Background of the study

Banks are a fundamental part of a nation's economy facilitating spending and investment thatstimulateeconomic growth. However, despite their important function in the economy, banks are at risk of failure. It has since been discovered that banks are the most regulated than any other financial institution because in case of failure, especially very large banks, the effects thereof can haveextensive implications as has been witnessed in the Great Depression and during the global financial crisis (Larson, 2011).

Risk-based capital adequacy ratios (CAR) as compared to non-risk-based CARs have long been a helpful tool for assessing the safety and performance of banks. Estrella, Park and Peristiani (2000) indicated that CAR gauges the safety and soundness of a bank and adds confidence to bank safety and soundness particularly during a crisis. However, some authors have argued that a sizeable and well capitalized bank may fall under if it does not manage its liquidity risk issues. This is evidenced by the collapse of Northern Rock and Beer Stearns banks of the USA that proved that profitability and capital are no defense against failure caused by liquidity risk as coined by Barfiled and Venkat (2012) in their liquidity risk management paper.

Internationally, previous studies on capital adequacy ratios mainly center on the influence of capital requirement on the riskiness of banks. For instance, Shrieves and Dahl (1992) shows that for banks that were undercapitalized according to regulatory standards, the minimum capital regulation was partially effective in forcing banks to increase their capital or decrease risks. Konish and Yasudab (2004) discover that in Japanese commercial banks implementing the capital adequacy requirement reduced risk taking and capital was negatively related to risk taking. Most researches carried out have been on financial stability of the overall financial system or the banking sector as a whole without a microanalysis approach to performance. For instance, IMF researches consider a macro-approach to bank soundness, analyzing data set of homogenousFinancial Soundness Indicators (FSI) comparable across countries over certain periods.

Other international researches have focused on capital ratios (risk-weighted, leverage and gross revenue) as predictors of bank failure or distress. Estrella et al (2000) found that the three alternative ratios perform equally well in predicting bank failure during one to two year horizons, with risk-weighted ratio performing better in longer horizons for United States banks. Buehler, Samandari and Mazingo (2009) focused their analysis of capital adequacy ratios as predictors of bank distress on the largest international banks. They find that total common equity to RWA ratio is a better predictor of distress followed by the ratio of Tier 1 capital to RWA. Buehler et al (2009) also noted that leverage ratios (capital to assets ratio) were related to the probability of distress although they did not provide any additional information about bank distress that risk-based capital ratios could have not already contained.

In Zimbabwe, there has been no systematic study of the capital adequacy ratio-bank performance relationship. Probably reasons might be ascribed to its late officialimplementation of the capital requirements for banking institutions in 1996 and financial information disclosure challenges, as compared to other countries. Nevertheless, researches have been mainly centered on the implications of minimum capital requirements on individual bank aspects such as lending, performance and risk management. For instance, Chikoko and Roux (2013) did a research on the impact of minimum capital requirements on commercial banks lending and found that rigid capital adequacy requirement have an undesirable impact on Zimbabwean commercial bank lending.

Mbizi (2012) also highlighted the view that there is a significant and positive relationship between commercial bank capitalization and its performance. However, these two research findings cannot be generalized to all banks since they had narrowed down to commercial banks only.

As per RBZ January 2009 monetary policy it was reported that, financial stability is a requirement for the economic health of Nations particularly during the outcome of the unfolding global financial crisis. To this effect, the RBZ and government as monetary authorities sort to improve the supervisory and regulation process in banking institutions in line with International best practices and financial sector developments. They implemented a number of measures intended at restoring confidence in the financial system, intensifying risk management systems in the banking sector and strengthening capitalization of banking institutions. All these measures were intended for rectifying challenges that bedeviled the banking sector and the economy at large during the 2003-2004 banking crisis and the 2007-2009 global financial crises. These challenges came in the form of income generation andpersistent liquidity problems, undercapitalization, abuse of corporate structures and bank regulations, poor board and senior management oversight (RBZ, 2010).

In light of these challenges, the Reserve Bank of Zimbabwe in cooperation with the government, responded by strengthening capitalization of banking institutions continuously changing the minimum capital requirements for banks from US$12.5 million for commercial banks to US$25 million then now to US$100 million. Following the introduction of the multi-currency system, the RBZ introduced a phased plan for enforcement of the arranged minimum capital requirements directing all banks to meet half of their prescribed capital levels by 30 September 2009 and 100% by 31 March 2010. Despite such an arrangement, some banks were still failing to subscribe to their full capitalization levels with 19 out of 24 banking institutions complying with the minimum capital requirement by 31 December 2010 (RBZ Monetary Policy, January 2011). The only way left for the RBZ was to extent capitalization deadlines to accommodate those banks that were failing to comply. From 31 December 2010, the deadline was extended to 30 June 2011 and by this date, 5 out of 25 operating banks (excluding POSB) did not comply with the prescribed minimum capital requirements. This response by the Central Bank is a clear indication that it places too much importance on bank capital adequacy alone as a way of strengthening financial stability. Its view is further reinforced by an announcement it made

inJanuary 2009 monetary policy presentation mentioning that banking institutions without capacity to maintain sufficient capital levels corresponding with their risk profiles on an on-going basis were to be shut down or put under curatorship. This is evidenced by the closure of Barbican Bank, Trust Bank and Royal Bank.

Capital adequacy ratio is the lowest amountof capital that needs to be put aside in a particular percentage to the risky assets the bank would contract. On the other hand, there is non-risk based capital adequacy ratio that simply measures the level of a bank's capital in relation to its total assets. However, risk-based CAR requirement, for more than twenty years, has been one of the principal regulatory mechanisms used to monitor banks. Presently, Anagnostopoulos and Buckland (2005) reviewed that most regulators around the world follow the Basel Accord, under which capital adequacy ratios are calculated by dividing a firm's regulatory capital by its risk-weighted assets. However, many researchers and banking practitioners have argued that capital adequacy ratios now have less significance due to the change from the historical-cost-based accounting regime to the fair-value-based system (Liao, 2013). On the contrary, capital held by a bank is considered as the loss and shock absorbing capacity of a bank and plays a central role in the smooth functioning of a bank. This capital must be sufficient to shield bank depositors and counterparties from the risks of the bank's on-balance sheet and off-balance sheet risks.

To be considered adequatelycapitalised under Basel I, a bank had to sustain a capital ratio of 8%, that is, the value of the bank's capital had to equal at least 8% of the value of the bank's risk weighted assets. However, Zimbabwe's financial system came under great pressure in 1998 with the fall down of the United Merchant Bank resulting in Reserve Bank of Zimbabwe increasing capital adequacy requirement for banking institutions, compared to the internationally conventional minimum ratio of 8%, (Zimbabwe financial report, 2010).

The core focus of this research is to determine the effectiveness of capital adequacy ratios in indicating bank performance. The research conducted about capital adequacy ratio has been inconclusive and has left the relationship between CAR and bank performance (soundness), which this study will seek to address. Gale (2010) noted that when common equilibrium effects are taken into account, it is not apparent that higher capital requirements will result in risk level reduction in the banking sector. Some critics argues that higher capital adequacy ratio might be an indication that a bank has a high risk profile and therefore capital adequacy ratio figure does

not necessarily tell much about performance of a bank. Therefore, this study is an attempt to answer the question: arecapital adequacy ratios good enough in indicating bank performance?

1.3 Problem Statement

The motivation of this study stems from the fact that emphasis is laid more in Zimbabwe, on regulation of capital adequacy ratios rather than the extent to which they reflect bank performance. Too much importance when evaluating bank performance is attached on risk-weighted capital ratios despite availability of other simple measures of capital adequacy. Some studies show that capital adequacy ratios are not related to bank performance and hence should not be used to monitor performance. Whereas others find that, they are powerful predictors of failure. Hence, this study is an attempt to provide solutions to this problem through evaluation of the relationships and effectiveness of various capital adequacy ratios in indicating bank performance.

1.4 Research Objectives

The main objective of this study is to determine the effectiveness of capital adequacy ratios in indicating bank performance. The other objectives are:

- to analyze types of capital adequacy ratios that are most relevant in indicating bank performance
- to examine the relationship between capital adequacy ratios and bank performance
- to determine whether simpler measures of capital adequacy that do not use risk weights do better than their risk-weighted counterparts as indicators of bank performance.
- to determine other indicators of bank performance in Zimbabwe

1.5 Research Questions

This research will attempt to answer the following questions:

- to what extent do capital adequacy ratios indicate bank performance?
- which types of capital adequacy ratios are most relevant in indicating bank performance?
- what nature of relationship exists between capital adequacy ratios and bank performance?
- which ratio is more indicative of performance – risk weighted or non-risk-based?
- Apart from capital adequacy ratios, are there any other major indicators of bank performance in Zimbabwe?

1.6 Significance of the study

This study seeks to give a detailed evaluation of capital adequacy ratios in indicating bank performance. A good appreciation of the relationships between capital adequacy ratios and bank performance will assist good policy formulation as well as capital regulation in the banking sector. Thus, this study will be of great importance to Bank Regulators in their policy formulation of minimum capital requirements for banks and defining the threshold at which to intervene in the management of failing banks. The study will also benefit commercial banks in capital preparation and maintenance; other researchers, accountants, economists and financial analysts in practice.

1.7 Scope of the study

This study will particularly focus on Zimbabwean commercial banks for the period post dollarization (2009-2012). Reference is going to be made to Basel II capital adequacy ratios.

1.8 Assumptions of the study

This study will have the following assumptions:

- Zimbabwe will continue using the multiple currency system throughout the research window period.
- All banks use the same risk-weighting techniques as proposed by the regulator.
- Bank financial statements information is a true and fair representation of banks' financial condition in accordance with IFRS, in the manner required by the Companies Act (Chapter 24:03) and Banking Act (Chapter 24:20).

1.9 Limitations of the study

In carrying out the study, the following limitations were encountered.

- Unavailability of complete data over the period under study in some instances limited the researcher to have a full sample of commercial banks in Zimbabwe. Some banking institutions did not have up to date financial statements and some were available but not audited. This limited the researcher into considering the period between 2009 and 2012 and a sample of 12 commercial banks that had audited financial statements publicly available.

- The researcher was also faced with time constraints as stipulated time for the completion of the study was too short to provide an in-depth research. The researcher had to strike a balance between the study, other courses and social activities. To ensure that this limiting factor does not have a significant bearing on the output of the research, social activities were foregone at the expense of the study and the researcher worked beyond normal working hours.
- This study is entirely dependent on secondary accounting data obtained from banks' annual financial statements. Hence, it is subject to all the limitations associated with published consolidated financial statements.

1.10 Definition of terms

Capital adequacy: Is a level of capital that banks are required to hold by the regulator in order to execute their business operations and absorb losses without ceasing trading.

Capital adequacy ratio: It is a measure of capital adequacy. Three types of CARs are measured: leverage ratio that compares capital to total assets, risk-weighted ratio that compares capital to risk-weighted assets and gross revenue ratio that compares capital to interest and non-interest income.

Risk-weighted assets: These are total assets of a bank after adjusted for their risk of loss or default, used for bank regulation.

Bank performance: It is a financial condition where a bank is not facing difficulties in meeting obligations to creditors and is synonymous with such terms as stability, soundness, productivity, survival and profitability.

1.11 Organization of the study

This chapter introduced the area of study and gave a brief background of the study highlighting the fact that most regulators are attaching too much importance on capital adequacy ratios as a measure of bank's financial stability. The major motivation for this study was alluded to the fact that emphasis is laid more in Zimbabwe, on regulation of capital adequacy ratios rather than the extent to which they indicate bank performance pushing the need to examine the effectiveness of these ratios as indicators of bank performance. It was shown that this research will be of importance to a number of beneficiaries, chief among them the Central Bank and commercial

banks. The chapter also gave limitations of the study as well as definition of key terms. Assumptions were then made and scope of the study identified. The rest of this study is organized as follows. Chapter two explains literature review, chapter three methodology, chapter four data presentation and analysis, and chapter five contains summary, conclusions and recommendations.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter is going to identify, discuss and evaluate literature related to capital adequacy ratios and bank performance. The relevant literature pertaining to CARs and performance is organized in conceptual subjects and in turn evaluated in detail. Various authors' views and arguments as well as international and regional studies pertaining to this area of study will be identified and evaluated. Much attention is given to those aspects, which answers the research questions and aid in achieving research objectives of this particular study.

2.2 Theoretical underpinning of capital adequacy

Over the past years, up until the 1970s, bank regulation lacked international contact as countries were left to discover how best to regulate banks that trade within their boundaries. In today's banking business, where banking activities are no longer restricted to the boundaries of any individual country, cross-border activities have increased swiftly bringing about a greater need for international collaboration in bank regulation (Larson, 2011). The Basel Committee on Banking Supervision (BCBS), as the international consultative authority, has stood firm to meet this need through guidance on regulation of bank capital that is among the vital issues to ensuring banking system stability, the world over.

Nevertheless, addressing the issue of bank capital regulation has been a continuing process over the past twenty-two years, and has resulted in the broadcast of capital adequacy standards (collectively known as Basel Accords) which various national regulators can apply (Larson, 2011). The Basel Committee, originally established in 1974 centered in the Bank for International Settlements, represents central banks and financial supervisory authorities of the major industrialized countries (the G-10 countries). The committee concerns itself with ensuring effective supervision of banks on a global basis and its prime interest has been in the area of capital adequacy ratios, (RBNZ, 2007). In 1988, the BCBS introduced the first Accord that provided for the execution of a credit risk measurement framework with a minimum capital standard of 8% of risk-weighted assets (RWA). This would signify that the value of the bank's capital had to equal at least 8% of the bank's RWA. Although the BCBS has no obligatory legal authority and was proposed for active international banks, since 1988 the framework has been

adopted by many countries and applied to all banks. According to Padoa-Schioppa (1996), Astudy conducted for 129 countries in Stockholm revealed that in 1996 above 90 percent of the 129 countries applied risk weighted capital adequacy requirements in keeping with the Basel Accord.

There has been substantial theoretical argue over incentives for banking institutions to adjust the risk profile of their assets under the Basel Accord (Mbizi, 2012). Against this background, there are two schools of thought. One school of thought asserts that capital requirements with differentiated risk weights offer an encouragement for banks to move from high-risk to low-risk assets if the gain allied with the lower capital charge more than offsets the lower yield on these assets. Thakor(1996) and Passmore and Sharpe (1994) established thata bank may swing from loans to securities as a result of an increase in a risk-based capital requirement. Furlong and Keeley (1989) argue that a value-maximizing bank will not increase its asset risk under more inflexible capital requirements.

On the other hand, the other school of thought hypothesizes thatthe 1988Basel Accord risk based capital requirements will result in banks taking more risk if capital requirements do not satisfactorilyrevealthe relative riskiness of assets and if there is information irregularity between regulators and rating agencies. The source of thishypothesis is that any asset category that bears identical proportional capital charge will encourage banksto move towards more risky assets in the category. If higher earnings on assets are not matched with an increase in capital, this will give banks an advantage to earn a higher return onriskier assets within the category(Mbizi, 2012). Banks might be able to increase the risk profile of the asset book fairly unchecked in the presence of information asymmetry with regard toquality of assets amongexternal parties. Kim and Santomero (1988) highlighted that asset replacement of this form is achievable within a portfolio model. The BCBS has acknowledged that the failure to distinguishsatisfactorily between credit risks within some assetcategories, led some banks intochanging their asset portfolios towards lower quality credits.

There is diverse empirical supportregarding the relationship between bank capital requirements and bank risk-taking. For instance, Sheldon (1996) carried out a study and found that US bank asset instability rose between 1987 and 1994 inboth banks that did not increase their capitalratios and those that increased. On the contrary, considering banks in Japan, higher capital ratios

tended to becoordinated by lower asset instability. Pyle and Gennotte(1991) found that risk-taking in banks increases following an increase in capital requirements. In the case of Nigerian banks, Ogere, Peter and Inyang (2013) finds a significant negative relationship between risk and capital adequacy ratio using banking sector data for a period of five years, from 2007 to 2011. This indicated that when risk level rises, capital adequacy ratio falls in the Nigerian Banking industry. Rob and Calem (1999) using banking aggregate data for 1984-1993, measured the impact of capital-based regulation ona cross section of United States banks. Rob and Calem (1999) found a U-shaped relationshipbetween risk taking and capital position: initially, banks that are undercapitalized take maximum risk and resort to less risk as their capital increases. However, as capital continues to rise,Calem and Rob (1999) find that a bank will take on more riskonce moreensuing in a U-shaped relationship.

2.3 Capital Adequacy Ratios defined

Capital has several meanings and its specific definition depends on the context in which it is used. The first proponents of capital were Modigliani and Miller. From an economist point of view, capital is that part of wealth that is used for production. In Accounting, capital is the net worth of the business, representing money invested in a business to generate income. Koch and MacDonald (2002) described capital as funds subscribed and paid by stakeholders representing ownership in a bank. Choudhry (2011) attempted to generalize the definition of capital from a bank perspective and he mentioned that bank capital is the difference between the assets and liabilities on its balance sheet, and is the property of bank owners used to meet any operating losses incurred by the bank. Overall, capital has to do with the source as well as the use of funds.

Regulators and researchers have differentiated between economic capital and regulatory capital. These two terms have frequently been used in the analysis of new framework for capital regulation introduced by the BCBS. Elizalde and Repullo (2004) defined economic capital as that level of capital which shareholders would choose in the absence of capital regulation, and regulatory capital as the minimum amount of capital that regulators would require from any financial institution. Choudhry (2011) however postulated that regulatory capital is comprised of those elements in a bank's balance sheet that are appropriate for calculation of capital ratios. However, for the purpose of this study a distinction between the two does not bring any

significant impact because the researcher will bring into attention various types of capital adequacy ratios that capture each of the components.

On the other hand, capital adequacy, as indicated by Kishore (2007) represent a total amount of funds that a financial institution should uphold and plan to maintain in order to conduct its business in a prudent manner. Adequate capital is the least amount necessary to stir confidence in banks and effectively fulfill the principaltask of preventing bank failure by absorbing losses without being strained into costly liquidation and enable banks to take advantage of profitable growth opportunities (Akintoye, 2008). Kosmodue (2009) supports Akintoye's point of view by his definition that capital adequacy is the sufficiency of the amount of equity to absorb any shocks the bank may experience.

Subsequently, capital adequacy ratio as indicated by BIS (2008) is a measure of the amount of capital that a bank should hold in proportion to risky assets to shield depositors and advance stability and efficiency of the financial system.However, this definition is regulatory centered and limited to risky assets only. Given the classification of CAR denominator as either risk-weighted assets or total assets or gross revenue the BIS definition does not sufficiently cover the non-risk based component of capital adequacy. As such, Estrella et al (2000) and Okezie (2011) defined three types of capital adequacy ratios based on the same measure of capital (Tier 1) applied in the numerator of all the three ratios. These ratios together with a range of capital ratios that include different types of capital and assets as brought forward by Buehler, Samandari and Mazingo (2009) are explained hereunder.

2.3.1 Risk-weighted Capital Adequacy Ratios

Estrella et al (2000) defined risk-weighted ratios as ratios that are scaled by total assets after they have been adjusted for their loss or default (that is, RWA). They are used for bank regulation with guidance from the Basel Accords. These ratios take RWA as the denominator of each ratio that falls under the risk-weighted category but assumes varying amounts of capital in the numerator.

$$\textbf{Risk-Weighted CAR} = \frac{\textbf{Capital Base}}{\textbf{Risk Weighted Assets}}$$

Estrella et al (2000) regard risk-weighted ratios as the most complex than the leverage and gross revenue capital ratios due to their use of risk weighted assets which are complex to calculate. The different forms in which capital (the numerator) can take when calculating this ratio defines different types of risk-weighted ratios banks are required to calculate by their regulators.

2.3.1.1 Core Tier 1 Ratio

Core Tier 1 ratio compares a bank's total core equity capital to its total risk weighted assets. Mayes and Stremmel (2012) described Tier 1 ratio as a risk-based measure of capital adequacy used to determine the amount of losses a bank can absorb before shareholder equity is wiped out.Reserve Bank of New Zealand (RBNZ), (2007) reinforcesMayes' view indicating that core capital is capital that is permanently and freely available to absorb losses without the bank being obliged to cease trading.

$$\mathbf{CoreTier1Ratio} = \frac{\mathbf{Tier1Capital}}{\mathbf{RiskWeightedAssets}}$$

Basel Committee on Banking Supervision (BCBS), (2004) defined Tier 1 capital to include equity capital and disclosed reserves less such items as goodwill. Central banks of different countries require a certain percentage of core capital to a bank's total capital base. As per Reserve Bank of Zimbabwe (RBZ), ratio of Tier 1 capital for all banks should be 8%, 2% higher than that of OECD countries, (FDIC, 2013). However, Yang (2012) argues that deduction of goodwill to tier 1 capital, not common equity led to overstatement of quality of capital and that capital requirements were not proportionate with risks taken by banks particularly those realized in a strained environment.

2.3.1.2 Tier 1 and Tier 2 Ratio

This is a risk-based measure of capital adequacy that combines Tier 1 and Tier 2 capital and is expressed as a percentage of total risk weighted assets (Buehler, Samandari and Mazingo, 2009). Tier 1 and Tier 2 ratio determines the capacity of the bank in terms of meeting the liabilities and other components of risks such as credit risk and operational risk. Tier 2 or supplementary capital absorbs losses only in the event of termination of a bank and take part after Tier 1 has

been lost by the bank (Kosmodue, 2009). An example of Tier 2 capital is subordinated debt. Buehler et al (2009) provided the definition of this ratio as follows:

$$\mathbf{Tier1andTier2Ratio} = \frac{(\mathbf{Tier1} + \mathbf{Tier2Capital})}{\mathbf{RiskWeightedAssets}}$$

The just mentioned two ratios proposed by Estrella, Park &Peristiani (2000) and Buehler et al (2009) are risk-based capital adequacy measures as they compared a bank's capital to its RWA not to total assets. In this regard, Basel Committee on Banking Supervision (BCBS), (2011) in its effort to strengthen capital buffers against losses in banking institutions, developed a leverage ratio which utilizes total assets of a bank instead of the sophisticated risk-weighted assets.

2.3.2 Leverage Capital Adequacy Ratio

Larson (2011) pointed out thatcomplication of risk-weighting methodology as well as the flaw of regulatory arbitrage paved way for a simple capital adequacy ratio (leverage ratio) that compares a bank's capital to its total tangible assets. Hulster (2009) in his World Bank Crisis response article reported that banks' extreme leverage was believed to have somewhat caused the 2007-2009 Global Financial Crisis resulting in the International community proposing a non-risk-based capital measure to complement the minimum capital requirements (BIS, 2013). Hulster (2009) identified three leverage types for banks – balance sheet (assets exceeding equity base), economic (exposure to change in the value of a position greater than the amount paid for it) and embedded (exposure larger than the underlying market factor) – stressing the point that it is impossible to have a single measure that can capture these three dimensions at once.

The leverage ratio compares either total common equity or core Tier 1 capital or combined Tier 1 and Tier 2 to a financial institution's total assets (Yang, 2012), Estrella et al (2000) and Buehler et al (2009). This grading brings about three types of leverage ratios – total common equity, Tier 1 and (Tier 1 and Tier 2). Due to the idea that total assets derived from banks' financial reports are used instead of the sophisticated RWA, leverage ratio is regarded as a simple capital adequacy ratio intended to act as a probable supplementary measure to the risk-based capital requirements. Estrella, Park, &Peristiani (2000) and Mayes and Stremmel (2012) found that leverage ratios are better indicators of bank performance, which view however runs contrary to that of RBNZ(2011) which argues that the leverage ratio imposes redundant cost on banks and do not add nothingconstructive to sophisticated measures as they view it as a basic measure. In

addition, Buehler, Samandari and Mazingo (2009) provide empirical evidence that although leverage ratios on anindividual basis have some bank distress indicative power, they do not have any marginal power in addition to risk-weighted CARs. Little or no benefit is derived from introducing leverage ratios to a banking society that is already subjected to risk-weighted ratios.

2.3.3 Gross Revenue Capital Adequacy Ratio (GRR)

Okezie (2011) and Estrella et al (2000) defined gross revenue CAR as follows:

$$\mathbf{GRR} = \frac{\mathbf{TCEorTier\ 1\ Capitalor\ (Tier\ 1\ + Tier\ 2\ Capital)}}{\mathbf{GrossRevenue}}$$

The numerator of the ratio can be either total common equity (TCE) or Tier 1 capital or combined Tier 1 and Tier 2 capital expressed as a percentage of gross revenue, the denominator. Gross revenue represents interest income and non-interest income before deductions of any expenses (Estrella et al 2000). Gross revenue capital ratios were found to predict bank failure in the same way as complex risk-weighted ratios during one or 2-year horizon (Estrella et al, 2000). A study on Nigerian banks for the period 1991-2004 by Okezie (2011) reviewed that risk-weighted, leverage and gross revenue capital adequacy ratios significantly predict bank performance and that there is no considerable difference in terms of efficiency of the three capital ratios in predicting distress.

Overall, it is clear that capital adequacy ratios provide useful information in relation to the capital adequacy of any banking institution, which information regulators can then use as a starting point in assessing the financial condition of banks. Jacobson et al (2002), to be considered adequately capitalized under Basel I the value of the bank's capital had to equal at least eight percent of assets weighted by their estimated risk. Sundarajan (2001) describes capital adequacy ratio as alogical construct that cannot be directly derived from standard financial statements because it has complex definitions of its two variables, that is capital and RWAs. He further articulated that national practice discrepancy in terms of identification of loan losses, loan loss provisioning and valuation of assets as well as national bank regulators autonomy in defining adjustments and weights makes it hard to directly weigh against capital adequacy ratios

between countries. However, this study particularly focuses on Zimbabwean banks only hence this challenge is of no use, the ratios can be compared from one bank to the other since they use the same definitions of capital and RWA provided by the same regulatory authority - RBZ.

2.4 Major Components of Capital Adequacy Ratios

Various countries bank regulators have Capital Adequacy Frameworks that sets an approach for computing regulatory CAR and the levels of those ratios at which banking institutions are required to operate. Common to all the Capital Adequacy Frameworks is that they are developed based on internationally agreed standards on capital adequacy promulgated by the Basel Committee on Banking Supervision (Jacobson, 2011). As commonly highlighted by the above formulas, capital adequacy ratios have two components, that is, capital base and asset base.

2.4.1Capital Base

Capital base component comprises of Tier 1 capital and Tier 2 capital as provided by Basel II. The amount of capital shown in bank balance sheet needs some adjustments to allow for the calculation of risk-based capital adequacy ratios. Two types of capital are therefore measured and definitions of these is adopted from Basel Capital Accord (1988) and Brash (2001).

Core Tier 1 capital refers to that level of capital that is freely and permanently available to absorb losses withoutthe bank being indebted to close down (RBNZ, 2007). Under Basel III, Tier 1 capital includes common equity Tier 1 and additional Tier 1 capital. Common equity Tier 1is the loss-absorbing highest quality equity capital consistingretained earnings, paid-in capital and disclosed reserves.Tier 1 capital is important because it safeguards both the survival ofthe bank and the stability of the financial system. The Basel committee originally considered equity capital and disclosed reserves as the key element of capital upon which importance should be placed (Larson, 2011). By equity capital, they meant issued and fully paid ordinary shares/common stock and non-cumulative perpetual preferred stock. Notwithstanding, the emphasis on equity capital and disclosed reserves, member countries of the Basel Committee have considered a number of other essential constituents of a bank's capital base which may be included in the system of measurement, (BIS, 2005). To this end, according to cross-sectional research of member countries' and other countries that have adopted the Basel rules, varying constituents of bank capital are now included in the system of measurement. For instance, the

Reserve Bank of New Zealand stipulated general provision for bad debts and subordinated debt in its banks' capital base whereas in Zimbabwe subordinated debt is not included (RBZ, 2009).

Tier 2 or supplementary capital is capital that generally absorbs losses only in the event of a winding-up of a bank, and so provides a lesser level of protection for depositors and other creditors (Kosmodue, 2009). Tier 2capital is sub-divided into upper and lower tier two capital. Upper tier two capital has no fixed maturity, while lower tier two capital has a limited life span, which makes it lesseffective in providing a defense against losses by the bank. An example of tier 2 capital issubordinated debt. In the event of a winding-up, all other creditors are repaid first before subordinated debt holders are repaid (Willkie and Gallagher, 2012).

2.4.2 Asset Base

Asset base is categorized into two, that is, risk-based and non-risk-based. Risk-based assets are termed risk-weighted assets. It has been noted that scholarly literature on bank capital is immense, but focus on risk-weighted assets is more narrow, (Le Leslé and Avramova, 2012). Kellarmann and Schlag (2012) identified three determinants of total RWA:

- capital requirements for market risk (market RWA)
- risk-weighted assets for credit risk (credit RWA)
- operational risk.

However, Kellarmann and Schlag (2012) argued that operational risk is not derived directly from assets; it is the risk of loss arising from inadequate or failed internal processes, people andsystems, or from external events. All bank assets are subject to risk weighting before being classified as RWA(Larson, 2011 and BIS, 2004). Estrella et al (2000) assert that risk weighting requires banks to charge more capital for riskier assets discouraging them from holding risky assets. Banks, as a means of responding to the risk reducing incentives, will increase the risk-weighted ratio without correspondingly raising capital. On the other side, failure to respond will direct to a low risk-weighted ratio. Thus, the ability of risk-weighted ratio to distinguish between risky and safe banks and predicting bank performance depends on the accurateness of risky weights to reflect the riskiness of assets, than other simple capital ratios (Estrella et al, 2000). Furthermore, Larson (2011) indicated that the risk-weighting methodology had a major flaw in that it caused regulatory arbitrage that may lead to detrimental economic effects.

On the other hand, non-risk based assets are those that have not been risk-weighted and they represent total tangible balance sheet assets (Okezie, 2011). Such assets are compared with various definitions of a bank's capital under leverage ratios.

2.5 Overview of Bank Performance in relation to Capital Adequacy

Bank performance is not easy to define and even to measure especially given the complex nature of the financial system, interdependence and the complex connections of different essentials of the banking system among themselves and with the real economy (Petrovska and Mihajlovska, 2013). Against this background, bank regulators, researchers and practitioners have failed to reach an agreement on a widely accepted or uniform definition of bank soundness. The definition can vary from one jurisdiction to another. Some researchers define bank performance as a measure of economic development and financial growth of a country while others say that achieving stability in banking is just the start of a sound banking system. ECB (2010) defines bank performance as the ability of a bank to produce sustainable profitability driven mainly by risk-taking, earnings and efficiency.

Gaur and Julee (2012) mentioned that soundness of the banking system reflects the economic development of the economy. Their argument is consistency with that of Vaithilington, Nair and Samudra (2006) who concluded that bank soundness is important for economic development of the country after they empirically examined impact of six key drivers of bank soundness (ICT infrastructure, integrity, strategic partnership, institutions, innovation and intellectual capital) on soundness of banks using a sample of developed, developing and underdeveloped countries. Davies (2010) on the other hand is of the view that bank performance gives some signal of how financial problems would be transmitted to the real economy. Makkar and Singh (2012) asserts that soundness (solvency) of banks means the ability of the bank to meet its long term fixed costs and accomplishing long term development and growth plans. They likened bank soundness to solvency highlighting that the better the bank's solvency position, the better it is financially.Subsequently, soundness of a bank is identical with profitability, survival, efficiency, stability, productivity, safety and a shock free environment as postulated by Loannidis et al (2009). In addition, a sound bank should comply with the set of regulations leading its operations and must also be firm, robust andsteady.

The aforementioned explanations indicate that bank soundness is indeed a broad term covering so many elements that are inter-twined for the overall survival of a bank. Observing individual aspects or elements alone to determine performance of a bank will not only reflect a biased and false picture about that bank but it will put it on jeopardy (European Central Bank, 2010). For instance, a bank that has reliable access to sufficiently source funds timeously and cheaply does not necessarily mean that it is sound because it can have difficulties in terms of capacity to utilize those funds to meet its obligations as they fall due. Moreover, a bank may be profitable and well capitalized but without having access to cash or credit. History shows that profitable ventures can go into liquidation for lack of cash because if creditors put much pressure on little cash reserves, the company may be forced to sell its assets at low prices. Hence it is critical to develop a mutual form of bank performance analysis than to solely rely on a single indicator.

2.6 Measures/Indicators of Bank Performance

The most importantobjective of banks today is to sustain stability and make definite they are cushioned against environmental shocks whilst at the same time being internally sound, Kumar, Harsha, Anand and Dhruva (2012). Kumar et al (2012) advocated for the importance of measuringperformance across various banks in a country to create an environment that result in a consistently stable financial system. Many bank regulators, credit rating agencies and researchers of different countries have come up with models of measuring bank performance both on micro and macro basis. However, a significant number of researchers and bank regulators have evaluated banks' performance based on the CAMELS model. For instance, papers by Prasad, Ravinder and Reddy (2011) and Chowdhury (2011) both used the CAMEL model in evaluating Indian Banks performance. CAMEL model was formerly developed in the United States to classify a bank's overall state. It involves analysis of six groups of indicators of bank soundness - capital adequacy, asset quality, management efficiency, earnings, liquidity and sensitivity to market risk (Hilbers et al, 2000). For each CAMELS parameter, there are different financial variables (ratios) that are used as proxies to measure the overall financial condition of the bank as highlighted hereunder.

2.6.1 Equity to Total Assets Ratio

Equity to total assets ratio is a ratio that determines the amount of assets funded by shareholders and owners' equity. The higher the ratios, from a long-term point of view, the better it indicates

sound financial position of an institution (Makkar and Singh, 2012). A bank that has a greater proportion of its assets funded by equity implies that it rely less on external sources of finance.

Ioannidis, Pasiuras and Zopounidis (2009) used this ratio to indicate capital strength of a bank when they assessed bank soundness using a sample of 944 banks from 78 countries under the CAMEL approach. Their inclusion of a proxy to measure capital strength was justified by their argument for the importance of capital which they stated as a first line of defense against the risk of bank's insolvency, as any losses a bank suffers could be written off against capital. Theodore (1999) who postulated that capital allows the leveraging of a bank's growth and diversification supported their line of thought, and a tight solvency position wouldbe an obstacle to do so. However, some authors have criticized the use of equity to total assets ratio as a measure of bank stability and advocated for a capital adequacy ratio which according to MacDonald and Koch (2006) signals the institution's ability to maintain capital in line with the nature and extend of all types of risks, and the management's ability to manage these risks. The fewer number of researchers who used equity total assets ratio in the past may be, in part, the reason why it is not widely accepted compared to other indicators.

2.6.2 Capital Adequacy Ratio

Capital adequacy ratios measures the amount of capital a firm has in proportion to either its risk-weighted assets or total assets, Estrella et al (2000) and Kumar et al (2012). The International Monetary Fund (IMF) encourages the use of risk-based CAR as an indicator of financial soundness and it mentioned that data for this ratio are compiled in accordance with the guidelines ofeither Basel I or Basel II. It highlighted that capital adequacy and availabilityultimately determine the degree of robustness of financialinstitutions to withstand shocks to their balance sheets.Kumar et al (2012) analysed twelve Indian banks performance over a period of eleven years (2000-11) using a CAR, which they defined as

$$\mathbf{CAR} = \frac{(\mathbf{Tier\ 1\ Capital} + \mathbf{Tier\ 2\ Capital})}{\mathbf{RiskWeightedAssets}}$$

In their analysis, they concluded that proportion of capital to the level of risk contracted by a bank is a better measure of performance than to look at the proportion of capital to total assets as advocated by Ioannidis et al (2009). Presently, the RBZ has prescribed a minimum capital adequacy ratio of 12% to be maintained by all banking institutions on an individual basis.

However, some regulators and researchers have utilized core Tier 1 ratio (Tier 1 Capital/RWA) instead of comparing both Tier 1 and 2 to RWA.

2.6.3 Non-performing Loans (NPL) to Total Loans

In addition to the aforementioned bank performance indicators, regulators have also used NPL to total loans ratio. However, definition and classification of NPL differ from one jurisdiction to the other. Overall, Van Greuning and Bratavonic (2003) defined a NPL as an advance or loan by a financial institution that is not earning income and full payment of principaland interest is no longer anticipatedor thematurity date has passed and payment in full has not been made. Flexibility in terms of using this ratio is constrained by the fact that information pertaining to NPLs and total loans is confidential and sensitive as it has a bearing on bank reputation and reputation (Chikoko et al, 2012). Notwithstanding this challenge, the ratio of non-performing loans has been accepted and widely used as a measure of asset quality for banking institutions. Guy (2011) agrees that the ratio of NPL to total loans has been widely used to measure asset quality. A higher NPL ratio is negatively related to bank performance and unfavorable to the overall stability of the bank hence directly related to bank failure.Sangmi and Nazir(2010) argue well that lower non-performing loans to total loans ratio reflect a quality portfolio and is most preferable.

2.6.4 Capital to Assets Ratio

This ratio should be more than 4% according to International Monetary Fund guidelines. It provides an assessment of the proportion of a bank's assets in relation to its capital, Buehler et al (2009). The higher the ratio indicates that more of internally generated funds and long-term sources of funds have been invested in assets, hence improve performance. However, given the risky nature of banking business, management of today do not care most about the proportion of total assets to capital level. They are interested in the level of capital that they should hold in commensurate with their risk profile, hence capital to assets ratio is a weaker indicator of bank performance.

2.6.5 Return on Assets

Earnings of a financial institution are reflected by its level of profitability and to measure profitability, return on assets (ROA) ratio is used. Rose and Hudgins (2010) provided the

definition of ROA as net income divided by total assets reflecting the ability of management to generate income from assets. It is the principal indicator of managerial efficiency indicating how capable management has been in converting assets into net earnings. Therefore, a lower ROA ratio signifies inefficient use of assets whereas a higher ROA is favourable to any firm. Rose and Hudgins (2010) argued that although in theory, stock price bahaviour is the best indicator of a financial institution performance this indicator is often not available for smaller banks whose stock is not actively traded in the market therefore financial analysts rely on market-value indicators in the form of various profitability ratios such as ROA and ROE. Wanzenried andDietrich (2011) pointed out that banks with a lower leverage ratio (higher equity) usually record a higher ROA but a lower ROE. A number of researchers have used this ratio and many regulators believe ROA is thebest measure of bank profitability (Hassan and Bashir, 2003). In addition, Rivard and Thomas (1997) in Olalekan and Adeyinka (2013) suggest that bankprofitability is best measured by ROA in that high equity multipliers do not disfigure ROA and ROA representsa better measure of the ability of the firm to generate returns on its portfolio of assets.

$$\mathbf{ReturnonAssets(ROA)} = \left(\frac{\mathbf{Netincome}}{\mathbf{TotalAssets}}\right)$$

2.6.6 Return on Equity (ROE)

Useful information about the profitability of a bank is provided by the ROA, but some would argue that bank owners do not care most about this, what they are much concerned with is the return on their equity investment which is an amount measured by the return on equity (ROE). Return on equity is an alternative measure of overall bank performance and is a common measure of the return to shareholders from the investments made in the firm. It measures how well management is attaining the goal of owner wealth maximization. Madura (2008) defines this ratio as net income divided by total shareholders' equity. Like ROA, ROE indicates managerial efficiency but in this case, in utilizing investor's funds. European Central Bank (ECB) (2010) reported that ROE on a stand-alone basis is not a good measure of performance, it is not risk-sensitive as other elements of risks such as proportion of risky assets, and solvency situation are not included in the ROE figure.

$$\mathbf{ReturnonEquity(ROE)} = \left(\frac{\mathbf{NetIncome}}{\mathbf{TotalEquity}}\right)$$

2.6.7 Net Interest Margin (NIM)

Bank performance is highly influenced by the interest payments earned on its assets (loans) relative to the interest paid on its liabilities (deposits), (Madura, 2008). NIM is a measure of the difference between interests payments received from borrowers (debtors) versus interest paid to lenders (creditors) in relation to those assets that are capable of generating a return. Gul et al (2011) define NIM ratio as the net interest income divided by total earning assets. Madura (2008) indicated that NIM in some cases include only the earning assets and exclude any assets that do not generate a return to the bank. Therefore, higher NIM reflects greater performance in interest earning assets. Nevertheless, Khrawish (2011) reasons that a higher net interest margin could be a reflection of riskier lending practices associated with substantial loan loss provisions.

$\mathbf{NIM} = \left(\frac{\mathbf{NetInterestIncome}}{\mathbf{Assets}}\right)$, net interest income is found by subtracting interest expenses from interest income.

2.6.8 Liquid Asset Ratio (LAR) and Loan to Depositor Ratio (LDR)

Following the recent global financial crises, liquidity can turn out to be a very significant problem for banks and hence it requires superiorconsideration. Liquidity is the ability of a bank to meet its obligations as and when they fall due and liquidity risk is the risk that a bank will not have adequate liquid assets to meet current obligations (Golin, 2001). To measure the level of liquidity and capture its impact on bank performance, LAR and LDR are used. Findings on the relationship between liquidity and profitability are mixed among researchers. For instance, Molyneux and Thorton (1992) found a negative relationship between profitability and liquidity whereas Dang (2011) postulates that adequate liquidity is positively related to profitability. Reason for the difference in their findings is explained by the difference in the proxies they used to measure liquidity. Nevertheless, Shen et al (2009) is of the view that a higher loan to deposit ratio or lower liquid asset ratio implies a lower probability of a bank to meet demand in loans. It has been noted that not all researchers have made use of these two ratios in measuring liquidity.

Loannidis et al (2009) used liquid assets to customer and short term funding ratio in their research. On the other hand, Ilhomovich (2009) used cash to deposit ratio in measuring Malaysian banks liquidity.

Overall, due to a greater number of researchers and regulators who have used and proposed ROA ratio as a measure of performance, it can be concluded that return on assets ratios among other financial ratios is the best indicator of bank performance. In many cases where the ratio was used, consistent and reliable results were obtained. This study in turn will also rely on this ratio as a measure of bank performance.

2.7 Empirical Literature Review

Empirical literature provided by different authors and researchers in different countries in relation to the subject under study is analyzed below. This empirical literature will further enlighten and provide guidance on the type of methodology appropriate for this study.

2.7.1 Indicators of Bank Performance

Ioannidis, Pasiuras and Zopounidis (2009) and Kumar, Harsha, Anand and Ghruva (2012) were notable researchers that used CAMEL approach to assess bank soundness across various countries and India respectively. Ioannidis et al (2009) used a sample of 944 banks from 78 countries in assessing bank soundness. They selected financial variables that proxy four of the five components of CAMEL approach leaving out the management component due to its complexity in terms of measurement. Apart from those proxies of the four components, they included bank size as well as regulatory and other country-level variables. Ioannidis et al (2009) used the equity to total asset ratio as an indicator of capital strength. Kumar et al (2012) however criticized the use of equity to total assets ratio and introduced the use of capital adequacy ratio as a measure of capital adequacy. They argued that strength of a bank's capital is not significant enough in measuring soundness but what matters is the proportion of a bank's capital to the level of risk it will contract.

Makkar and Singh (2012) used a Bankometer Model in evaluating financial performance of 37 Indian commercial banks for the period between 2006-07 and 2010-11. They preferred this model, which was developed under the guidelines of IMF (2000), because they argued that it checked the vulnerabilities of financial distress of banks better than the usual methods like Stress Tests and CAMELS. Using an exploratory research design and secondary data from financial

statements, journals, Reserve bank publications, they derived Bankometer ratios from CAMELS and CLSA stress tests parameters. They made some few modifications to the selected ratios in order to blend the measurement of bank soundness. Six Bankometer parameters were used each with a given percentage range: CAR, Capital to Asset ratio, Equity to Total assets, NPLs to Loans, Cost to Income and Loans to Assets ratio. These were then used to formulate Bankometer ratio where solvency (S) was a function of the Bankometer parameters (IMF,2000&Sher, et, al, 2010) in Makkar and Singh (2012). Soundness of banks was then measured using their solvency where banks with an S figure above 70% were solvent and those with S less than 50% were insolvent. Solvency results revealed that all banks had sound financial position as all had Solvency score more than 70%.

Yuanjuan and Shishun (2012) carried out a study in China to evaluate the effectiveness of CAR regulation. Multiple linear regression model was used to analyze the relationship between CAR and bank performance of China's 14 listed banks over a period of five years (2005-2010) using secondary data. CAR was the dependant variable with ROA, ROE, EPS, Deposit-Loan ratio and NPL ratio as explanatory variables. Yuanjuan and Shishun (2012) study revealed a significant positive relationship between CAR and ROA and Earnings per share, whereas, CAR was negatively correlated to NPL ratio and deposit-loan ratio. Overall, they found a positive relationship between bank performance and CAR.

2.7.2 Capital Adequacy Ratios and bank performance

Barriors and Blanco (2000) reported that capital accounts represent a small proportion of a bank's financial resources and it plays an important part in the long-term financing and solvency of a bank. As mentioned earlier, capital performs several functions but an agreement exists among researchers that the elementary function of capital is to guide against losses uncovered by current earnings and to protect depositors and creditors in the event of liquidation,Olalekan and Adeyinka (2013). Therefore, it can be concluded that capital is very much crucial for any firm's performance and as such it should be adequate but however there are different opinions among experts as to what constitute adequate capital of which at the present moment there is no consensus in sight in regard to this issue. Thus, as noted by Nwanko (1991) in Olalekan and Adeyinka (2013), the issue of what make up adequate capital for banks has a long history and is nearly as old as banking itself. Nevertheless, different authors and researchers have attempted to

define capital adequacy and Kishore (2007) described it as a total amount of funds that a bank should set aside and plan to maintain in order to carry out business in a prudent manner.

Bank performance is the opposite of bank failure or distress and there are various researchers in different countries that carried out studies on capital adequacy ratios as predictors of bank failure and/or distress. Notable among them include Estrella et al (2011), Buehler et al (2009) and Okezie (2012). Using secondary data obtained from Call Reports for the period 1988 to 1992 of US insured commercial banks, Estrella et al (2011) examined the predictive power of three capital ratios – risk-weighted, leverage and gross revenue – on bank failure. Their simple frequency distribution analysis and parametric model of bank failure revealed that the three alternative capital ratios predict bank failure evenly well. They found that CARs are significantly related to bank performance using cross-section logistic regression analysis.

Okezie (2011) in Nigeria carried out a similar study to that of Estrella et al (2000) from 1991 to 2004. OLS regression, Granger causality test and autoregression were used to analyze data and results show that capital adequacy ratios do not differ significantly in their level of efficiency in predicting distress. However, Okezie (2011) results are consistent with those ofEstrella et al (2000) in shorter horizons but runs contrary in longer horizons (2 years and above) where Estrella et al (2000) found that leverage and gross revenue ratios are not good predictors of distress.

Closing following the researches of Okezie (2011) and Estrella et al (2000), is the study done by Buehler, Samandari and Mazingo (2009). Buehler et al (2009) focused their analysis of the relationships between capital ratios and bank performance on the largest global banks. Logistic regression was used and the Gini coefficient to examine the relationship between bank performance and CARs and to compare one ratio to another respectively. Unlike Estrella and Okezie who used leverage, gross revenue and risk-weighted ratios, Buehler et al (2009) made use of risk-weighted and leverage ratios only. Their results show that risk-weighted ratios (particularly TCE to RWA ratio) are best predictors of performance. Leverage ratios were found to have useful predictive powers only in the absence of risk-based capital ratios.

Furlong and Keeley (1991) asserts that capital ratios in their keyrole of measuring capital adequacy cannot on a separate basis form a basis upon which performance is measured. They argued that the effect of capital adequacy on bank performance highly depends on the prevailing

regulatory body in the country and on such factors as competition, more depositors, profit maximization, less distress incidences, less fund costs, risk in portfolio interest as well as bankrupt avoidance and their negative externalities among other factors. Furthermore, in determining bank performance in relation to its capital adequacy (proxy by CARs), Barrios and Blanco (2000) in Okafor et al (n.d) mentioned that a number of variables have to be taken into account and these include bank's managerial quality and productive efficiency that depends largely on the degree of competition in the industry. They pointed out that it is in the effective ability of bank management to manage capital that determines how adequate the capital is, which capital then contributes to performance.

Okafor et al (n.d) argues that capital adequacy ratios is primarily concerned with credit risks and having CARs beyond the minimum levels recommended by the Basel Capital Accord does not warranty safety and soundness of a bank. A bank that is impervious to credit risks indicated by higher CAR does not necessarily mean it is profitable because it might be prone to liquidity, market, operational and other inherent risks. Their line of thought was supported by Brash (2001) who identified other types of risks that are not recognized by CARs, for instance, inadequateinternal control systems. Subjectively, Brash's argument might not apply now, considering that Basel II capital adequacy ratios capture the operational risk component. Be that as it may, Brash (2001) concludes that CARs are only as good as the information on which they are based and should not be interpreted as the only indicators essential to judge bank financial performance.

Moreover, there are a considerable number of studies carried out across countries especially Nigeria, with regard to capital adequacy and bank profitability. Olalekan and Adeyinka (2013) found a non-significant relationship from primary data and a positive significant relationship from secondary data analysis between capital adequacy and bank profitability in Nigerian banks for the period between 2006 and 2010. Another research in Nigeria by Yunisa and Omah (2013) recommends banks to comply with minimum capital requirements to ensure efficiency in performance because their study revealed that the higher the CAR, the greater the unexpected losses it can absorb.

Charles and Kenneth (2013) studied the impact of capital adequacy on financial performance of commercial banks in Nigeria for the period 2004-2009 using time series and cross-sectional

secondary data. Panel data model was then used to estimate the relationship between return on assets, capital adequacy ratio, loans and advances, NPL and liquidity. Their results reviewed that for the period under study, capital adequacy positively influences bank performance but loans and advances negatively impacts bank profitability. The reason why their finding on the relationship between loans and advances and bank profitability runs contrary to that of Kolapo et al (2012) who found a positive relationship might be ascribed to too many loans concentrated in the stock market during the period under study.

Oladehinde and Abiodun (2011) counter attacked Modigliani &Miller (1958)'s proposition that capital structure of a firm cannot affect its values under the assumption of a frictionless world of market efficiency. Oladehinde and Abiodun (2011) argued that banking institutions lack any rationale in the frictionless world of Modigliani &Miller because they operate in a volatile highly regulated world. Hence, as more and more capital is injected into the business, more profit will be recorded indicating that capital of a bank measured by CAR has a direct relationship with its profitability (performance).

Nevertheless, although there is greater amount of evidence suggesting that capital adequacy ratios are important in analyzing financial institutions' financial condition, their use must not be overlooked and regulators ought to correctly interpret their meaning. Ayadi, Arbak and Groen (2011a) and Groen (2011) provided a case of a Belgian-French bank named Dexia that failed despite having recorded regulatory capital ratio at the end of June 2010 that was wellabove the legal standards. EuropeanBanking Authority (EBA) performed stress tests on Dexia based on the criteria of Basel II ratio (Core Tier 1 ratio) and the bank was ranked number 12 out of the 90 tested banks (Groen, 2011). Compared to the regulatory capital adequacy ratio of 8%, Dexia bank's capital adequacy ratios were well above this rate (by 4.1%). Nevertheless, despite reporting such higher and pleasing percentages, the bank fell under.Lannoo (2011) commented that Stress test conducted by EBA took into account very limited losses on outstanding loans to the public sector and did not consider liquidity in its analyses jeopardizing the bank's position. Hence, thisrecent experience of Dexia Bank as presented by Ayadi, Arbak and Groen (2011a) indicates that reliance on this single capital indicator can bevery costly.

Barfiled and Venkat (2012) present a similar argument against capital adequacy ratios as indicators of bank performance in their liquidity risk management paper. The authors have argued that a

sizeable and well-capitalized bank may fall under if it does not manage its liquidity risk issues. This was evidenced by the collapse of Northern Rock and Beer Stearns banks of the USA proving that profitability and capital are no defense against failure caused by liquidity risk, (Barfield and Venkat, 2012).

2.8 Summary

The chapter reviewed a variety of literature surrounding capital adequacy ratios and bank performance. This was an in-depth revelation of theoretical literature underpinning capital adequacy as well as the various definitions of capital adequacy ratios and key indicators of bank performance. The chapter also highlighted the relationships between capital adequacy ratios and bank performance with mounting empirical evidence, especially from Africa. Eventually, this literature was further assessed and analyzed to provide guideline to this study's methodology detailed in the next chapter; chapter 3.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the manner in which this study is planned, structured and conducted to assist in explaining the nature of the data collected as well as the various methods employed that will lead to generation of appropriate conclusions through applicable data processing. Areas to be covered in this chapter are mainly focused on giving a general plan of how the research questions will be answered and objectives achieved. These areas are research design, research population, model specification, justification of variables as well as data types and sources. Lastly, the chapter will outline data presentation and analysis plan before it closes with a brief summary.

3.2 Research Design

Research design is a strategy of the study, a plan for obtaining answers to the research questions set and shows linkages of other parts to the research. To this end, an explanatory research design was selected for this study since the researcher intent to explain relationships between CARs and bank performance. Explanatory research design establishes causal relationships and is not restricted to realistic registration and there is a quest for an explanation why reality is showing itself in a certain way (Jong and Voordt, 2002). This is consistence with the purposes of this research, which is an attempt to evaluate the effectiveness of capital adequacy ratios in indicating bank performance. The research design is also appropriate for this study as it present an opportunity to use quantitative data and offers variety of unique means of data collection. For this study, this research design is used in conjunction with quantitative analysis of secondary data only. However, explanatory research design is not without its flaws, and its major weakness lies in the fact that it heavily relies on quantitative data that is prone to measurement errors.

3.3 Research Population

The population of this study, to which the researcher will generalize the study findings, is made up of Zimbabwean commercial banks that were legally operational from beginning of 2009 up to end of 2012. Of these banks, only those that have their financial statements published up to 2013 will be included because they form the basis upon which data will be analysed and used for

general conclusions. Moreover, only banks that will have complete data for the period between 2009 and 2012 will constitute the research population.

3.4 Research Sample

The study utilized a judgemental sampling technique to select a sample for this research. Research sample is a portion of the population and it should miniature representation of the population from which it comes such that generalizations of the findings can be made to the population as a whole. In evaluating capital adequacy ratios as indicators of bank performance, a sample of 12 banks was selected for this study. The criteria upon which such a number was included was solely on the researcher's discretion based on consistence of financial statements of various banks and access to such, banks' year end profits as well as resource constraints in completion of this study. These 12 banks ranges from well capitalized to critically capitalised banks based on their level of minimum capital requirements.

3.5 Model Specification

The research model is according to the work of Okafor et al (2010) who tested the relationship between capital adequacy and bank performance using earnings as the regressand and total assets, liquidity and capital adequacy as regressors. Charles and Kenneth (2013) also studied the impact of credit risk management and capital adequacy on financial performance of commercial banks in Nigeria using panel data model to estimate the relationship between return on assets, capital adequacy ratio, loans and advances, NPL, total assets and liquidity ratio. Other researchers to which reference is made in specifying the model for this study are Shishun and Yuanjuan (2012), Estrella et al (2000) and Okezie (2011). Three capital ratios are used as explanatory variables, these are:

- Risk-Weighted ratio (RWR)
- Leverage Ratio (LVR)
- Gross Revenue ratio (GRR)

Return on assets ratio (ROA) is used as a measure of bank performance represented by earnings and becomes the dependant variable. Subsequently, this study specifies that

$$ROA = f\left(\frac{TC}{TA}, \frac{TC}{GR}, \frac{TC}{RWA}\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where:

ROA = Return on Assets, given by ($\frac{NI}{TA}$) and NI is Net Profit after tax

TA = Total Assets

TC = Core Tier 1 capital

RWA = Risk Weighted Assets

GR = Gross Revenue or Profit

Assuming that the relationship above is linear, the model to be estimated becomes:

$$ROA = \beta_0 + \beta_1\left(\frac{TC}{TA}\right) + \beta_2\left(\frac{TC}{GR}\right) + \beta_3\left(\frac{TC}{RWA}\right) + \mu \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

When LVR $=\left(\frac{TC}{TA}\right)$,

GRR $= \left(\frac{TC}{GR}\right)$ and

RWR $= \left(\frac{TC}{RWA}\right)$

The functional equation in (1) and equation (2) above can now be written as:

$$ROA_{it} = \beta_0 + \beta_1 LVR_{it} + \beta_2 GRR_{it} + \beta_3 RWR_{it} + \mu_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

μ is the error term, $\beta_0$is the intercept andβ_1, $\beta_2$and $\beta_3$are the slope coefficients, it represents bank i at time *t*.

Thus, a panel regression model is formed which assumes linearity in both the parameters and variables as indicated by the absence of any indices or power in the equation.

3.5 Justification of variables

The regression model specified above has a dependent variable - ROA (measure of bank performance) and three types of capital adequacy ratios as the explanatory variables. Other

variables not included in this model but that collectively explain bank performance are captured by the error term. These variables are each justified below.

3.5.1 Bank Performance (ROA)

Bank performance in theory and empirically has been measured by such ratios as ROA, ROE and NIM. Most studies have adopted the use of ROA and this ratio in turn is used as the dependant variable in this model. ROA is a measure of a bank's profitability which in turn reflects the level of earnings a bank has over a given period. This ratio shows the extent to which management has been able to generate earnings from assets hence the higher the ratio, the better. It is important to include such a variable in the model because profit in the end ensures continued existence of the bank and satisfactory profits with adequate risk controls preserve capital, which then provides a basis for a financial institution survival and future growth. The use of this dependant variable in the model was not conformed to any criteria but is based on the researcher's judgements and empirical considerations.

3.5.2 Capital Adequacy Ratios

Capital adequacy ratios are of three types – risk-weighted, leverage and gross revenue. These indicate the level of capital that a bank has in relation to its assets (risk weighted or non-risk weighted). Risk based capital cushions a bank against such risks as credit risk, operational risk and market risk and capital risk-weighted ratio has widely been used as a measure of bank safety and soundness around the world. Leverage ratio is a non-risk-based capital measure, which considers total assets in place of risk-weighted assets. Gross revenue represents that proportion of profit that is available for a bank after taking into account costs associated with sales. Availability and adequacy of capital help determine the degree of robustness of a financial institution to withstand shocks. All the three ratios (LVR, GRR and RWR) shall compare Tier 1 capital to total assets, gross revenue and risk weighted assets respectively.

3.5.3 Error term

The error term or stochastic disturbance is described by Gujarati (2004) as a proxy for all the omitted or neglected variables that collectively affect the dependent variable (bank performance) but are not (or cannot be) included in the regression model. Including such a term has an advantage that it clearly indicates weight of other variables that affect bank performance and that

individual bank performance cannot be fully explained only by the aforementioned variables included in the model.

3.6 Estimation Procedure

The study utilizes the method of generalized least squares (GLS) in estimating the panel regression model. Unlike the method of ordinary least squares that assigns equal weight to each observation, the GLS method takes into account the unequal variability of the regressand, ROA. This technique therefore has an opportunity of producing best linear unbiased estimators even on the presence of heteroscedasticity.

3.7 Diagnostic Tests

The model competence is evaluated before it is used and after estimation to allow for forecasting and avoid spurious regression respectively. In evaluating the indicative powers of capital adequacy ratios to explain bank performance, the researcher estimates a panel data linear regression model using a statistical package, Stata12. The researcher will conduct a sequence of necessary procedural tests of stationarity, multicollinearity, heteroscedasticity and model specification to detect equation specification errors. A brief description of these diagnostic tests is given hereunder.

3.7.1 Unit root test

Unit root tests are done on all the regression variables in order to avoid spurious regression results as well as to establish the number of times that a variable must be differenced for it to be stationary. Stationarity tests are very critical under this study since panel data contain an element of time series. The researcher makes use of Harris Tzavalis tests.

3.7.2 Multicollinearity Test

Time series variables have an ability to influence each other in terms of their bahaviour in explaining the variations in dependent variable. In order to estimate variable coefficients with great accuracy and produce unbiased econometric results there is need to ascertain that there is no perfect correlation among explanatory variables. In this regard, the researcher employs the help of a correlation matrix that looks at correlations of cross independent variables.

3.7.3 Heteroscedasticity

Time series data suffers from the problem of heteroscedasticity that occurs due to the existence of outliers in the residuals of the model. Data is heteroscedastic when the residuals associated with a regression analysis are not equal or alternatively if there is non-constant variance among the regressors (Gujarati, 2004). To test for heteroscedasticity in the data, the research will utilize the Breusch-Pagan / Cook-Weisberg test under the null hypothesis that data is heteroscedastic against the alternative that there is constant variance in the data.

3.7.4 Model Specification Test

After conducting the aforementioned tests and regressing, the researcher has to test the overall model specification to ensure that it has adopted a correct functional form, does not include measurement errors and excludes irrelevant variables. Using Stata12, the command ovtest under the Ramsey Reset test will be utilized to detect model specification errors.

3.8 Data Types and Sources

The study makes use of panel data collected annually, that is, on the financial year-end of each selected bank in the evaluation of capital adequacy ratios as indicators of bank performance. Cross-sectional component of the data lies in the fact that the researcher gathers data of dependent and explanatory variables for each bank for a specific point in time. Time series is recognized by the fact that data is gathered and compared for each bank over a number of successive years. The data gathered is for the period 2009 to 2012. This period is more appropriate than during the period when Zimbabwe was experiencing hyperinflation, which would distort meaningful analysis and results. All data collected was secondary obtained mainly from selected banks' financial statements, annual reports and Zimbabwe Stock exchange.

3.9 Data collection methods and research instruments

The study used secondary data only in pursuit of its objectives and answering the research questions. Secondary data is that data which has already been gathered and published by other sources in relation to the area under study. Secondary data as postulated by Saunders et al (1997) include both quantitative and qualitative data used in both descriptive and explanatory research further categorized by Kervin (1992) into raw data (little if any processing) and computed data (which has received some form of selection or summarizing). Therefore, this study is explanatory in nature and makes use of computed quantitative data. RBZ and other data

publications, press releases, textbooks, finance journals, business reports and the internet are among the secondary sources used in this research. Textbooks, finance journals and the internet provided the bulk of this research's literature and end of year financial statements and annual reports of selected banks provided data needed to estimate the equation.

The research utilizes secondary data because it is the most appropriate for this study since much of the information needed to answer the research questions was collected by other sources. Secondary data because it has been previously collected by organizations, provides an unobtrusive measure and there is permanency of the data. Not only does secondary data allow time series analysis but also it is readily available and less expensive since it may have few resource (time and money) requirements. Resources saved will then allow more time and effort to think about theoretical aims and substantive issues as well as time in analyzing and interpreting the data. It also, through re-analyzing, leads to unexpected new discoveries and it allows for comparative analyses between banks and same banks for different periods if data collection methods are comparable.

However, secondary data is not without its limitations. The major flaw of secondary data in relation to this study lies in the fact that it is prone to manipulation and extrapolation, resulting in such errors exhibited in the study jeopardizing the reliability and authenticity of the research results. Against this background, all data in this research is subject to scrutiny for accuracy, authenticity and reliability and only audited financial statements are considered.

3.10 Data presentation and analysis plan

After data are collected and desired results are achieved it is imperative to then present, interpret and analyze them in order to measure, explain, explore, construct concepts, make comparisons and examine relationships. The data gathered through the techniques highlighted in this chapter is analyzed electronically and regression analysis is to be used. Statistical tables will be used to present data collected through supportive statistical package Stata12. The actual data presentation and analysis is reserved for the next chapter, chapter four.

3.11 Summary

This chapter outlined the manner in which the study is planned through discussion of the research methodology. An explanatory research design was employed and its justification was given. The chapter went on to give a model specification for this study as well as the justification

of variables. Data types and sources were clearly outlined as well as research sample and population before data collection and instruments were presented. The chapter indicated that secondary data collected mainly from company financial statements formed the bulk of data needed to estimate the regression equation. The chapter then signaled to the next chapter, chapter four, by highlighting data presentation and analysis plan.

CHAPTER FOUR: DATA PRESENTATION AND ANALYSIS

4.1 Introduction

This chapter seeks to give a presentation of the data obtained in carrying out the research and its subsequent analysis. Focus is on detailed analysis of data and discussion of findings that answer the research questions and achieve the objectives outlined in chapter one in relation to theory and empirical reviewed literature. Thus, presentation, analysis and interpretation of results obtained from regression through Stata12 on the indicative powers of capital adequacy ratios on Zimbabwean commercial banks performance for the period between 2009 and 2012 is done in this chapter. Tables will assist in presenting the findings.

4.2 Diagnostic Tests

In computation of the linear regression model, a sequence of necessary procedural tests of stationarity, multicollinearity, heteroscedasticity and model specification were done and the following results were obtained.

4.2.1 Unit Root Test

Unit root tests were done on all the regression variables in order to avoid spurious regression results. The researcher used Harris Tzavalis tests and table 4.1 below illustrates test results. The hypothesis employed by the researcher was as follows:

H_0: panels contain unit roots

H_I: panels are stationary

Table 4.1 Summary of Unit Root Tests

Variable	z	p-value
Leverage ratio	-3.2104	0.007
Gross revenue ratio	-7.7018	0.0000
Risk-weighted ratio	-3.9866	0.0000

Source: Raw Data

The results from table 4.1 above clearly indicate that all the explanatory variables are stationary or explained alternatively; the panels are stationary. This is evidenced by probability values of

greater than 0.05 and the odds ratio (z) that have exceeded 2 in absolute value. Thus, the null hypothesis that the panels contain unit roots is rejected. Stationarity in the panels implies that the variables are relatively stable over time; there is no so much volatility in terms of the variables and regression results can be used with higher degree of certainty.

4.2.2 Multicollinearity Test

The existence of a linear relationship amongst regressors in an equation is an indication of multicollinearity. Presence of multicollinearity tends to result in very small t statistics and wide confidence intervals for the coefficients. Standard errors will increase with the increasing presence of multicollinearity in the explanatory variables. Against this background, correlation matrix that makes use of correlation of cross independent variables to ascertain the level of independency of explanatory variables to each other was utilized. The test was conducted under the null hypothesis that the model suffers from multicollinearity against the alternative that the model is free from the problem of multicollinearity. Results are displayed on table 4.2.

H_0: the model suffers from multicollinearity

H_I: the model is free from multicollinearity

Table 4.2 Correlation Matrix

	Leverage ratio	Gross revenue ratio	Risk-weighted ratio
Leverage ratio	1.0000		
Gross revenue ratio	-0.0655	1.0000	
Risk-weighted ratio	0.0456	0.5995	1.0000

Source: Raw Data

The rule of thumb for collinearity strength is 0.8 and any strength exceeding 0.8 must be corrected. Thus, for two variables to be independent of each other, their collinearity strength should not be greater than 0.8. In this case, results above show that the model is free from multicollinearity as indicated by cross values that are less than 0.8 leading to the rejection of the null hypothesis. This implies that exogenous variables are independent of each other; one variable can freely explain the variations in the dependent variable without interference from other explanatory variables.

4.2.3 Heteroscedasticity Test

Time series data suffer from the problem of heteroscedasticity that occurs owing to the existence of outliers in the residuals of the model. Data is heteroscedastic when the residuals associated with a regression analysis are not equal or alternatively if there is non-constant variance among the regressors. The researcher to test for heteroscedasticity in the data used the Breusch-Pagan / Cook-Weisberg test. Results of the test are displayed on Table 4.3.

H_0: There is non-constant variance in the data

H_I: There is constant variance in the data

Table 4.3 Breusch-Pagan / Cook-Weisberg test for Heteroscedasticity

Chi2(1)	**1.44**
Prob> Chi2	0.2309

Source: Raw Data

From table 4.3, probability of the Chi2 of 0.2309 is outweighed by the Chi2(1) of 1.44 hence H_0 is not rejected concluding that the dataset is heteroscedastic, hence method of generalized least squares is used to estimate the parameters of the regression equation.

4.3 Presentation of the model

Regression was run through a generalised least square technique using an econometric statistical package Stata12 after the aforementioned diagnostic tests were carried out. Table 4.5 belowpresents results of the regression.

Table 4.5 Presentation Results Summary

Variable	Coefficient	Std. Error	t-statistic	Probability
C	0.0403101	0.0124828	3.23	0.002
LVR	0.5043156	0.1828368	2.76	0.008
GRR	0.0055091	0.0082479	0.67	0.508
RWR	0.1796799	0.0715858	2.51	0.016

Source: Raw data

R-Squared	**= 0.3339**	**F(3, 44)**	**= 7.35**
Adjusted R-Squared	**= 0.2884**	**Prob> F**	**= 0.0004**

Therefore, the regression model is now given by:

$$ROA_{it} = \beta_0 + \beta_1 LVR_{it} + \beta_2 GRR_{it} + \beta_3 RWR_{it} + \mu_{it}$$

$$ROA_{it} = 0.0403101 + 0.5043156 LVR_{it} + 0.0055091 GRR_{it} + 0.1796799 RWR_{it}$$

4.3.1 Overall Model Specification Test

A model correctly specified is one that has adopted a correct functional form, excludes irrelevant variables and does not contain measurement errors (Gujarati, 2004). In line with this definition, the researcher utilized the Ramsey Reset test for overall model specification test with the null hypothesis that the model is correctly specified against the alternative that the model is not correctly specified.

Table 4.4 Model Specification Test Results

F(3,41)	**2.47**
Prob> F	0.0751

Source: Raw Data

Using fitted powers of the dependent variable (ROA) with 3 degrees of freedom in the model and 44 in the residual, theRamsey Reset test conducted revealed that the model has no omitted variables as the probability of the F-statistic has exceeded 5%. The null hypothesis is accepted implying that the model is correctly specified.

4.3.2 Goodness of fit

Goodness of fit is commonly measured by the coefficient of determination, R^2. The regression model explains almost 34% of the total variations in the regressandas given by the value of R-squared of 0.3339. In other words, 33.39% of the total variations in Zimbabwean commercial bank performance are explainedendogenously by capital adequacy ratios. Thefigure is a clear indication that besides CARs other variables, contributing almost 66%, exist that explains commercial bank performance. The results are supported by Brash (2001) who concluded that CARs are only as good as the information on which they are based and should not be interpreted as the only indicators necessary to judge bank financial performance. However, the omitted or

neglected variables that collectively indicate performance are captured by the error term.Adjusted R-squared, which is a better measure of goodness of fit because it has more forecasting power, is 0.2884. This means that the regression model explains nearly 29% of the variations in bank performance after considering the degrees of freedom. This coefficient of determination is somewhat small in general, but its significance varies and depends with each particular scenario. Other variables could have been incorporated but unfortunately, the study was restricted to evaluation of capital adequacy ratios only.

4.4 Interpretation of Results from the model

The explanatory variables are statistically significant at 95% confidence interval as almost all variables have t-values greater than two save for gross revenue ratio (GRR) that has a t-statistic of 0.67. However, t-statistic greater than or equal to 2 still holds asmore than half of the regressorsare significant. The intercept of 0.0403101 implies that in the absence of core Tier 1 capital adequacy, ceteris paribus, banks possess some characteristics of performance although they are very little. This is true in the sense that this study focused on core capital of commercial banks only leaving other capital components such as supplementary capital and tier 3 partially explaining bank performance. However, the interpretation of the intercept is an arbitrary variable and may thus be ignored or disregarded.

4.4.1 Leverage Ratio

The coefficient of the proportion of tier 1 capital to total assets of a bank is 0.5043156 implying that there is fairly strong positive relationship between leverage ratio and bank performance. A 1% increase in leverage ratio will lead to a 0.504% increase in bank performance. This result did not come as a surprise because as more of internally generated funds and long-term sources of funds are invested in assets, performance as a result will improve leading to the conclusion that leverage ratio is a strong indicator of bank performance. These findings are consistence with the studies of Estrella et al (2000) andMayes and Stremmel (2012) who found that leverage ratios are better indicators of bank performance. Their view however runs contrary to that of RBNZ(2011) which argues that the leverage ratio imposes unnecessary cost on banks and add nothing useful to sophisticated measures as they view it as a crude measure.

4.4.2 Gross Revenue Ratio

The coefficient of gross revenue ratio (GRR) of 0.0055091 reveals that in aggregate tier 1 capital expressed as a percentage of total interest and non-interest income is insignificant in explaining Zimbabwean commercial bank performance. GRR has an insignificant t-statistic of 0.67 and therefore is a very weaker indicator of bank performance since a unit increase in GRR result in 0.0056 units increase in performance. This is explained by the level of income derived from bank lending activities that is fast dwindling given higher levels of non-performing loans in Zimbabwe leaving banks relying on small non-interest income realized from fees and other charges insignificant in improving their performance. Non-interest income is further dilapidated from reduced account activities as well as reclassification of inactive bank accounts. Empirical evidence from Nigerian banks for the period 1991-2004 provided by Okezie (2011) suggest that there is no significant difference between leverage ratio and gross revenue ratio in terms of efficiency in predicting bank performance, which view however runs contrary to the findings of this study. Okezie (2011) findings might be based on the premise that his study covered a greater time horizon as compared to this study explaining the difference between the findings. Conversely, Estrella et al (2000) concluded that gross revenue ratio indicate performance during periods of greater than 4-year horizons whose finding however is in agreement with this study.

4.4.3 Risk Weighted Ratio

Proportion of core tier 1 capital of a bank expressed as a percentage of total RWAs was found to be statistically significant at 95% confidence interval to explain variations in bank performance. Coefficient of risk-weighted ratio (RWR) of 0.1796799 reveals that risk-weighted ratio has a positive relationship with performance across banks under investigation. A 1% increase in risk-weighted ratio will lead to almost 18% increase in performance of commercial banks in Zimbabwe. The finding also review that risk weighted ratio is a good indicator of bank performance as it has a probability of 0.016. This finding is in agreement with a number of researches, for instance, one done by Okezie (2011), Estrella, Park, &Peristiani (2000)and Buehler, Samandari and Mazingo (2009). This is often true because tier 1 or core capital of a bank comprise of paid-in capital, retained earnings and disclosed reserves which are the highest quality loss absorbing capital of a bank.

However, this result did not come up as expected since the researcher was anticipating risk-weighted ratio to be a better indicator of performance than the leverage ratio. Some diggings into

the cause for such a result reveals that there was inconsistence and flaws in the risk-weighting of assets by most commercial banks as evidenced by lack of intellectually equipped personnel and advanced ICT infrastructural models. Moreover, commercial banks are increasing their RWRs without correspondingly increasing capital because the process of risk weighting requires banks to charge more capital for riskier assets. Therefore, risk weighting discourages banks from holding risky assets leaving the ability of RWRs in indicating performance depending on the accurateness of risky weights to reflect the riskiness of assets.

4.5 Effectiveness of capital adequacy ratios in indicting bank performance

Overall, results from the panel regression reveals that capital adequacy ratios are effective in indicating bank performance as indicated by the coefficients of the ratios – 0.0055091, 0.1796799 and 0.5043156 for GRR, RWR and LVR respectively. It is also evident from the results that for the four years under investigation, leverage ratio outweighed risk-weighted ratio in explaining commercial bank performance in Zimbabwe. However, most researches done in other countries found that risk weighted ratios indicate bank performance better than other simple ratios such as the leverage ratio and gross revenue ratio. For instance, Estrella et al (2000) and Buehler (2009) found that risk-weighted ratio indicate performance more effectively than other non-risk-based capital adequacy ratios in US and Nigeria respectively. The researcher can also safely conclude that the coefficient of gross revenue ratio is an indication that it is not effective in indicating bank performance, which view however is consistence with other researches particularly that done by Okezie (2011). As a whole, capital adequacy ratios are to a lesser extent effective in indicating bank performance.

4.6 Types of capital adequacy ratios that are most relevant in indicating bank performance

After running the regression using Stata the results indicate that although both leverage ratio (LVR) and risk-weighted ratio (RWR) indicate commercial bank performance, leverage ratios are most relevant. This is explained by the higher t-value of LVRgreater than 2 of 2.76 and a probability of 0.008 close to zero followed by RWR with a probability of 0.016 with a t-value of 2.51. This follows that the level of ordinary share capital, reserves and retained earnings held by a bank in proportion to its total assets as compared to risk-adjusted assets is more relevant in indicating performance. In addition, reasons as to why leverage ratio has displayed higher indicative powers of performance more than risk-weighted ratio in comparison to other researchers' findings might be attributed to the fact that this ratio (LVR) utilized the same

denominator (total assets) with a proxy used to measure performance (ROA). Nevertheless, the regression results are in agreement with the study of Okezie (2011) who found an insignificant difference between risk-based ratios and non-risk based ratios in terms of performance in indicating bank stability.

4.7 The relationship between capital adequacy ratios and bank performance

As already highlighted above, all the three capital adequacy ratios have a positive relationship with performance as derived from the observation of the ratios' coefficients. Individually, LVR top the list in terms of its strong relationship with commercial bank performance followed by RWR and GRR had also a positive relationship though it is insignificant. Nevertheless, collectively the relationship between capital adequacy ratios and bank performance is a lowly positive one. Several other studies have also found a positive relationship between capital adequacy ratios and bank performance. For instance, in China between the period 2005 and 2010, Yuanjuan and Shishun (2012) found a significant positive relationship between capital adequacy ratio and ROA as a proxy for bank performance. Furlong and Keeley (1991) asserts that capital adequacy ratios cannot, on a standalone basis, form a basis upon which performance is measured. They argued that the effect of capital adequacy on bank performance highly depends on the prevailing regulatory body in the country and on such factors as competition, more depositors and risk in portfolio interest among other factors. Conversely, Qin and Pastory (2012) found that capital adequacy ratios are negatively related to performance of banks in Tunisia for the period from 2000 to 2009.

4.8 Indicative powers of bank performance between risk-weighted ratios and non-risk based ratios

This research focused on three capital adequacy ratios which were then further categorized into risk-based and non-risk based. Two types of risk-based namely leverage ratio (LVR) and gross revenue ratio (GRR) were identified and one risk-based ratio – risk weighted ratio (RWR) which were classified according to their denominator component. Non-risk based ratios incorporated both total assets (LVR) or interest and non-interest income before any expenses deductions (GRR), and the risk-based ratio incorporates RWAs. The researcher wanted to determine whether non-risk based ratios outperform their risk-based counterparts in indicating bank performance among other objectives. This study's findings revealed that not all non-risk based

ratios outperform the risk-weighted ratio in indicating bank performance. Only the leverage ratio outweighed the RWR as it has the highest coefficient, t-value and lowest probability.

4.9 Otherindicators of bank performance in Zimbabwe

Findings of this research indicated a greater need to look at other aspects that collectively influence performance of commercial banks in Zimbabwe as capital adequacy ratios have contributed for about 34% only. As highlighted in chapter 2 of this study together with further findings, these other indicators among others, can take one of the following forms as shown by table 4.6 below.

Table 4.6 Other bank performance indicators

Indicator	Description
NPL Ratio	Asset quality, measured by the ratio of NPL, is such an important indicator of the future prospects of a bank. Because banks derive most of their income from loans and advances, higher NPL ratio is an indicator of poor performance.
Cost to Income Ratio	Management efficiency of any bank has a bearing on its performance. Their ability to cover costs with available funds and to generate income from assets provide basis upon which performance of a bank is measured.
LAR and LDR	It is one thing for banks to be adequately capitalised and another to meet their commitments cheaply and timeously. Liquid asset ratio and loan to deposit ratio are useful indicators of how well a bank is performing. Liquid assets are negatively correlated to probability of bank failure.
Bank Size	Banks are susceptible to financial market shifts. Their exposure to market fluctuations, although difficult to capture using accounting data, provides useful information with regard to performance. Logarithm of total assets as a proxy for bank size has been widely used as an indicator of performance though the subject has always been under academic debate.

Source: Author's findings

4.10 Summary

The chapter focused on data presentation, interpretation and analysis in relation to theory and empirical evidence from other studies. The chapter first outlined necessary procedural tests of stationarity, multicollinearity, heteroscedasticity as well as overall model specification

competence to ensure validity and reliability of the variables under investigation. After diagnostic tests, results of panel regression run using a statistical package Stata version 12 revealed that leverage ratio and risk-weighted ratio are statistically significant in indicating bank performance. Regression results pointed to the fact that capital adequacy ratios alone are not enough in explaining performance with support from other studies,(Brash, 2011) that concluded that capital adequacy ratios should not be interpreted as the only indicators necessary to judge bank financial performance. In terms of a positive relationship between CARs and bank performance, the study's findings are in line with study of Yuanjuan and Shishun (2012). Simpler measures of capital adequacy were found to be most relevant in indicating performance than the more sophisticated measure, which is the risk-weighted ratio. Overall, results show that for the period under study, CARs are to a lesser extent effective in indicating bank performance. The next chapter will give a summary of the whole study giving conclusions and recommendations based on the findings analysed under this chapter and will further outline suggestion for future study.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of major issues raised from chapter 1 to chapter 4 and offers conclusions according to the findings of this research. Recommendations in a general discussion are made in light of the objectives and research questions set backed by research results. Further to summary, conclusions and recommendations, the chapter seeks to highlight suggestion of further areas that can be looked by other researchers in future.

5.2 Summary of the Study

The focus of this study was to determine the overall effectiveness of capital adequacy ratios as indicators of bank performance as well as analyzing the difference in efficiency between different types of capital adequacy ratios in indicating bank performance. The study was driven by the fact that emphasis is laid more in Zimbabwe on regulation of capital adequacy ratios rather than the extent to which they indicate performance and stability of banks. In addition, conclusions and relationships between capital adequacy ratios and bank performance among countries are mixed and inconclusive. Hence, the study sought to provide solutions to such problems within the Zimbabwean context through a detailed evaluation of capital adequacy ratios in indicating performance.

A brief background of this study from international, regional as well as local contexts revealed that most regulators in different countries are attaching too much importance on capital adequacy regulation necessitated largely by the aftermath of the 2007-2009 global financial crises. The issue of financial soundness and stability has been mainly judged depending on the level of capital held by financial institutions as reflected in the risk-weighted capital ratios. However, some researchers and different authors argue that over-reliance on CARs can be very costly and they are not enough in explaining bank performance. Other alternative regulatory policies must also be considered in the overall assessment of banking sector financial condition.

The study therefore adopted an explanatory research design that took an econometric approach in answering the research questions and achieving objectives. An econometric panel linear

regression model was utilized to unveil the indicative powers of capital adequacy ratios in indicating commercial bank performance between the period 2009 and 2012 in Zimbabwe. Secondary data obtained from 12 commercial banks' financial statements and annual reports formed the basis of data required for estimating the regression equation.

Results of this study indicate that there exist other variables, besides CARs, that vividly indicate bank performance and these among others include liquidity, asset quality and management efficiency ratios. Simpler measures of capital adequacy, notably, leverage ratios contain useful information that regulators can supplement with sophisticated measures in regulating commercial banks. Overall, capital adequacy ratios are such important tools for assessing financial condition of banks although in this study they were found to be less effective in indicating performance.

5.3 Conclusions

The following conclusions are made based on the findings derived from the previous chapter as well as theoretical and empirical postulations:

- Capital adequacy ratios are not the only factors that can be adopted in assessment of the overall performance of commercial banks in Zimbabwe. Capital held by banks in proportion to their risk profile and total assets is critical in cushioning banks against such risks as credit risk, operational and market risk but equally important other determinants of bank performance should not be overlooked lest banks fall under.
- Simple measures of capital adequacy notably the ratio of a bank's capital to its total assets can provide useful information pertaining to capital adequacy, which information regulators can use as a starting point in assessing the financial condition of banking institutions. Leverage ratio was found to be significantly related to bank's performance and since it is simple and not costly to compute, it provides a basis upon which performance can be measured.
- Results of the econometric model revealed a positive relationship between risk-weighted ratio and bank performance slightly lower than that between leverage ratio and performance. The proportion of a bank's capital expressed as a percentage of its total risk weighted assets is an important tool for designing capital regulation frameworks particularly under the supervisory arm.

- Gross revenue ratio did not prove itself an indicator of bank performance in Zimbabwe although it has a positive relationship with performance. Conclusions can be safely made that this ratio despite its simple nature in computing cannot be used to assess the financial condition of banking institutions since regression results revealed an insignificant statistical relationship between gross revenue ratio and bank performance.
- Data collected has shown that most banks have high gross revenue ratio which reveal that some banks are realizing little income from lending activities necessitated by higher levels of non-performing loans in Zimbabwe sitting in aggregate at 16% as at December last year. These higher levels of NPL compared to the International Standards have assisted in explaining poor performance in some banks and the sector as a whole.
- All commercial banks currently operating in Zimbabwe are well cushioned against risks since they have their capital adequacy ratios above the RBZ requirement of 10%. However, having capital adequacy ratios above the regulatory standards does not imply automatic survival of banks. Case studies of banks in other countries that have failed regardless of good capital levels provide sufficient evidence that Zimbabwean banks should ride on in pursuit of overall performance and stability.
- Overall, from the model results, capital adequacy ratios are effective in indicating commercial bank performance but to a lesser extent. Positive relationships exist but they are not strong. Great care must be exercised not to rely heavily on these ratios as empirical literature revealed that CARs can be too costly if misinterpreted and over-relied upon.

5.4 Recommendations

In light of research objectives as well as findings of this study, the following policy recommendations are made especially to the major beneficiaries of this research.

5.4.1 Micro criteria to minimum capital requirements regulation

In light of the "one size fits all" approach of capital adequacy regulation in Zimbabwe where banks in the same category are required by the Reserve Bank of Zimbabwe to meet the same minimum capital requirements, the researcher recommends a system whereby each bank is allowed to hold capital commensurate to its risk profile. Different banks differ in terms of the risk they assume and holding capital in line with the risks faced, at individual basis, will be a true reflection of the bank's position over a given period.

5.4.2 Supplementary use of other simple capital adequacy ratios for regulation purposes

This study brought a revelation that simpler measures of capital adequacy particularly leverage ratio can indicate bank performance as well more as the risk-weighted ratio. The leverage ratio also contain useful information and is virtually costless to compute although it is not well suited in determination of optimum levels of bank capital. It may be possible to obtainconsiderable benefits from the use of simple capital ratios, as a supplementary requirement and having risk-weighted ratios in formulating key requirements. Hence, the researcher recommends that since there is no significance difference between leverage ratio and risk-weighted ratio in terms of efficiency in influencing performance, it might be beneficial to use the two ratios supplementary in commercial bank supervision.

5.4.3 Attention to other alternative regulatory policies

In Zimbabwe, the issue of bank soundness is addressed with too much emphasis on capital adequacy regulation. Failure to comply with minimum capital requirements has led many banks placed under curatorship and others closed. An important result of this study has shown that capital adequacy alone is not enough in determining performance of banks. Care ought to be taken by policymakers not to too heavily rely on any distinct tool in constructing future standards overriding banking industry. The objective should not be to set minimum capital requirements in a way that eliminatesthe likelihood of bankfailure, but rather to balance the benefits and costs of alternative policies, to leverage other tools at regulators' disposal including implementation of other individual CAMELS parameters.

5.4.4 Continued use of capital adequacy ratios in indicating performance

The continued use of capital adequacy ratios in determining bank soundness and stability is recommended. Risk-weighted ratio provides a better determination of the optimum level of a bank's capital, which capital banks can use to withstand macro-environmental shocks that obstruct performance. Leverage ratios on the other hand are simpler and not influenced by the ever varying risk pattern of banks. Therefore, given the important roles played by capital, it is imperative that measures of capital adequacy be continuously used in assessing financial condition of banks.

5.5 Suggestions for future study

The study focused on determining the effectiveness of capital adequacy ratios in indicating commercial bank performance. Thus, the researcher was limited to capital adequacy ratios only and it neglected many other variables that influence performance of banks. Therefore, other researches can include such variables as liquidity ratios, management efficiency ratios, asset quality measures and variables that encompass sensitivity to market conditions as explanatory variables. Since the research compared core or tier 1-bank capital ratios only, further researches can be done using other capital ratios to see if effectiveness will remain the same.In addition, not only can future studies embark on wider explanatory base but also further researches can target other Zimbabwean banking sectors such as merchant and building societies.

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Appendix A: Raw Data

BANK	YEAR	ROA	LVR	GRR	RWR
1	1	0.135636345	0.040118769	1.169866817	0.182780621
1	2	0.088435388	0.017587756	0.957982714	0.171778718
1	3	0.1106	0.0210	1.148139013	0.138987359
1	4	0.076294088	0.024394159	0.812810396	0.079461219
2	1	0.146189374	0.0087	0.875713834	0.439019139
2	2	-0.00913456	0.005571604	0.464793746	0.297156858
2	3	0.12884642	0.053996686	0.79128431	0.273500621
2	4	0.096623634	0.075478145	0.681858547	0.126593221
3	1	0.073390411	0.019489192	0.782970009	0.093962664
3	2	0.069510192	0.03224115	0.482127162	0.083873732
3	3	0.05178454	0.025157052	0.363399643	0.067445697
3	4	0.054083802	0.027839591	0.337741468	0.077284758
4	1	0.071278264	0.066001988	1.037172379	0.199737921
4	2	0.123326737	0.001249562	1.419147694	0.248638421
4	3	-0.01088433	0.006809006	0.612489612	0.1013
4	4	0.062951896	0.030387893	1.728398651	0.265789168
5	1	0.11077312	0.076529661	1.124699727	0.204876512
5	2	0.078849502	0.022607653	0.506297165	0.112151747
5	3	0.077097963	0.025385039	0.342487873	0.100809709
5	4	0.080635476	0.024815909	0.486731775	0.144262741
6	1	0.098132669	0.026080878	1.032656889	0.201460075
6	2	0.070733468	0.026396314	0.287224519	0.094454911
6	3	0.037750566	0.060967032	0.225952536	0.032363194
6	4	0.147373408	0.005314076	0.703976826	0.143506324
7	1	0.008835427	0.014545526	0.467968956	0.103346895
7	2	0.086499483	0.0100	0.782290472	0.120147071
7	3	0.0930	0.01857441	0.77411954	0.126638379
7	4	0.135752368	0.027693274	0.915188888	0.172196957
8	1	0.153309258	0.055021312	1.699502211	0.333333333
8	2	0.162067722	0.129192293	0.94074885	0.225372571
8	3	0.146961285	0.082588507	0.882313847	0.2065
8	4	0.134398966	0.0922	0.781123412	0.186498213
9	1	0.116597718	0.05737612	0.800158974	0.217729596
9	2	0.0836	0.067312071	0.721400503	0.148559716
9	3	0.097453864	0.027129705	0.604949963	0.132203915
9	4	0.098177709	0.03341888	0.515383511	0.121958424
10	1	0.082425479	0.013802464	0.991297026	0.187857978
10	2	0.100509199	0.029734723	0.657434389	0.185434673

10	3	0.094783821	0.06763872	0.120618124	0.197881081
10	4	0.094473038	0.044617908	0.726264577	0.138852084
11	1	0.091887758	0.033433141	0.690330523	0.183840331
11	2	0.075352175	0.022845043	0.601893397	0.155788091
11	3	0.087328862	0.030840832	0.55433389	0.146537715
11	4	0.106803681	0.043512798	0.5800	0.149780923
12	1	0.126342084	0.023443331	1.054317408	0.253330233
12	2	0.132476234	0.022186466	1.041582126	0.270331973
12	3	0.116067804	0.01919182	0.522821846	0.094478955
12	4	0.123668731	0.016994401	5.171060034	0.393731975

Appendix B: Diagnostic Test and Regression Results

```
. xtunitroot ht lvr

Harris-Tzavalis unit-root test for lvr
------------------------------------------

Ho: Panels contain unit roots                Number of panels  =     12
Ha: Panels are stationary                    Number of periods =      4

AR parameter: Common                         Asymptotics: N -> Infinity
Panel means:  Included                                    T Fixed
Time trend:   Not included
------------------------------------------------------------------------------
                     Statistic          z          p-value
------------------------------------------------------------------------------
 rho                  -0.1359       -3.2104        0.0007
------------------------------------------------------------------------------

. xtunitroot ht grr

Harris-Tzavalis unit-root test for grr
------------------------------------------

Ho: Panels contain unit roots                Number of panels  =     12
Ha: Panels are stationary                    Number of periods =      4

AR parameter: Common                         Asymptotics: N -> Infinity
Panel means:  Included                                    T Fixed
Time trend:   Not included
------------------------------------------------------------------------------
                     Statistic          z          p-value
------------------------------------------------------------------------------
 rho                  -0.8857       -7.7018        0.0000
------------------------------------------------------------------------------

. xtunitroot ht rwr

Harris-Tzavalis unit-root test for rwr
------------------------------------------

Ho: Panels contain unit roots                Number of panels  =     12
Ha: Panels are stationary                    Number of periods =      4

AR parameter: Common                         Asymptotics: N -> Infinity
Panel means:  Included                                    T Fixed
Time trend:   Not included
------------------------------------------------------------------------------
                     Statistic          z          p-value
------------------------------------------------------------------------------
 rho                  -0.2655       -3.9866        0.0000
------------------------------------------------------------------------------

. corr lvr grr rwr
(obs=48)

             |      lvr      grr      rwr
-------------+---------------------------
         lvr |   1.0000
         grr |  -0.0655   1.0000
         rwr |   0.0456   0.5995   1.0000
```

```
. reg roa lvr grr rwr
```

Source	SS	df	MS	Number of obs	=	48
				F(3, 44)	=	7.35
Model	.023083692	3	.007694564	Prob > F	=	0.0004
Residual	.046058767	44	.00104679	R-squared	=	0.3339
				Adj R-squared	=	0.2884
Total	.06914246	47	.001471116	Root MSE	=	.03235

roa	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lvr	.5043156	.1828368	2.76	0.008	.1358323	.8727989
grr	.0055091	.0082479	0.67	0.508	-.0111134	.0221316
rwr	.1796799	.0715858	2.51	0.016	.0354081	.3239516
_cons	.0403101	.0124828	3.23	0.002	.0151527	.0654676

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of roa

         chi2(1)      =     1.44
         Prob > chi2  =   0.2309

. ovtest

Ramsey RESET test using powers of the fitted values of roa
       Ho:  model has no omitted variables
                  F(3, 41) =      2.47
                  Prob > F =      0.0751
```