

BANK PERFORMANCE: DOES BANK SIZE MATTER?

BY

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DECLARATION

This research paper is my original work and has not been presented for a degree in any other university.

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ABSTRACT

Economic theory suggests that if larger banks have a greater control of the domestic market, and operate in a non-competitive environment, lending rates may remain high while deposit rates for larger institutions remain lower because they are perceived to be safer. Thus, larger banks may enjoy higher profits but empirical evidence remains inconclusive. This study sought to establish the impact of bank size on commercial bank performance in Kenya. Using panel data for the period 2007-2014 we employed system generalized method of moment (GMM) estimation technique in order to overcome the endogeneity problem. The empirical findings show that for the case of commercial banks in Kenya, size does not matter in determining bank profitability. This implies that although scale economies are important for profitability, local markets in Kenya do not always allow such scale economies to translate to higher profitability. The control variables lagged profitability, market concentration, GDP growth and inflation were all significant in explaining bank profitability.

LIST OF ABBREVIATIONS

AR (1)	Arellano and Bond test for First Order Serial Correlation
AR (2)	Arellano and Bond test for First Second Serial Correlation
FE	Fixed Effect
GDP	Gross Domestic Product
GMM	Generalized Method of Moment
OLS	Ordinary Least Squares
RE	Random Effect
ROA	Return on Asset
ROE	Return on Equity

Contents

DECLARATION.....	I
ACKNOWLEDGEMENT.....	II
ABSTRACT.....	III
LIST OF ABBREVIATIONS	IV
CHAPTER ONE: INTRODUCTION.....	1
1.1 BACKGROUND OF THE STUDY	1
<i>1.1.1 Kenya Banking Sector</i>	<i>2</i>
1.2 STATEMENT OF THE PROBLEM.	4
1.3 OBJECTIVES OF THIS STUDY	4
1.4 SIGNIFICANCE OF THE STUDY	5
CHAPTER TWO: LITERATURE REVIEW.....	6
2.1 INTRODUCTION.....	6
2.2 THEORETICAL REVIEW	6
2.3 EMPIRICAL REVIEW	6
<i>2.3.1 Bank size.....</i>	<i>7</i>
<i>2.3.2 Control Variables.</i>	<i>8</i>
2.4 OVERVIEW OF LITERATURE.....	10
CHAPTER THREE: METHODOLOGY	11
3.1 INTRODUCTION.....	11
3.2 THEORETICAL FRAMEWORK.....	11
3.3 MODEL SPECIFICATION	11
3.4 ESTIMATION AND TESTING PROCEDURES	12
3.5 DATA SET AND MEASUREMENT OF VARIABLES.....	14
<i>3.5.1 Data Sources.....</i>	<i>14</i>
<i>3.5.2 Dependent Variables</i>	<i>14</i>
<i>3.5.3 Bank Specific characteristics.....</i>	<i>14</i>
<i>3.5.4 Industry Specific Variables.....</i>	<i>16</i>
<i>3.5.5 Macroeconomic Factors.....</i>	<i>17</i>
CHAPTER FOUR: EMPIRICAL RESULTS AND DISCUSSION.....	18
4.1 INTRODUCTION.....	18
4.2 DESCRIPTIVE STATISTICS	18
4.3 CORRELATION ANALYSIS.....	19
CHAPTER FIVE: SUMMARY, CONCLUSION AND POLICY IMPLICATIONS	24
5.0 INTRODUCTION.....	24

5.2 CONCLUSION	24
5.3 POLICY RECOMMENDATIONS.....	24
5.4 AREAS FOR FURTHER RESEARCH.....	25
REFERENCES.....	26
APPENDICES	29

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Commercial banks play a crucial role in supporting financial markets and have a substantial bearing on the success of an economy (Samad A. *et al.*, 2006). The core function of financial intermediaries is to help the movement of funds to the borrowers from the savers. Boyd and Prescott (1986), postulates that financial intermediaries borrow from one set of agents in the economy and lend to another; deal with borrowers whose information may be different from theirs; produce expensive information on the qualities of would-be borrowers and use it to assign loans and set terms; are well diversified to the extent that the subsets of borrower and lenders are typically large and issue securities which have pay-offs that are different from the ones they hold. The Kenyan financial sector is dominated by commercial banks which implies that a slight failure in this sector will have adverse effect on a country's economic growth (Ongore and Kusa, 2013). Additionally, Adusei (2015) argues that the collapse of one bank has widespread impact to the financial system and a country's economy as a whole. Its therefore important to design an indicator framework for monitoring vulnerability in the financial sector. One of the most important indicators is bank profitability. According to Athanasoglou *et al.* (2008) a banking sector that is profitable has a higher capability to meet adversaries and also enhance the financial systems' strength.

Determinants of bank performance can be put into three groups: variables that are induced by management decision and policy objectives (bank-specific factors), variables that capture the industry structure and market growth (industry-specific factors) and elements that reflect the economic atmosphere under which the bank operates (macroeconomic factors). Some of the bank characteristics include: bank size, credit risk, asset quality, management efficiency, liquidity, default risk and capital adequacy. Industry-specific variables include market concentration and market growth. The most commonly used macroeconomic variables include GDP and inflation.

Large banks should take advantage of economies of scale to get cost advantages which coupled with improved operational efficiency will lead to more profits (Adusei, 2015 and Samad A. *et*

al., 2006). However, there exist mixed results on the effect of bank size on profitability. In presence of considerable economies of scale, bank size will have a positive relationship with bank profitability (Akhavain *et al.*, 1997). There is also a possibility to have a negative link between the size of a bank and its profitability (Sufian and Habibullah, 2009 and Košak and Čok, 2008). Goddard *et al.*, (2004) observed no statistically significant association between the size of a bank and its profitability. In all, it is right to say that evidence on the impact of size on profitability of a bank is not conclusive. This study was meant to establish the association between commercial bank size and commercial bank performance in Kenya.

1.1.1 Kenya Banking Sector

As of year 2015, there were 42 listed commercial banks in Kenya, 39 of which were privately owned while Kenyan Government had controlling stake in the other 3 commercial bank (Central Bank of Kenya). Four of these commercial banks have been put under receivership with the most recent one being Chase bank limited.

Table 1: Commercial bank size in Kenya, Uganda and Tanzania: 2007-2014

Year	Bank Size (Total Assets) Million Kshs		
	Kenya	Uganda	Tanzania
2007	797,237.00	205,606.06	405,412.86
2008	934,197.00	298,364.18	522,525.83
2009	1,074,617.00	344,314.60	593,579.26
2010	1,374,460.00	395,901.15	710,861.27
2011	1,602,573.00	439,991.87	821,420.17
2012	1,834,549.00	494,797.97	966,483.51
2013	2,136,656.00	593,710.15	1,097,065.80
2014	2,522,742.00	640,510.22	1,070,255.34

Source: Central bank of Kenya, Bank of Uganda and Bank of Tanzania bank supervision reports and statistical bulletin

All figures are in Kenya Shillings based on the rate exchange at the close of each period.

One of the most commonly used measure of the size of a bank is total assets (Marinković and Radović, 2014). The table above shows total commercial banks assets for the period 2007-2014 in Kenya, Uganda and Tanzania. It's evident that bank size in the three East African Countries had a positive growth over the study period. The size of commercial banks in Kenya as measured by the total assets increased by 68.40% from 797,327 Million in 2007 to 2,522,742 Million

Kenya Shillings in 2014. In Uganda, bank size grew by 67.90% from 205,606.06 Million in 2007 to 640,510.22 Million Kenya Shillings in 2014. Lastly, in Tanzania, the size of commercial banks grew by 62.12% from 405,412.86 Million in 2007 to 1,070,255.34 Million Kenya Shillings in 2014. From the table, it's evident that Kenya has the largest commercial banks, followed by Tanzania and Uganda has the smallest.

The performance measures of commercial banks have several dimensions. One of the most essential dimensions is profit. Profits as a measure of performance can be analyzed into two ways: return on equity (ROE) and return on asset (ROA). Return on asset illustrates profits gained per dollar of assets, most crucially, echoes management's capability to create revenue from the assets at their disposal. ROE shows how efficiently the management of the bank is making use of shareholders' funds.

Table 2: Commercial bank performance in Kenya, Uganda and Tanzania: 2007-2014

	Commercial Bank Performance					
	Kenya		Uganda		Tanzania	
Year	ROA	ROE	ROA	ROE	ROA	ROE
2007	2.70%	28.00%	3.80%	30.70%	2.90%	25.00%
2008	2.60%	26.50%	3.50%	24.80%	3.83%	23.25%
2009	2.60%	25.00%	3.00%	18.80%	3.22%	18.44%
2010	3.80%	28.20%	2.70%	18.00%	2.16%	12.13%
2011	4.40%	30.90%	4.00%	27.30%	2.53%	14.47%
2012	4.70%	30.00%	3.90%	24.20%	2.58%	13.88%
2013	4.70%	29.20%	2.50%	15.20%	2.55%	13.08%
2014	3.40%	26.70%	2.60%	16.10%	2.51%	12.56%

Source: Central Bank of Kenya, Bank of Uganda and Bank of Tanzania Bank Supervision Annual Reports: 2007-2014

Table 2 shows commercial banks performance in Kenya, Uganda and Tanzania in terms of ROA and ROE. In the year 2007, Ugandan commercial banks had the best performance. In 2008 and 2009, Tanzanian commercial banks had the best performance in terms of ROA while Kenyan commercial banks had the best performance in terms of ROE. From 2010 to 2014, Kenyan commercial banks had the best performance. From table 1, the size of the banks in the three

countries had a positive growth each year. However, bank performance within the same period as shown in table 2 was a little volatile.

1.2 Statement of the problem.

Ever since the world emerged from the 2007/08 crisis, the debate on optimal bank size has heightened (Viñals et al., 2008). Many institutions have become too large in absolute size. However, a review of bank performance literature showed that the research on the impact of bank size on commercial bank profitability in Kenya had not been incorporated in previous studies. Most of the studies focused on the determinant of commercial bank profitability. Susan Moraa Onuonga, (2014) studied the impact of internal factors on bank profitability. Ongore and Kusa, (2013) reviewed the factors affecting commercial banks financial performance. Kiganda, (2014) investigated the impact of macroeconomic factors on profitability of Equity Bank Ltd. This study sought to fill this knowledge gap by exploring the effect of bank size on commercial bank performance in Kenya.

Consistent with the research problem, this study raised the following research questions:

- What is the impact of bank specific-factors on commercial bank performance in Kenya?
- What is the impact of industry-specific factors on commercial bank performance in Kenya?
- What is the impact of macroeconomic conditions on commercial bank performance in Kenya?

1.3 Objectives of this study

The main objective of this study was to investigate the effect of bank size on commercial bank performance in Kenya. With specific objectives being:

- i. To analyze the effect of bank-specific factors on commercial bank performance in Kenya.
- ii. To analyze the effect of industry-specific factors on commercial bank performance in Kenya.
- iii. To analyze the effect of macroeconomic factors on commercial bank performance in Kenya.
- iv. To provide policy recommendations based on the findings in (i), (ii) and (iii) above.

1.4 Significance of the Study

The stability of the financial system heavily depends on profitability of banks and the factors affecting this profitability (Mörttinen *et al.*, 2005; Borio, 2003). The banking sector assembles and allocates savings, sustains trade, assists in diversification of risk thus promoting economic growth (Levine, 1997). Therefore, finding answers to the above research questions would be important to single out the factors that determine a successful commercial bank so as to draft policies to enhance bank performance.

This study contributed to prevailing literature by presenting new empirical evidence on the impact of bank size on bank profitability in Kenya. Furthermore, currently, this kind of study has not been done in the Kenyan banking sector.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews iterated literature on the subject under study as presented by various scholars, authors, researchers and analysts. The chapter is organized based on the specific objectives in order to ensure relevance of the problem. The chapter provides a distinct comprehension of prevailing knowledge on the topic under study. The specific areas covered include the theoretical underpinning of the study and the empirical review which include bank size, liquidity, capital adequacy, asset quality, age, market concentration, GDP and inflation.

2.2 Theoretical Review

The agency theory, stewardship theory and the inverted U-curve theory can help explain the link between commercial bank size and profitability. Agency theory of the firm suggests that the interests of shareholders and managers are in constant conflict. The actions and decisions of managers are skewed towards personal gain. This implies that the managers can increase the size of the bank to gain more power and earn higher salaries. According to this theory, bank size will have a negative influence on bank profitability. Stewardship theory suggests that managers are naturally trustworthy and hence are not susceptible to misuse firm's resources (Davis *et al.*, 1997). Stewardship theory postulates that managers are good stewards of the corporate assets.

The inverted U-curve theory suggests that profitability will first rise as the bank size increases, eventually level-off overtime, and then begin to fall as the bank becomes extremely large. A large financial institution can contract with a huge number of borrowers which results in diversification which further reduces the anticipated cost of overcoming information asymmetries. This results in cost savings which leads to higher profits. In other words, a large bank will be able to take advantage of economies of scale. The counter argument is that as the bank becomes too large, profits will start to fall because of bureaucratic reasons thus exhibiting a nonlinear relationship.

2.3 Empirical Review

There are three major categories of factors determining bank profitability which include bank-specific factors, macroeconomic environment and industry-specific factors. This section will

discuss five bank-specific factors (Bank size, Age, Liquidity, Capital adequacy and Asset quality) one industry specific variable (Concentration) and two macroeconomic factors (Inflation and GDP).

2.3.1 Bank size

In the banking industry, the size of a bank is used to capture economies and diseconomies of scale. The size of a bank is computed as the logarithm of total assets. We also include size squared (S^2) in the model so as to account for potential nonlinearities due to diseconomies of scale as the bank becomes extremely large.

Using panel data analysis, Pervan *et al.*, (2015) studied profit persistence and factors determining bank profitability in Croatia within the period 2002 to 2010 and realized a positive and significant association between bank size and profitability. Total assets were log transformed to capture bank size and applied the Arellano and Bond, (1991) GMM estimation technique. Their results postulate that banks should make use of their size to exploit cost advantages whose realization together with improved management would contribute to further increases in efficiency which would result into higher profitability. This is in conformity with earlier studies that realized a significantly positive association between bank size and profitability (Adusei, 2015; Pervan and Pervan, 2010; Flamini *et al.*, 2009 and Kosmidou, 2008)

The above findings are however in sharp contrast with the findings of Naceur and Goaid, (2008) who studied the impact of macroeconomic environment, financial structure and bank specific characteristics on the profitability of Tunisian bank's from 1980-2000. The study found out that bank size had a negative influence on profitability. This study applied Fixed effect (FE) model, Random coefficient model and Random effect (RE) model. According to Košak and Čok, (2008), the negative relationship can be as a result of diseconomies of scale that are associated with large banks especially after accelerated growth periods.

Heffernan and Fu, (2008) used system GMM to study the profitability of different Chinese banks from 1999-2006 and found that bank size had no statistically significant influence on bank performance. Their findings are in conformity with the outcomes of Goddard, (2004) and Athanasoglou, (2008).

Gibson and Eichengreen, (2001) proposed that growing a banks' size would have a positive impact on profitability up to a certain point beyond which, any further increase in size will negatively affect profitability. For systemically large banks, growth appears to have progressed beyond the point where it can be rationalized on the grounds of shareholders interest (Demirguc-Kunt and Huizinga, 2012).

2.3.2 Control Variables.

Liquidity risk: It arises when the bank is not able to accommodate declines in its obligations (Liabilities) or to finance increases in loan demand. This variable is a crucial contributing factor of bank profitability because the market for loans particularly credit to firms and individuals is precarious and therefore holds higher expected returns than other asset portfolio for instance, government securities. It is therefore anticipated that high liquidity will lead to high profitability (Bourke, 1989). This proposition is in harmony with the results of Sufian and Habibullah, (2009) who surveyed the performance of thirty seven commercial banks in Bangladeshi between 1977 and 2004. They used the ratio of total loans to assets to represent bank liquidity and employed a log-linear regression model. They found out that high loan-to-assets ratio positively impacts bank profitability.

The above results are contrary to the findings of Marinković and Radović, (2014) in their study of factors determining bank net interest margin in Serbia. Their study applied panel OLS approach and established an inconclusive association between liquidity and bank profitability. This is because all banks hold a liquidity reserve equal to the ratio imposed by the regulator.

Capital adequacy: it's measured as a ratio of total equity (total shareholders fund) to total bank assets or a ratio of capital reserves to total bank assets. It's expected that banks with high capital adequacy ratio will experience minor financial hardships during a financial crisis which will lead to higher profits. Susan Moraa Onuonga, (2014) in her study of the performance of the leading six commercial banks in Kenya using Generalized Least Square method found out that capital adequacy had a positive impact of bank performance. The study states that well capitalized banks can access more funds at cheaper cost hence able to lend at low interest rates and reduces the need for external funding which culminates into high profits. Sufian and Habibullah, (2009) confirmed the above results in their study of Bangladeshi commercial banks.

Other studies in support of the above findings include Molyneux and Forbes, 1995 and Berger, 1995.

Asset quality: This is measured by the ratio of non-performing loans to total loans. This is because loan is a key income generating asset for commercial banks. A lower ratio shows a healthy loan portfolio and it's expected to impact positively on bank profitability (Sangmi and Nazir, 2010).

Age: Large amounts of empirical research has been generated to explain the importance of age in firms' performance. Beck et al (2005) shows that older institutions perform worse than new entrants. This results are confirmed by Hsiu-Ling et al (2007) who established that the older the bank, the worse the ROA.

Market concentration: According to economic theory, there is a likelihood that market concentration will either positively or negatively affect bank profitability. Pervan, (2015) in their study of factors determining profitability and persistence of profits in the Croatian banking sector within the period 2002-2010 found out that concentration (CR4d) had a positive and statistically significant influence on profitability. Their study employed Generalized Methods of Moments estimation technique and used the deposit shares of the four largest commercial banks to compute the concentration ratio. The above findings are in conformity with Demirguc-Kunt and Huizinga, (1999), Gilbert, (1984) and Rhoades, (1982). They suggest a monotonic link between the concentration of a firm and superior performance.

Macroeconomic factors: The two most commonly used macroeconomic variables include GDP and inflation. GDP measures the overall health of the economy. The intuition is that with economic growth, business environment is improved and barriers to entry are lowered, this leads to high competition which causes profitability reduction (Tan and Floros, 2012). On the other hand, increasing GDP suggests an improvement in the general income in an economy and thus profit enhancing (Kosmidou, 2008). Other researchers who established a positive impact of GDP growth on bank performance include Pervan *et al.*, (2015) and Sufian and Habibullah, (2009).

Inflation can either be anticipated or unexpected. If it's anticipated, bank management will have a chance to adjust interest rates appropriately which enhances profitability (Perry, 1992). The above positive link is supported by Guru *et al.*, (2002), who studied profitability determinants in

the Malaysian banking sector from 1986-1995. On the other hand, unexpected inflation causes cash flow problems to borrowers leading to abrupt abrogation of loan arrangements negatively affecting bank profitability. Pervan *et al.*, (2015) in their study of profit persistence and factors determining bank profitability in Croatia found out that inflation had a negative influence on bank performance. The negative link is supported by Sufian and Habibullah, (2009).

2.4 Overview of Literature

A review of previous literature in the former section shows that the effect of a variety of factors that determine bank performance is inconclusive. Most of the studies done in Kenya examined the determinants of bank profitability (Susan Moraa Onuonga, 2014;Kiganda, 2014;Ongore and Kusa, 2013). From the literature review, the key determinants of profitability include bank characteristics (bank size, liquidity, capital adequacy, asset quality, default risk, management efficiency and bank age), industry characteristics (market growth and market concentration) and macroeconomic environment (economic growth and inflation rate). It's worthwhile to note that no study in Kenya has focused entirely on the effect of commercial bank size on commercial bank profitability. Therefore, this study aims at filling this gap.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

The methodology employed in determining how bank profitability is influenced by bank size is presented in this chapter. The variables used in the study are explained, including sources of data and diagnostic tests to be performed on the data.

3.2 Theoretical Framework

We discussed the impact of commercial bank size on profitability as we controlled for other factors that influence bank profitability which include: liquidity, capital adequacy, age, asset quality, market concentration and macroeconomic factors. We employed three sets of theories which include: stewardship theory, agency theory and inverted U-curve theory. Stewardship theory forecasts that bank size will have a positive impact on bank profitability. The agency theory predicts that bank size will negatively affect bank performance. Alternatively, the inverted U-curve theory suggests that bank profitability will first rise as the bank size increases, eventually level-off overtime, and then begin to fall as the bank becomes extremely large.

Establishing the link that exist between commercial bank size and profitability will enable policy makers to formulate policies that will enhance profitability of commercial banks.

3.3 Model Specification

Considering the dynamic nature of commercial bank profits, a model with dynamic specification was formulated. The previous period's profit is included in the model as a determinant of profitability in the present period. The model takes the form:

$$\pi_{it} = \alpha + \delta\pi_{it-1} + \sum_{k=1}^K \beta_k X_{it}^k + \sum_{l=1}^L \beta_l X_{it}^l + \sum_{m=1}^M \beta_m X_t^m + \varepsilon_{it} \dots \dots \dots (1)$$

$$\varepsilon_{it} = v_{it} + \mu_i$$

Where π_{it} is the profit of bank i at time t , α is a constant term and π_{it-1} shows one-period lagged profitability with δ being the adjustment speed. Any value of δ between 0 and 1 implies that profits persist where zero implies no competition and one implies high competition. v_{it} is the idiosyncratic error and μ_i is the unobserved bank effect where $V_{it} \approx IID(0, \delta_v^2)$, and $\mu_i \approx IID(0, \delta_\mu^2)$. $X^l, X^K \& X^m$ represent a vector of industry specific factors, bank specific factors and macroeconomic factors respectively while $\beta_k, \beta_l \& \beta_m$ are the slope coefficients.

The measures of profitability used include ROE and ROA. We adopted a model which considered bank profitability being a function of one-period lagged profits, size, liquidity, age, capital adequacy, asset quality, market concentration, inflation and GDP growth.

This is expressed as:

Bank profitability = $f(\text{One-period lagged profit, Size, Age, Liquidity, Capital adequacy, Asset quality, Market concentration, Inflation and GDP})$

Generally, the models to be estimated are:

$$\ln ROA_{it} = \beta_0 + \delta \ln ROA_{it-1} + \beta_1 \ln S_{it} + \beta_2 \ln LI_{it} + \beta_3 \ln CA_{it} + \beta_4 \ln AQ_{it} + \beta_5 \ln HH_t + \beta_6 \ln INF_t + \beta_7 \ln GDP_t + \beta_8 \ln (AG)_t + \varepsilon_{it} \dots \dots \dots (2)$$

$$\ln ROE_{it} = \beta_0 + \delta \ln ROE_{it-1} + \beta_1 \ln S_{it} + \beta_2 \ln LI_{it} + \beta_3 \ln CA_{it} + \beta_4 \ln AQ_{it} + \beta_5 \ln HH_t + \beta_6 \ln INF_t + \beta_7 \ln GDP_t + \beta_8 \ln (AG)_t + \varepsilon_{it} \dots \dots \dots (3)$$

Where S is the bank size, LI is bank liquidity, CA is capital adequacy, AQ is asset quality, HH is market concentration, GDP is the annual gross domestic product, INF is annual inflation rate and AG is the bank age in years. All data is log transformed to deal with skewness.

3.4 Estimation and testing procedures

This panel study utilized unbalanced panel data of Kenya commercial banks spanning from 2007 to 2014. Model (1) forms the basis of our estimation. However, with this dynamic specification, estimators like random effect (RE), OLS and fixed effect (FE) become biased. OLS estimator will be inconsistent and biased because of correlation between lagged variable and the error term. The FE estimator will be biased since the lagged variable is correlated with the previous periods' error term i.e. $E(\pi_{it-1}, v_{it-1}) \neq 0$. The consistency of FE estimator will depend on T

being large. RE generalized least square estimator will be biased since after quasi-demeaning is performed, $(\pi_{it-1} - \theta\bar{\pi}_{i-1})$ and $(\varepsilon_{it-1} - \theta\bar{\varepsilon}_{i-1})$ will be correlated. The instrumental variable estimator will be consistent but not necessarily efficient since it doesn't consider each and every moment condition. As proposed by Arellano and Bond, (1991), GMM estimation can overcome the above problems. Some of the greatest advantages of GMM is that it does not need distributional assumptions such as normality and can permit for heterogeneity of unfamiliar form (Marno Verbeek, 2004).

However, Arellano and Bond estimator is inefficient when applied to panel data with small T and with weak instruments. We therefore adopt system GMM estimator proposed by Blundell and Bond (1998). The system GMM estimator reduces the finite sample bias, improves the accuracy of the estimates and controls for unobserved heterogeneity. We use two-step GMM estimation. The two-step GMM estimator uses the first step GMM estimator errors to construct heteroscedasticity-consistent standard errors while one-step estimator assumes homoscedastic errors. Therefore, the two-step estimator is more efficient than one-step estimator even when the error term is homoscedastic. However, the standard errors of the two-step estimator are downward biased due to estimation of the weighting matrix and hence we used corrected standard errors as proposed by Windmeijer (2005).

The tests performed on the econometric model (1) are as follows: First, we test for over-identification of the model. Second, we test for first and second-order serial correlation.

We test the validity of our model using Hansen test of over-identification. The value of Hansen J test should exceed 0.05 in order to exclude the possibility of endogenous instrumental variables (Pervan *et al.*, 2015). If we do not reject null hypothesis, it means that all moment conditions are met and all the instrumental variables are accepted.

Serial correlation (First and Second order) is tested by computing *AR(1)* and *AR(2)* Arellano and Bond tests. *AR(1)* will test for the independence of residual difference while *AR(2)* will test for lack of second-order serial correlation in the first difference residuals (Arellano and Bond, 1991).

3.5 Data set and measurement of Variables

3.5.1 Data Sources

Annual data on bank specific variables and industry specific variables was pulled together from annual financial statements of Kenya's commercial banks within the period 2007-2014. This data is available in the bank supervision reports of Central Bank of Kenya. Macroeconomic variables are retrieved from Kenya National Bureau of Statistics database.

3.5.2 Dependent Variables

The study uses two measures of bank profitability which include ROE and ROA. ROA is computed as follows:

$$ROA = \frac{NetProfit\ Before\ Tax}{Total\ Asset}$$

The ratio shows the profits earned per a dollar of asset, most essentially, it indicates management's ability to utilize banks resources to make profits (Dietrich and Wanzenried, 2011).

ROE is another measure of profitability and its calculated as follows:

$$ROE = \frac{NetProfit\ Before\ Interest\ and\ Tax}{TotalEquity}$$

3.5.3 Bank Specific characteristics

Bank Size (S): It captures economies and diseconomies of scale. The log transformed total assets represents bank size (Amindu and Wolf, 2013). It can also be computed as natural logarithm of customer deposits. Some of the studies that use logarithm of total assets to represent bank size include: (Sufian and Habibullah, 2009; Adusei, 2015 and Demirguc-Kunt and Huizinga, 2012). Empirical results on the bearing of bank size on bank profitability are mixed. To account for potential nonlinearities due to diseconomies of scale as the bank becomes extremely large, we include size squared (S^2) in the model. Therefore, we predict an indeterminate link between bank size and bank profitability.

Asset Quality (AQ): It's measured as the ratio of non-performing loans to total loans. It shows the quality of a banks' loan portfolio (Samad A. *et al.*, 2006). We therefore postulate a positive link between asset quality and bank profitability.

Table 3: Summary of variables and measurements

Variable	Measure	Expected sign effect	Source
ROA	Ratio of Net profit before tax to total assets		CBK
ROE	Ratio of Net profit before tax and interest to total assets		CBK
<u>Bank Specific Characteristics</u>			
Bank size S	Natural log of total assets	Indeterminate	CBK
Capital Adequacy CA	Total equity to total assets ratio	Positive	CBK
Liquidity LI	Total loans to total assets ratio	Positive	CBK
Age AG	Number of years	Negative	CBK
Asset Quality AQ	Non-performing loans to total loans ratio	Positive	CBK
<u>Industry Specific Variables</u>			
Market Concentration (HH)	Herfindahl Hirshman Index (Crd4)	Positive	CBK

<u>Macroeconomic Condition</u>			
Gross Domestic Product (GDP)	Annual GDP growth	Positive	KNBS
Inflation (INF)	Growth in consumer price index	Negative	KNBS

Capital Adequacy (CA): It's measured as a ratio of total equity to total bank assets. This ratio reflects the financial leverage degree of a bank. A greater equity asset ratio implies high risk aversion and safeguard to bank default risk. Molyneux, 1993 postulates that high amount of equity reduces capital cost thus triggering a positive effect on profitability. Other studies that support the positive link between high capitalization and profitability include: Berger, 1995; Sufian and Habibullah, 2009 and Pervan *et al.*, 2015. We therefore postulate that capital adequacy will have a positive influence on bank profitability.

Liquidity (LI): This shows bank's capability to accommodate its financial liabilities when they fall due. Total loans to assets ratio represents bank liquidity. Some of the studies that have used this ratio to represent bank liquidity include: Sufian and Habibullah, 2009 and Bourke, 1989. A higher ratio shows that the bank has more of its assets in loans. This implies a high credit risk exposure which implies a higher rate of interest to be charged hence high profits earned (Curak *et al.*, 2012). It's therefore expected that high liquidity will lead to high bank profitability.

Age (AG): The total number of years that a bank has been in operation will be used to capture the age of the bank. Age captures learning effect. We expect a negative association between bank age and performance.

3.5.4 Industry Specific Variables

Market Concentration (HH): It is computed as the deposits share of the four biggest commercial banks in overall bank deposits. It's measured by the Herfindahl-Hirschman index. The smaller the index, the higher the competition and the smaller the concentration. Pervan *et al.*, 2015 in their study of profit persistence and profitability determinants of Croatian commercial banks used the deposits share of the largest four banks to compute the concentration ratio. Most of the

studies suggest a monotonic association between firm's concentration and superior performance (see Gilbert, 1984, Rhoades, 1982 and Heggstad and Mingo, 1977). We therefore expect that market concentration to positively influence profitability.

3.5.5 Macroeconomic Factors

Gross domestic product (GDP) growth: This measures the overall health of the economy. The variable has different results in different studies. Some studies suggest an inverse association between growth of GDP and bank profitability (Tan and Floros, 2012) while others suggest a direct relationship (Pervan *et al.*, 2015;Sufian and Habibullah, 2009). We therefore expect GDP growth to positively influence profitability.

Inflation (INF): This is used as a measure of macroeconomic stability and its computed by the annual consumer price index. The Fishers equation is the rational for including annual inflation rate. Fishers equation postulates that based on market expectations of inflation rates in the future, that nominal interest rates will be adjusted thus increasing the difference between interest expense and interest revenue (Marinković and Radović, 2014). High inflation rates threaten firms and household liquidity, reducing their ability to pay back loans hence negatively affecting profitability. We therefore postulate that inflation will negatively influence bank profitability.

CHAPTER FOUR

EMPIRICAL RESULTS AND DISCUSSION

4.1 Introduction.

This chapter presents the findings of the study. This includes the summary statistics, GMM estimation results and diagnostic tests.

4.2 Descriptive statistics

Table 4 presents summary statistics. The mean and the standard deviation for ROA and ROE are within the expected range. However, there is a wide range between the minimum and the maximum ROA and ROE. ROE ranges from -17% to approximately 30% with a median of 2.9% and a mean of 2.7% implying that a few observations fell above the mean while a majority of observations were clustered below the mean. ROE ranges from -17% to approximately 45% with a mean of 6.4% and a median of 6.6%. The positive average ROA and ROE implies that the Kenyan banking sector is moderately profitable. This is consistent with Ongore and Kusa, (2013) who found positive average ROA and ROE in their study of the determinants of financial performance of commercial banks in Kenya.

Table 4: Summary Statistics.

Variable	Notation	Obs	Mean	Median	Std Dev	Max	Min
Return on asset	ROA	333	0.0272	0.0292	0.0343	0.3066	-0.1752
Return on equity	ROE	333	0.0641	0.0663	0.0488	0.4494	-0.1743
Capital adequacy	CA	333	0.1753	0.1490	0.1185	1.1241	0.0271
Asset quality	AQ	331	0.0864	0.0527	0.1090	1.0510	0
Liquidity ratio	LI	333	0.5692	0.5504	0.4663	6.3791	0

Log size	S	333	23.6615	23.4063	1.3633	26.6554	20.0120
Age	AG	333	28.1832	18	25.686	118	1
Market concentration	HH	336	0.0493	0.0469	0.0103	0.0653	0.0372
GDP growth (%)	GDP	336	5.0594	5.5076	2.3104	8.4028	0.2323
Inflation rate (%)	INF	336	9.6702	8.5996	4.3374	18.3055	3.8104

4.3 Correlation analysis

Table 5 shows the correlation analysis. According to Kennedy (2008), multicollinearity becomes a problem if the correlation coefficient is more than 0.7. There is a positive correlation between bank profitability (ROA) and banks size (S), capital adequacy (CA), GDP growth and bank age (AG). As the bank size increases, bank profitability tends to increase. Banks that are well capitalized face lesser cost of funding and hence as capitalization increases, bank profitability increases as well. As the banks become older, their profitability tends to increase. This confirms the learning effect. However, there is a negative correlation between ROE and capital adequacy. This implies that banks operate too carefully and ignoring lucrative investment prospects. The banks face a high cost of funding due to low capitalization and hence the negative correlation with bank performance (ROE).

Asset quality (AQ) and market concentration (HH) have a negative correlation with bank performance (ROE & ROA). The negative correlation between asset quality and bank performance implies that as the level of non-performing loans increases, bank profitability decreases. The negative correlation between market concentration and bank performance implies that high competition negatively affects bank profitability.

Table 5: Correlation Matrix

	ROA	ROE	CA	AQ	LI	AG	HH	INF	GDP	S
ROA	1									
ROE	0.5634	1								
CA	0.1542	-0.0801	1							
AQ	-0.3736	-0.2352	0.0995	1						
LI	-0.089	0.082	0.1018	-0.0539	1					
AG	0.3906	0.1396	-0.1221	-0.1414	-0.1378	1				
HH	-0.039	-0.1445	-0.0105	-0.0089	0.1004	-0.1038	1			

INF	-0.0417	0.0504	-0.0332	-0.0537	0.0775	-0.0091	0.1685	1		
GDP	0.0293	0.0407	-0.0233	-0.0005	-0.0577	0.0374	-0.517	-0.6841	1	
S	0.4232	0.2656	-0.2896	-0.3282	-0.055	0.4645	-0.290	-0.0098	0.1127	1

4.4 Estimation results and discussion

Determining the extent to which bank performance depends on bank size was the key objective of this study. A more comprehensive model specification to test further this link, was guided by the summary statistics in the previous sub-section. Table 6 shows estimation results using system GMM as discussed in chapter three. The regression results for ROA were not plausible as indicated by AR (2) test and hence not discussed here (see in the appendix).

The estimated equation fits the panel reasonably well as indicated by the F test. The test has a p value of less than 5% thus rejecting the null hypothesis that all coefficients in our regression are equal to zero. The results show the presence of negative first-order autocorrelation. However, this does not imply inconsistent results because this case is rejected by AR (2) tests for the null hypothesis that there is no serial correlation in the first difference residuals. The p-value for the second order autocorrelation implies that the moment conditions of the model are valid. This further implies that the estimates of the model are consistent (Arellano and Bond, 1991). The Hansen J test of over identifying restrictions shows a p-value of 0.468. This test has the null hypothesis that the instruments as a group are exogenous. The results show a p-value greater than 0.05 implying that our instruments choice is valid.

The speed of adjustment is highly significant confirming the dynamic nature of the model. It takes the value of approximately 0.65 implying that profits persist in the Kenyan banking sector. This further implies that the Kenyan banking sector is not competitive. The results confirm the findings of Pervan *et al.*, (2015). The findings signal barriers to competition reflecting either impediments to market competition or informational asymmetry, Berger *et al.*, (2000). This may also indicate the existence of market power in the industry.

Table 6: Two-step system GMM estimation results (dependent variable: ROE)

Variant model specification			
Variable	Notation	1	2
Lagged ROE	ROE_{t-1}	0.6451* (7.68)	0.6451* (7.68)
Bank size	S	0.0856 (1.56)	
Size squared	S^2		0.0428 (1.56)
Capital adequacy	CA	0.0845 (0.34)	0.0845 (0.34)
Asset quality	AQ	-0.0759 (-1.09)	-0.0759 (-1.09)
Liquidity	LI	-0.1639 (-1.01)	-0.1639 (-1.01)
Age	AG	-0.1031 (-1.34)	-0.1031 (-1.34)
Market concentration	HH	0.5219* (2.06)	0.5219* (2.06)
Inflation	INF	0.1251* (2.41)	0.1251* (2.41)
GDP growth	GDP	0.0755* (2.25)	0.0755* (2.25)
F -test		F(9, 42)=135.26 Prob>F =0.000	F(9, 42)=135.26 Prob>F =0.000
Hansen J ^a		$\chi^2(8) = 7.65$ Prob>chi2=0.468	$\chi^2(8) = 7.65$ Prob>chi2=0.468

AR(1) ^b		z=-2.86 p-value=0.004	z=-2.86 p-value=0.004
AR(2) ^c		z=1.19 p-value=0.233	z=1.19 p-value=0.233

This table shows regression results to determine the impact of bank size on performance while controlling for macroeconomic, industry specific and bank specific factors. Estimations were performed using two-step system GMM. T-statistics are in parenthesis and significance at 1% is noted by *. Estimation at 5% and 10% produced no changes in significance of estimates hence not included.

Bank Size

Contrary to theory, the impact of bank size on bank performance is positive but not statistically significant. We also did not find evidence of non-linear effects on bank size. This implies the absence of significant economies of scale in the Kenyan banking sector. The results confirm the findings of Heffernan and Fu, (2008) in their study of profitability of different Chinese banks for the period 1996-2006. The insignificant link between bank size and bank performance confirms the agency theory of the firm. A growth strategy in the Kenyan banking sector may not be to the best interest of the shareholders. The results can further be elucidated by the fact that small sized and new banks place a lot of emphasis on growing faster than improving profitability.

The results show that the effect of capital adequacy on bank profitability is positive but statistically insignificant. We cannot confirm the results of Ongore and Kusa, (2013) who found a positive and statistically significant association between capital adequacy and bank performance in Kenya. Our results show that capital adequacy does not matter in determining bank profitability. This implies that most profitable banks neither finance their operations with debt instruments nor equity.

Asset quality shows negative but insignificant impact on bank profitability implying that it doesn't matter in determining bank profitability. Liquidity is negatively related with bank profitability but the relationship is statistically insignificant. This is supported by the fact that liquidity management is more related to fulfilling depositors obligations which is consistent with Ongore and Kusa, (2013). Bank age had a negative and statistically insignificant impact of bank profitability. This fails to confirm the learning effect in Kenyan banking sector.

Market concentration had a positive and significant relationship with bank profitability. As concentration increases, competition decreases and profitability increases. One of the paradigm that advocates for this relationship is structure conduct performance paradigm which postulates that the most important profitability determinant is increased market power driven by increased market growth and concentration. A profitability enhancing market growth ensues when demand for bank products and services rises as a result of better quality services and acceptable price. The results confirm the findings of Pervan *et al.*, (2015), Gilbert, (1984) and Rhoades, (1982).

The level of inflation, measured by CPI had a positive and significant effect on bank profitability. This implies that inflation was anticipated and hence the bank management had a chance to adjust interest rates accordingly further increasing the spread between interest revenue and interest expense causing a positive effect on profitability. The results are in conformity with the findings of Guru *et al.*, (2002) who studied profitability determinants in the Malaysian banking sector from 1986-1995 and found a positive link between inflation and bank performance. The results do not however confirm the findings of Pervan *et al.*, (2015) and Sufian and Habibullah, (2009) who found a negative link between inflation and bank performance.

GDP growth has a positive and significant impact on bank performance. This suggests an improvement in the general income in the economy is profit enhancing. GDP growth positively affects loan demand and supply of deposits hence the positive impact on bank profitability. The positive relationship is supported by Pervan *et al.*, (2015), Sufian and Habibullah, (2009) and Kosmidou, (2008). The results did not confirm the findings by Tan and Floros, 2012) that with economic growth, business environment is improved and barriers to entry are lowered leading to high competition which reduces profitability.

CHAPTER FIVE

SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

5.1 Introduction

This study investigates the impact of bank size on bank performance in Kenya's commercial banks. The impact of bank size on bank profitability is analyzed by specifying a framework that uses macroeconomic factors, industry specific factors and bank specific factors. The study uses dynamic panel data of Kenyan commercial banks spanning from 2007-2014.

5.2 Summary of findings

Estimation results show that bank size doesn't matter towards bank profitability. Bank size has a positive and statistically insignificant impact on bank profitability. The impact of inflation on bank performance is positive and significant. The implication is that commercial banks in Kenya properly anticipate inflation and adjust prices of their services accordingly. GDP growth has a positive impact on commercial bank profitability in Kenya. Market concentration has a positive and significant on profitability. This implies that banking industry in Kenya is not competitive. The previous period profitability was positive and statistically significant implying that profits persist in the Kenyan banking sector which also points to non-competitive banking industry.

5.3 Conclusion

From the results of the study, we have established that bank size, capital adequacy, liquidity, age and asset quality do not count in determining bank profitability in Kenya. Additionally, we have established that previous period's profit, GDP growth, inflation and market concentration have a positive and statistically significant effect on bank profitability in Kenya. To the extent that market concentration positively affects bank profitability, commercial banks should intensify their deposit mobilization efforts in order to increase profitability.

5.4 Policy Recommendations

The research results have implications for both the bank management and the policy makers. Since bank size is insignificant in determining bank profitability, banks should not pursue strategies for increased growth. The results do not show the presence of significant economies of scale to warrant increased profitability through increased growth.

Policy makers should come up with policies that enhance GDP growth and macroeconomic stability so as to enhance profitability in the banking sector in Kenya. GDP growth positively affects various factors of demand for and supply of loans thereby promoting profitability in the banking sector while a monetary policy that enhances price stability would reduce the household's liquidity risk and subsequently their default risk thereby improving banks profitability. Considering the positive and significant link between concentration and bank profitability, policy makers should also come up with policies that enhance fair competition in the financial sector. This is because as the bank increases its share of customer deposits, its profitability increases and this can lead to monopoly power.

5.5 Areas for further research

This study has established an insignificant link between bank size and bank performance but further studies needs to be done to establish the optimal bank size while incorporating market value measures of performance. Additionally, some variables used in other studies were excluded in this study such as management efficiency and technological development. Therefore, further research that includes these variables should be done to establish if and why there may be changes in estimated parameters.

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APPENDICES

Appendix 1: Estimation results using GMM (dependent variable: ROA)

Variant model specification			
Variable	Notation	1	2
Lagged ROA	ROA_{t-1}	0.3530 (1.62)	0.3530 (1.62)
Bank size	S	0.1469 (1.45)	
Size squared	S^2		0.0734 (1.45)
Capital adequacy	CA	1.3459 (1.94)	1.3459 (1.94)
Asset quality	AQ	0.0031 (0.02)	0.0031 (0.02)
Liquidity	LI	-0.2201 (-0.73)	-0.2201 (-0.73)
Age	AG	0.1400 (1.19)	0.1400 (1.19)
Market concentration	HH	1.1182* (2.23)	1.1182* (2.23)
Inflation	INF	0.00381 (0.05)	0.00381 (0.05)
GDP growth	GDP	0.1094 (1.47)	0.1094 (1.47)
F -test		F (9, 42) =369.59 Prob>F =0.000	F (9, 42) =369.59 Prob>F =0.000
Hansen J ^a		$\chi^2(8) = 15.41$ Prob>chi2=0.05	$\chi^2(8) = 15.41$ Prob>chi2=0.05
AR (1) ^b		z=-2.20 p-value=0.028	z=-2.20 p-value=0.028
AR (2) ^c		z=-1.86 p-value=0.044	z=-1.86 p-value=0.044

This table shows regression results to determine the impact of bank size on performance while controlling for macroeconomic, industry specific and bank specific factors. The results were not discussed since the Hansen J test did not reject the null hypothesis hence invalidating the choice of our instruments. The results were not plausible.