

**DETERMINANTS OF INTEREST RATE SPREADS AMONGST  
COMMERCIAL BANKS IN KENYA**

**By**

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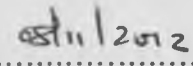
**SCHOOL OF BUSINESS**

**OCTOBER, 2012**

## DECLARATION

I declare that this is my own original work and to the best of my knowledge it has not been submitted for a degree award in any other University or institution of higher learning.

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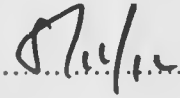
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## **DEDICATION**

This project is dedicated to my beloved son, Warren Zawadi Mugeni; whose coming into this world on 2nd April 2011 was a mystery in itself and inspired me to pursue this programme so as to create a better future for him.

## **ACKNOWLEDGEMENTS**

The MSC Finance Programme has been quite intensive and I would like to appreciate the School of Business for selecting me in the pioneer class.

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## ABSTRACT

This study sought to identify the determinants of interest rate spreads amongst commercial banks in Kenya and to quantify the impact of those factors on interest rate spreads. Determinants from previous studies were used to guide the choice of independent variables, but instead of focusing on the customary spreads or margins of individual banks, the spreads for the banking sector as a whole were examined. Monthly data on the change in overall consumer price index (inflation), 91 day treasury bill rates, inter-bank rate, cash reserve ratio, Central Bank Rate, credit loss ratio (measured by specific provisions to total loans), the ratio of operating costs to total income, and the Herfindahl- Hirschman index (a proxy for market structure) for the entire banking sector were used as independent variables.

A multivariate interest rate spread model was formulated to test the significance of each of the independent variables as determinants of bank's spread. The monthly average data of the variables were regressed against the percentage of interest rate spread for the month as the dependent variable. The study covered the period 2007: 1 to 2011: 12 when the macroeconomic environment was quite volatile, and the debate on interest rate spreads was reignited. Secondary data was obtained from various published sources, but mainly from the Central Bank of Kenya and the Kenya National Bureau of Statistics. The R Statistical Package was used for analysis.

The results of the study indicate that over the last five years, the Central Bank Rate and the Credit Loss Ratio have been the most significant determinants of interest rate spreads amongst commercial banks in Kenya. The Treasury Bill Rate and Market Structure have also contributed to banking sector spreads. The results however also clearly indicate that many of the factors commonly believed to be critical determinants of interest rate spreads may not in fact have been relevant to the size of the banking sector spreads over the last 5 years. Possibly most surprising was the statistical insignificance of the inflation, inter-bank rate and cost to income ratios. Although these variables have been highlighted in previous studies as determinants of interest rate spreads they were unable to explain the variation in banking sector spreads in Kenya for the period studied. This may be due to the relatively short period (5 years), which is insufficient to draw inferences over the long run. The results therefore do not suggest that inflation, inter-bank rate and cost to income ratio are not determinants of the size of spreads, but rather indicate the need for the further studies on these variables, taking a longer period into account.

## TABLE OF CONTENTS

<b>DECLARATION</b> .....	<b>ii</b>
<b>DEDICATION</b> .....	<b>iii</b>
<b>ACKNOWLEDGEMENTS</b> .....	<b>iv</b>
<b>ABSTRACT</b> .....	<b>v</b>
<b>TABLE OF CONTENTS</b> .....	<b>vi</b>
<b>LIST OF FIGURES</b> .....	<b>ix</b>
<b>CHAPTER ONE</b> .....	<b>1</b>
<b>INTRODUCTION</b> .....	<b>1</b>
1.1 Background of the Study .....	1
1.1.1 Overview of Interest Rates:.....	3
1.1.2 Interest Rate Spread: .....	4
1.1.3 Determinants of Interest Rate Spreads: .....	4
1.1.3.1 Operating Costs:.....	5
1.1.3.2 Default Risk: .....	5
1.1.3.3 Market Structure: .....	5
1.1.3.4 Proscribed Reserve Requirements: .....	6
1.1.3.5 Inflation:.....	6
1.1.3.6 Public Domestic Sector borrowings: .....	6
1.1.3.7 Discount Rates: .....	7
1.1.3.8 Inter-bank Rates:.....	7
1.1.3.9 Treasury Bill Rates: .....	8
1.1.4 Commercial Banking Industry in Kenya:.....	8
1.2 Statement of the Problem.....	10
1.3 Objectives of the study.....	14
1.4 Value of the study .....	14
1.4.1: Policy Implications.....	14
1.4.2: Practice .....	14
1.4.3: Theory .....	14
<b>CHAPTER TWO</b> .....	<b>15</b>
<b>LITERATURE REVIEW</b> .....	<b>15</b>

2.1 Introduction.....	15
2.2 Review of Theories .....	15
2.2.1 The Fisher Effect .....	15
2.2.2 The Loanable Funds Theory of Real Interest Rates .....	17
2.2.3 The Liquidity Preference Theory of Interest Rates .....	18
2.2.4 The term structure of Interest Rates .....	20
2.2.5 The unbiased expectations theory .....	20
2.2.6 The Market Segmentation Theory.....	21
2.2.7 Other Factors Impacting Interest Rates .....	22
2.2.8 The Monetary authorities and the rate of interest.....	23
2.3 Empirical Studies.....	25
2.4 Conclusions from Literature Review:.....	29
<b>CHAPTER THREE.....</b>	<b>31</b>
<b>RESEARCH METHODOLOGY .....</b>	<b>31</b>
3.1 Introduction.....	31
3.2 Research Design.....	31
3.3 Population and Sample .....	32
3.4 Data Collection .....	32
3.5 Data Analysis .....	32
3.5.1 Postulations of the Model.....	33
3.6 Estimation Procedure .....	34
3.6.1 Testing overall utility of the model .....	34
3.6.2 Assumptions of the Liner Classical Regression Model.....	35
<b>CHAPTER FOUR.....</b>	<b>36</b>
<b>DATA ANALYSIS AND FINDINGS.....</b>	<b>36</b>
<b>4.1 Introduction; .....</b>	<b>36</b>
<b>4.2 Regression Results: .....</b>	<b>36</b>
<b>4.3 Summary of findings and Interpretation of Results.....</b>	<b>38</b>
4.3.1 Inflation: .....	39
4.3.2 Treasury Bill Rate: .....	39
4.3.3 Interbank Rate: .....	39
4.3.4 Cash Reserve Ratio: .....	40
4.3.5: Central Bank Rate: .....	40
4.3.6: Credit Loss Ratio:.....	41

4.3.7: Cost to Income Ratio:.....	41
4.3.8: Herfindhal- Hirschsman Index:.....	41
<b>4.4 Conclusion .....</b>	<b>42</b>
<b>CHAPTER FIVE .....</b>	<b>43</b>
<b>CONCLUSIONS AND POLICY IMPLICATIONS.....</b>	<b>43</b>
<b>5.1 Introduction.....</b>	<b>43</b>
<b>5.2 Conclusions.....</b>	<b>43</b>
<b>5.3: Recommendations: .....</b>	<b>44</b>
5.3.1: Monetary Policy .....	44
5.3.2: Treasury Bill Rate .....	44
5.3.3: Market Structure.....	44
5.4 Limitations of the Study.....	44
5.5 Suggestions for further Research .....	45
<b>APPENDICES.....</b>	<b>45</b>
APPENDIX 1: SAMPLE DATA COLLECTION FORM	45
Appendix II: Commercial Banks Operating in Kenya as at 31 <sup>st</sup> December 2011 .....	46
Appendix III: Data used in the Study .....	48
Appendix IV: Regression Results .....	51
<b>REFERENCES.....</b>	<b>57</b>



## LIST OF FIGURES

Figure 1: Expected Inflation and Interest Rates (Three-month Treasury Bills), 1953-2005 .....	16
Figure 2: IRS plotted as a time series data showing Autocorrelation functions .....	51
Figure 3: The partial ACF above in fig 3 is cut at lag 1 signifying an AR(1) process .....	52
Figure 4: This is an Autocorrelation function superimposed in a theoretical ACFplot .....	53
Figure 5: Model Assumption (distribution of error term) .....	54
Figure 6: Histograms of the residue .....	55

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

A bank is a financial intermediary that offers loans and deposits, and payment services. Nowadays, banks also offer a wide range of additional services, but it is these functions that constitute banks' distinguishing features. Financial intermediaries and financial markets' main role is to provide a mechanism by which funds are transferred and allocated to their most productive opportunities. Financial intermediaries thus bridge the gap between borrowers and lenders and reconcile their often incompatible needs and objectives. They do so by offering suppliers of funds safety and liquidity by using funds deposited for loans and investments. Financial intermediaries help minimize the cost associated with direct lending – particularly transaction costs and those derived from information asymmetries Smith & Walter (2003).

Commercial banks are considered as profit serving institutions. They accept deposits, provide convenient means of payment, and lend money to their customers in addition to many other services. In return for these services, banks receive different charges and interest. Banks also do pay interest on various deposits. Banks bridge the gap between the needs of lenders and borrowers by performing 3 types of transformation; Size transformation, maturity transformation and risk transformation. Generally, savers/depositors are willing to lend smaller amounts of money than the amounts required by borrowers. Banks collect funds from savers in form of small size deposits and repackage them into larger-size loans. Banks perform this size transformation function exploiting economies of scale associated with the lending/borrowing function, because they have access to a larger number of depositors than any individual borrower. Banks transform funds lent for a short period of time into medium and long-term loans. For example, they convert demand deposits into 25-year residential mortgages. Individual borrowers carry a risk of default (known as credit risk) that is the risk that they might not be able to repay the amount of money they borrowed. Savers on the other hand, wish to minimize risk and prefer their money to be safe. Banks are able to minimize the risk of individual loans by diversifying their investments, pooling risks, screening and

monitoring borrowers and holding capital and reserve as a buffer for unexpected losses. Casu, et al (2006).

The Banking sector of an economy plays a vital role in economic growth and development of a country through vital monetary policy. Banks facilitate trade and commerce by providing safe keeping of cash, means of making payments through the accounts of their clients, finance with appropriate advice on financial matters related to the local as well as international markets. A stable, efficient and business friendly financial system not only reduces uncertainty, cost of transactions and improves economic efficiency through efficient allocation of resources, but also brings the real sector closer to the monetary sector of the economy (Sidiqqi, 2012).

This research project is aimed at analyzing the determinants of interest rate spreads using average loan and deposit interest rate data obtained from the Central Bank of Kenya. The Researcher is motivated by the persistent wide interest spreads in Kenya despite various policy actions implemented to reduce the costs of implicit tax. Though the banks have, in recent weeks, cut lending rates, the cuts are a far cry from what is expected. This has not gone down well with the public. Recent news papers opinion pieces have shown that there remains a pervasive view amongst stakeholders that high interest rate spreads are caused by the internal characteristics of the banks themselves, such as their tendency to maximize profits in an oligopolistic market, while others argue that the spreads are imposed by the macroeconomic, regulatory and institutional environment in which banks operate.

The results are important, as they will aver or refute the claims made by many commercial bank managers that the typically high spreads in Kenya are caused by market and macro factors outside of their control. This, however, is not simply an exercise in apportioning blame, because as Randall (1998) suggests, "to the extent that the determinants of interest rate spreads are distortionary, these problems can be redressed so as to permit interest rate spreads to narrow, with positive effects on economic growth and the efficiency of resource allocation".

### **1.1.1 Overview of Interest Rates:**

An interest rate is a price that relates present claims on resources relative to future claims on resources. An interest rate is the price that a borrower pays in order to be able to consume resources now rather than at a point in the future. Correspondingly, it is the price that a lender receives to forgo current consumption. Like all prices in free markets, interest rates are established by the interaction of supply and demand: in this context, it is the supply of future claims on resources interacting with the demand for future claims on resources. An interest rate may, therefore, be defined as a price established by the interaction of the supply of, and the demand for, future claims on resources. That price will usually be expressed as a proportion of the sum borrowed or lent over a given period. (Cecchetti, 2008).

Interest rates have a crucial role in the financial system. For example, they influence financial flows within the economy, the distribution of wealth, capital investment and the profitability of financial institutions. For banks, the exposure to interest rate risk, that is the risk associated with unexpected changes in interest rates, has grown sharply in recent years as a result of the increased volatility in market interest rates especially at the international level. It's therefore no surprise that in today's world, interest rates are of enormous importance to virtually everyone—individuals, businesses, and governments. Quoted as a percentage of the amount borrowed, interest rates link the present to the future, allowing us to compare payments made on different dates. Interest rates also tell us the future reward for lending today, as well as the cost of borrowing now and repaying later. (Howels, 2007).

The main reason for the enduring unpopularity of interest comes from the failure to appreciate the fact that lending has an opportunity cost. Think of it from the point of view of the lender. People who offer credit don't need to make loans. They have alternatives, and extending a loan means giving them up. While lenders can eventually recoup the sum they lend, neither the time that the loan was outstanding nor the opportunities missed during that time can be gotten back. So interest isn't really the breeding of money from money as Aristotle put it; it's more like a rental fee that borrowers must pay lenders to compensate them for lost opportunities (Smith & Walter, 2003).

### **1.1.2 Interest Rate Spread:**

Of course, interest rates also vary depending on whether you are borrowing or lending. For example, there is a spread between the interest rate at which banks are prepared to lend (the offer rate) and the rate they are willing to pay to attract deposits (the bid rate). This spread between the offer and bid rates covers the administrative costs of the financial intermediaries and provides profit for them. The spread is itself, subject to change and likely to be smaller, the greater the degree of competition among the financial institutions (Kimutai, 2003).

Pyle (1971) argues that the larger the spreads between loan and deposit rates, the more likely the necessary condition for intermediation to occur can be met. From a policy perspective, lower spreads are considered desirable. Quaden (2004) for example, argues that a more efficient banking system benefits the real economy by allowing "higher expected returns for savers with a financial surplus, and lower borrowing costs for investing in new projects that need external finance". If the banking sector's interest rate spread is large, it discourages potential savers due to low returns on deposit and while limiting financing for potential borrowers (Ndung'u and Ngugi, 2000).

Claeys and Vennet, 2004 and Idrees, 2007) have explored various determinants of interest rate spreads. These determinants can be classified as macroeconomic (examples include inflation, and government borrowing proxied by the treasury bill rate), market (such as inter-bank rate and discount rate) and bank-specific (including administrative costs, non-performing loans, non-interest income, liquidity ratio, market share of banks and return on assets.) have been of significant importance. These determinants are discussed in brief, in the following section:

### **1.1.3 Determinants of Interest Rate Spreads:**

The following have been identified by various studies, as important variables determining the level of interest rate spreads.

### **1.1.3.1 Operating Costs:**

Since banks are profit-seeking entities, it is entirely logical that the burden of operational costs will be shared with bank customers. Ndung'u and Ngugi (2000) note that 'it has been observed that large spreads occur in developing countries due to high operating costs, financial taxation or repression and lack of a competitive financial/banking sector among other factors'.

### **1.1.3.2 Default Risk:**

Studies have shown that there is a positive relationship expected between non-performing loans and interest spreads. Banks faced with risky loans require a higher net interest margin to compensate for default risk. Ho and Saunders (1981) defines default risk as the ratio of the net loan charge-off to total earning assets. Loan portfolio risk is measured by the provision for loan losses.

### **1.1.3.3 Market Structure:**

Internal organization and management, including government ownership and control and the regulatory framework, define market structure. For example, a repressive financial system is characterized by credit ceilings that impose uneven credit-rationing criteria and reduce efficiency in resource allocation. In addition, a repressed financial system has interest rate ceilings that create a disincentive for resource mobilization as investors are poorly rewarded, while banks have no incentive to compete for deposits as extra deposits represent idle cash reserves. Consequently, deposit supply and demand is sub-optimal. In addition, the presence of government owned and controlled banks and a weak legal system make it difficult to enforce the regulatory system. Thus, the market structure incorporates the degree of competition, concentration and interlocking control between financial institutions and business enterprises and the degree of specialization. (Fry, 1995).

Ho and Saunders (1981) argue that larger banks tend to be more competitive and therefore have narrower margins.

#### **1.1.3.4 Proscribed Reserve Requirements:**

Proscribed reserve requirements are considered a market determinant of banking sector Interest Rate Spread, as such reserves reflect a burden associated with operating in the banking sector. A positive correlation between such reserves and IRS is expected, as high liquidity reserve requirements act as an implicit financial tax by keeping interest rates high. Chirwa and Mlachila (2004) explain that by noting that “opportunity cost of holding reserves at the central bank, where they earn no or little interest, increases the economic cost of funds above the recorded interest expenses that banks tend to shift to customers”. They further argue that the large pool of resources created by high reserve requirements allow for the financing of high fiscal deficits, and thereby creates an environment of high inflation and persistently high intermediation margins.

#### **1.1.3.5 Inflation:**

There is a field of extensive studies on the test of the positive relationship between the expected inflation rate and interest rate spreads. This variable is an indicator of the cost of doing business in an economy, and it is expected to be positively correlated with Interest Rate spreads, particularly in developing countries where inflation is high and variable (Chirwa and Mlachila, 2004). Hakan et al, (2004) analysed the effect of different types of inflation uncertainty on a set of interest rate spreads for the UK economy. According to this study, where three types of inflation uncertainty i.e., structural uncertainty, impulse uncertainty, and steady-state inflation uncertainty are defined and derived using a time-varying parameter model, the findings were that both structural and steady-state inflation uncertainties increase interest rate spreads, while empirical evidence for the impulse uncertainty is not conclusive.

#### **1.1.3.6 Public Domestic Sector borrowings:**

The activities of the government can influence interest rates. The government issues Treasury bills and bonds to finance government deficits (the gap between the government's expenditure and its revenues). When these deficits are large, the Treasury sells more bonds. This will have the effect of pushing interest rates up, because of the higher supply. Robinson

(2002) notes that “the level of government borrowing and its influence on money and credit markets is an element of macroeconomic policy that imposes constraints on the flexibility on interest rates”.

### **1.1.3.7 Discount Rates:**

This is the cost faced by commercial banks when borrowing from central banks. Although declining in popularity, the discount rate is still used in Kenya as a monetary policy instrument and the Central Bank of Kenya has indeed indicated this as one of the three tools used to enforce monetary policy. An extract from the CBK Website reflects this understanding... “The Bank, as lender of last resort, may provide secured short-term loans to commercial banks on overnight basis at punitive rates, thus restricting banks to seek funding in the market resorting to Central Bank funds only as a last solution. The discount rate is set by the Central Bank to reflect the monetary policy objectives”.

Tennant and Folawewo (2007) findings is that whether or not the discount rate is still being used by the government as a means of controlling the money supply, it is undoubtedly an important factor in determining the size of the banking sector interest rate spreads. Governments and central banks should therefore carefully consider the level at which they set their discount rates as it has significant feedback impacts on economic variables through the interest rate spreads.

### **1.1.3.8 Inter-bank Rates:**

According to Kenya Bankers Association, ‘Banks don’t borrow from CBK to onlend. They borrow to square their positions at the clearing-house. The cost of funds in the interbank market to a large extent determines the true cost of funds in the various banks.’

(Ngugi, 2004) found out that Inter-bank rate has a significant impact, which implies that banks which borrow or are in inadequate liquidity situations have to charge higher spreads.



### **1.1.3.9 Treasury Bill Rates:**

This is generally regarded as an indicator of the interest rate policy being pursued by the government, and a benchmark for the rates charged by commercial banks. This variable is therefore also expected to be positively correlated with Interest Rate Spreads, because lower Treasury Bill rates would lead to lower interest rate spreads and vice versa. According to Ngugi (2004), Treasury Bill Rate reduces the interest margin as it serves as a diversifying asset for the banks. Other studies have however found Treasury bill rates to be an insignificant determinant of interest rate spreads (Tennant and Folawewo, 2007) or only significant in the short-run (Kimutai, 2003).

### **1.1.4 Commercial Banking Industry in Kenya:**

The banking industry is governed by the Companies Act, the Banking Act, and the Central Bank of Kenya (CBK), Act. As at 30<sup>th</sup> June 2012, the sector comprised 43 commercial banks, 1 mortgage finance company, 6 deposit-taking microfinance institutions, 5 representative offices of foreign banks, 115 foreign exchange bureaus and 2 credit reference bureaus. Out of the 44 institutions, 31 are locally owned and 13 are foreign owned. The locally owned financial institutions comprise 3 banks with significant shareholding by the Government and State Corporations, 27 commercial banks and 1 mortgage finance institution (Central Bank of Kenya Quarterly Report-June 2012).

The banking sector was liberalized in 1995 and exchange controls lifted. The Central Bank of Kenya which falls under the Ministry of Finance, but has an autonomous Board, is responsible for formulating and implementing monetary policy, and fostering the liquidity, solvency and proper functioning of the financial system. Central Bank of Kenya also supervises the management of the financial institutions licensed under the Banking Act. Prior to the implementation of the Structural Adjustment Programmes in 1983, the financial sector in Kenya suffered from absolute controls. Interest rates were maintained below market – clearing levels, and direct control of credit was the primary monetary control instrument of the authorities. Between 1983, and 1987, the differentials between the interest rates of banks and non-bank financial institutions were narrowed. This improved the competitiveness of commercial banks. One of the first steps towards freeing interest rates was taken in 1989,

when the government started selling Treasury bonds through Auction. In 1991, interest rates were completely freed. Since then, interest rates have been following a steep upward ascent (Kibe, 2003).

The Kenya banking sector emerged from a high non performing loans environment in the 80's,90's and early 2000's. This was partly attributed to weak credit risk management, weak corporate governance and non-performing government related debt. Due to the strengthened legal and regulatory environment, credit standards have been enhanced and government related and other legacy non-performing debt has been resolved. The introduction of the credit information sharing mechanism in 2010 has further strengthened credit appraisal standards". It is also generally acknowledged that there is now greater competition in the banking industry. Further, CBK has progressively reduced the cash reserve ratio. Some Analysts argue that Credit Reference Bureaus (CRBs) have lowered the costs of information search and risk assessment for banks' existing and potential customers while establishment of cash centers in various towns has reduced the cost of transporting money. (Central Bank of Kenya Quarterly Report – June, 2002).

The Kenyan banking sector continued on a growth trajectory with the size of assets standing at Kshs.2.2 trillion, loans and advances worth Kshs.1.3 trillion, while the deposit base was at Kshs.1.7 trillion and profit before tax of Kshs.53.2 billion as at 30<sup>th</sup> June 2012. During the same period, the number of bank customer deposit and loan accounts stood at 14,893,628 and 2,051,658 respectively. The ratio of gross NPLs to gross loans was 4.5% as at 30<sup>th</sup> June 2012. However the quality of assets measured as a proportion of net non-performing loans (Gross non-performing loans less provision and interest in suspense) to gross loans was 0.8 % in June 2012. The banking sector profit before tax for the quarter ended 30<sup>th</sup> June 2012 increased by 15.5% from Kshs.24.7 billion in March 2012 to Kshs.28.5 billion in June 2012. On an annual basis, the profitability of the sector increased by 30.4 %to Kshs.53.2 billion from the Kshs.40.8 billion registered in June 2011. For the period ended June 2012, average liquid assets amounted to Kshs.599.0 billion while total liquid liabilities stood at Kshs.1,571.1 billion, resulting to an average liquidity ratio of 38.1%, well above the minimum statutory limit of 20% (Central Bank of Kenya Quarterly Report – June, 2002).

## 1.2 Statement of the Problem

The general high interest rate environment has spurred numerous debates in Kenya about the determinants of banking sector interest rate spreads. Yet, Banking sectors in many developing countries are characterized by persistently high interest rate spreads. Studies by Randall (1998) , Gelbard and Leite (1999), and Brock and Rojas-Suarez (2000) all show that interest rate spreads in Sub-Saharan Africa, Latin American and the Caribbean are wider than in OECD countries. This is attributed to inefficiency in the banking sectors of developing countries. Such spreads reflects the costs of intermediation that banks incur, inclusive of their normal profits (Robinson 2002).

Theoretical models and empirical studies points to various determinants of interest spread .These include market structure, risk factors (capital, liquidity, interest rate and credit), management quality and risk preferencing, operational costs and macroeconomic policy variables. In addition, Ho and Saunders(1981) modelled interest spread integrating the hedging and expected utility approach (later referred to as HS). The model abstracts from institutional constraints, financial management problem and credit risk. It defines pure spread as a function of the degree of managerial risk aversion, the size of transactions undertaken by the bank, market structure and variance of interest rates. The model was modified by Mcshane and Sharpe (1985) and Allen (1988) relaxing some of the assumptions. For example unlike Ho and Saunders (1981). Mcshane and Sharpe (1985) assume that a bank is a risk-averse dealer in the credit market while Allen (1988) assumes loan heterogeneity, arguing that pure spread can be reduced when cross-elasticity's of demand between bank products are considered.

There are several reasons why debate over interest rates has never shown signs of abating even as key stakeholders haggle over diverse proposals of taming interest rates.

Even though the Central Bank of Kenya (CBK) Monetary Policy Committee (MPC) has frequently cut the bank's prime lending rate (CBR) to spur household and business spending, majority of banks tend to ignore the signals, citing high cost of funds, and the overall cost of doing business in the country. The editorial in the Daily Nation dated Wednesday September

19, 2012 titled, "Banks still mischievous" states that "the interest spread debate is back and commercial banks now have very little, if any credible excuses why the difference in what they pay for deposits and what they charge borrowers is still in double digits. The article continues ....but it is disturbing that the banks keep claiming that overheads, mainly staff remuneration, are the main determinants of lending rates and not the cost of funds as is the case in developed markets. In its latest statement, the Monetary Policy Committee noted that interest rate spreads remained high suggesting that these cost reductions had yet to be fully transferred to bank customers and the economy at large through declining cost of credit. According to a research commissioned by the Kenya Bankers Association, the average lending rate was 15.05 percent last year against an average deposit rate of 4.22 per cent – leading to a spread of 10.83 per cent. The editorial above points out that, "this is way too high compared to international benchmarks where the spread is between four and six percent". Bankers argue that the proponents of this argument ignore the fact that the circumstances in this market such as credit losses, are not comparable to those in the developed world.

Key players in the banking industry cite high credit loss ratios, high cost of collateral, poor infrastructure, a complicated land tenure system and a slow judicial process as some of the reasons for their high priced loan products (Business Weekly, Tuesday September 18, 2012, pg 43). According to the Central Bank of Kenya, "the credit risk environment in Kenyan banks has improved substantially in recent years, and the benefits ought to be passed to borrowers by way of lower spreads". Kenya Bankers Association blames inefficiencies in the interbank market for the lukewarm response to the CBK's monetary policy". Banks have also remained adamant against an immediate reduction in interest rates arguing that the tenor and cost of funds (deposits) do not allow them to respond swiftly to monetary policy signals. Other observers have been quick to point out that banks continue to report healthy profit figures that increase year on year. It is noteworthy that the sector is developing and deepening faster than the overall economy. It grew by 9.0% in 2010 and 7.8% in 2011 while the economy grew by 5.8% and 4.4% in 2012 and 2011 respectively (CBK Quarterly Report –June 2012).

These debates can only be resolved through objective quantitative re-examination of the determinants of the high rate spreads and a number of studies have attempted to provide answers/explanations.

According to Ndung'u and Ngugi (2000), financial reforms and liberalization should improve efficiency in the intermediation process. This implies that the spread will decline over time as liberalization is accomplished and the financial sector develops. But in Kenya, financial liberalization seems to have led to a widening interest rate spread. The main factors that appear to propel this are distortions in the loans market, institutional impediments and the policy environment. Ndung'u and Ngugi (2000) presented empirical support for these views and argued that disequilibrium in the loans market is a major factor in driving the spread and has substantial feedback effects, which reflect persistence of the disequilibrium. They also concluded that institutional and policy factors impact on transactional costs and compound the effects of risks and uncertainty in the market, thus exacerbating the spread. They recommended that to narrow the interest spread, it was important to maintain a stable macroeconomic environment and thus reduce credit risks. There is also a need to minimize implicit taxes like reserve and cash ratios, accompanied by fiscal discipline and to reduce the demand for financing budget deficit with low-cost funds. In addition, banks should invest in information capital to reduce the moral-hazard and adverse-selection problems.

Kimutai (2003) while identifying inflation rate, T-bill rate, cost to income ratio, cash reserve ratio default risk and structure of the banking industry as significantly contributing to the high interest rate spreads, did acknowledge that other internal and external factors not included as variables in his study could also contribute to the high banks interest rates spread. Interestingly, Kimutai (2003) found out that the Treasury Bill Rate is insignificant in the long-run. The Treasury bill rate, is generally viewed as the benchmark interest rate in the economy, and lowering of this rate is expected to have a signaling effect, precipitating a lowering of interest rates by other stakeholders.

Ngugi (2004) concluded that the wide interest spreads are explained by an imperfect credit market that is characterized by credit, interest rate, and liquidity risk. Other factors include

capital cost, operational costs, cost of financial innovation, limited diversity of banks' assets portfolio, weak management, and future to maintain price stability. Therefore to narrow interest margins, efforts must be made to deal with the problem of non-performing loans, and to make the credit market more competitive. Her study showed that cost-inefficiency, is a major factor explaining the high interest rate rates despite the policy action to reduce the cost of implicit tax.

It would appear that the factors identified in previous studies have largely been addressed. Hence there is some merit in the argument that the spreads should be lower. In spite of concurrence that narrower spreads can have tangible economic benefits, there is different understanding of the real causes and the most appropriate policy intervention. Efforts to address this, however, have to distinguish between the rhetoric of rival stakeholder groups, populist action by politicians and the actual determinants of banking sector interest spreads. This study re-examines the impact of various factors identified in previous studies but differs from these previous studies by substituting the NPL% with Credit Loss ratio as a proxy for default risk, and substituting Treasury bill rate with government borrowings/total loans and advances as a proxy for government fiscal activities. The CLR variable is expected to more closely correlate with interest rate spreads as it measures provisions for losses which have a direct impact on banks' bottom lines while the variable (Crowd) measures for the entire banking sector, public sector borrowing as a percentage of total loans, and will represent the extent to which government fiscal policy affects interest rates.

The Research question is 'are banks justified in charging the high spreads, considering the improved macroeconomic and market conditions, reduced default risk and more focused macro-economic policy?'

### **1.3 Objectives of the study**

To establish the determinants of interest spreads amongst commercial banks in Kenya.

### **1.4 Value of the study**

The factors that contribute to the high interest rate spreads are important concerns to policy makers, the banking industry/public and the academic fraternity.

#### **1.4.1: Policy Implications**

This Research will be of interest to Policy makers who, as indicated in the background, would like to see narrower spreads. Widening interest spread is an indicator of the underlying weak institutional policy set-up of the financial sector (Ndung'u & Ngugi, 2000). To this extent, policy makers will want to understand the real causes of high interest rate spreads so as to devise the most appropriate policy interventions.

#### **1.4.2: Practice**

The Research is of interest to Commercial banks as it provides objective analysis of the justification for the high interest rate spreads. The Research will also be of interest to the Central Bank of Kenya, as the findings will assist in a more informed monetary policy. The Research will also be of interest to the general public (depositors and borrowers, who suffer the actual impact of the high spreads

#### **1.4.3: Theory**

The implications of the findings of this research on the academic and popular discourse are important, as it contributes to existing literature on causes of high interest spreads in Kenya.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Introduction

This chapter presents critical reviews concerning the study on determinants of Banking Sector interest spreads in general. This is done through a review of the main theories on interest rates, the role of the monetary authorities in interest rate determination, and findings of empirical Studies.

#### 2.2 Review of Theories

There is substantial analytical work that has gone into explaining interest rate determination. A number of these theories are discussed below:

##### 2.2.1 The Fisher Effect

This suggests that changes in short term interest rate occur principally because of changes in the expected rate of inflation. If we go further and assume that expectations held by market agents about the rate of inflation are broadly correct, the principal reason for changes in interest rates becomes changes in the current rate of inflation. We could in that case write  $r=i-p$ , where  $r$  is the real interest rate,  $i$  is the nominal interest rate and  $p$  is the inflation rate. (Mishkin, 2010).

Named after the American Economist, Irving Fisher, this is the most well known theory, and forms the basis of the standard recommendations on real interest rates. It argues that competitive financial markets would establish nominal interest rates on deposits that are positive in real terms, because savers must be induced to hold financial rather than real assets, and on average, real assets grow in nominal terms at the rate of inflation. Thus the nominal deposit interest rate must equal the expected inflation rate plus a small underlying real rate. This real rate provides the incentive to hold financial rather than real assets. Lending rates in turn will also be positive in real terms, since they are based on the cost of deposits plus a margin covering the cost of intermediation consisting of reserve requirements, taxes, risk, administrative costs, overheads and Return on Equity (Davies, 1986).



The accuracy of this prediction is shown in the behavior of US interest rates relative to inflation. The interest rates on three-month Treasury bills have usually moved along with the expected inflation rate (see figure below).

Figure 1: Expected Inflation and Interest Rates (Three-month Treasury Bills), 1953-2005



Source: Frederic S. Mishkin, "The Real Interest Rates: An Empirical investigation, *Carnegie-Rochester Conference Series on Public Policy* 15 (1981): 151-200". These procedures involve estimating expected inflation as a function of past interest rates, inflation, and time trends.

Consequently, it is understandable that many economists recommend that inflation must be kept low if we want to keep nominal interest rates low. The main criticism of Fisher's theory is that it has deficiency in that it is a partial equilibrium theory that confines itself to the analysis of the capital market and works with the assumption that the prices of goods and services are already determined. (Mishkin, 2010).

### 2.2.2 The Loanable Funds Theory of Real Interest Rates

The term loanable funds simply refers to the sums of money offered for lending and demanded by consumers and investors during a given period. The interest rate in the model is determined by the interaction between potential borrowers and potential savers. According to the loanable funds theory, economic agents seek to make the best use of the resources available to them over their lifetimes. One way of increasing future real income might be to borrow funds now in order to take advantage of investment opportunities in the economy. This would work only if the rate of return available from investment were greater than the cost of borrowing. Thus borrowers should not be willing to pay a higher real rate of interest than the real rate of return available on capital. In a perfect market, this is equal to the marginal productivity of capital – the addition to output that results from one unit addition to capital, on the assumption that nothing else changes. This is influenced by factors such as the rate of invention and innovation of new products and processes, improvements in the quality of the workforce and the ability to reorganize the economy to make better use of scarce resources. Savers on the other hand are able to increase their future consumption levels by foregoing some consumption in the present and lending funds to investors. We start by assuming that consumers would, other things being equal, prefer to consume all their income in the present. They are prepared to save and lend only if there is a promise of a real return on their savings that will allow them to consume more in future than they would otherwise be able to do. The real rate of return lenders demand thus depends on how much they feel they lose by postponing part of their consumption. Thus, the rate of return is the reward for waiting, that is, for being willing to delay some of the satisfaction to be obtained from consumption. The extent to which people are willing to postpone consumption depends upon their time preference (Saunders & Cornet, 2011).

Unsurprisingly, the loanable funds theory has some problems. Firstly it is clear that people go on saving even when real interest rates become negative and remain so for quite long periods. This can occur through the existence of money illusion i.e. a confusion between real and nominal values causing people not to take inflation fully into account. It happens only in the short – run (when the system is in disequilibrium). This means however, that the model does not do very well in explaining changes in interest rates over what economists refer to as the

short-run, but this can involve quite long periods of actual time. Secondly, real as well as nominal interest rates are capable of changing rapidly. We can see that the concentration on the long run in the loanable funds approach to interest rates seriously understates the role of monetary authorities in a modern economy. Thirdly, there is another problem stemming from the assumption that the rate of inflation or expected rate of inflation has no long-run impact on the real rate of interest. Unfortunately for the theory, there is no doubt that inflationary expectations do influence the willingness of people to save and of potential investors to borrow (Howels, 2007).

The loanable funds theory can be modified to take such complaints into accounts. The problem is that these changes are ad hoc and run the risk of destroying the central idea at the heart of the loanable funds – that the market economy is stable and has a strong in-built tendency to return to equilibrium. The real rate of interest is a key variable in the explanation of how this might happen. It therefore makes sense to look at a different theory of interest rates- one that is constructed on entirely different assumptions as to how the economy works (Mishkin, 2010).

### **2.2.3 The Liquidity Preference Theory of Interest Rates**

According to the theory, investors will always prefer short-term securities to long-term securities. In an uncertain world, then, saving and investment may be much more influenced by expectations and by exogenous shocks than by underlying real forces. One possible response of risk-averse savers is to vary the form in which they hold their financial wealth depending on what they think is likely to happen to assets prices- they are likely to vary the average liquidity of their portfolios. In periods in which people are confident that assets prices will increase, they are encouraged to hold a high proportion of their portfolios in liquid assets, benefiting from the higher rates of interest that they offer. Increased doubts about future assets prices, on the other hand encourages people to give up these higher rates of interest in search of greater security offered by more liquid assets. This happens in financial markets all the time. For example in the equity market, the shares of some companies are likely to fare better than others in falling market, and investors become more likely to buy these shares if they appear a fall in share prices. Again bonds with distant maturity dates

carry more capital risk than those near to maturity and are thus relatively less attractive when the markets turn from the equity and bond markets and hold instead, short-term securities and cash during periods of uncertainty. (Howels, 2007).

Here we see a quite different role for interest rates than that played in the loanable funds theory. Plainly, an expectation of an increase in interest rates increases the prospect of a fall in financial assets prices generally and for a greater relative fall in the prices of illiquid assets. In other words, an expected increase in interest rates, *ceteris paribus*, increases the preference of asset holders for liquidity. This general idea was developed into an economic theory by J M Keynes within a simplified model in which there were only two types of financial assets – money, the liquid asset, and bonds with no maturity date (consols), the illiquid asset. An increased preference for liquidity in this model is equivalent to an increased demand for money. Thus the demand for money increases whenever people think interest rates are likely to rise than they believe they are likely to fall. This is Keynes' speculative motive for holding money instead of less liquid assets in order to avoid a capital loss. (Mishkin, 2010).

There is very little objection to this negative relationship between interest rates and the demand for money since there are other possible explanations for it. Investors must be offered a liquidity premium to buy longer-term securities that have higher risk of capital losses. This difference in price or liquidity can be directly related to the fact that longer-term securities are more sensitive to interest –rate changes in the market than short-term securities. Because the longer the maturity on security, the greater its risk, the liquidity premium increases as maturity increases. The liquidity premium theory states that long-term rates are equal to the geometric average of the current and expected short-term rates plus a liquidity or risk premium that increases with the maturity of the security. For example, according to the liquidity premium theory, an upward-sloping yield curve may reflect the investors' expectations that future short-term rates will rise, be flat, or fall, but because the liquidity premium increases with maturity, the yield curve will nevertheless increase with the term to maturity (Crouhy, 2005).

## 2.2.4 The term structure of Interest Rates

To explain the process of estimating the impact of an unexpected shock interest rates on the entire term structure of interest rates, Financial Institutions use the theory of the term structure of interest rates or the yield curve. The term structure of interest rates compares the market yields or interest rates on securities, assuming that all characteristics (default risk, coupon rate, e.t.c) except maturity are the same. The change in required interest as the maturity of a security changes is called *maturity premium (MP)*. The *MP*, or the difference between the required yield on long and short-term securities of same characteristics except maturity, can be positive, negative, or zero (Saunders & Cornet, 2011).

Note that these yield curves may reflect factors other than the investors' preferences for the maturity of a security, since in reality, there may be liquidity differences among the securities traded at different points along the yield curve. Our principal concern here, however, is with instruments that differ only in their time period – that is, there is an equal risk of default and no difference in transaction costs.(Mishkin, 2010).

## 2.2.5 The unbiased expectations theory

According to the unbiased expectations theory for the term structure of interest rates, at a given point in time, the yield curve reflects the markets' current expectations of future short-term rates. Thus the upward sloping yield curve reflects the market's expectation that short term rates will rise throughout the relevant time period. Similarly, a flat yield curve reflects the expectation that short-term rates will remain constant over the relevant time period.

The theory assumes that present long-term rates depend entirely on future short-term rates. Lenders are taken to be equally happy to hold short-term or long-term securities. The simplest form of this theory assumes that lenders have perfect information and know what is going to happen to short-term interest rates over the future. In this case, the long-term interest rates will be average of the known future short-term rates.(Howels, 2007).

The logic underlying the theory, that expectations of the future short-term interest rates shape the term structure of longer-term interest rates is intuitive, appealing, and common

assumption in macroeconomic modeling. However, people do not have perfect information about the future course of short-term interest rates. All they can have are estimates of these rates, which are subject to the risk of error. The further into the future we try to look; the greater is the chance that we shall be wrong (Mishkin , 2010).

One of the inherent dangers with the expectations theory is that it can be very simple to overestimate future short term interest rates. Factors such as political shifts, disaster situations, or sudden changes in consumer tastes and preferences can easily impact the direction of interest rates and throw the projections developed through the use of this theory out of line (Kinyuru 2011).

### **2.2.6 The Market Segmentation Theory**

Market Segmentation theory argues that individual investors have specific maturity preferences. Accordingly, securities with different maturities are not seen as perfect substitutes under the market segmentation theory. Instead, individual investors have preferred investment horizons dictated by the nature of the assets and liabilities they hold. For example, banks might prefer to hold relatively short-term Treasury Bills because of the short-term nature of deposit liabilities, while insurance companies might prefer to hold longer term treasury bonds because of the longer-term nature of their life insurance contractual liabilities. As a result, interest rates are determined by distinct supply and demand conditions within a particular maturity bucket or market segment (e.g the short end and the long end of the market). (Howels, 2007).

The market segmentation theory assumes that neither the investors nor the borrowers are willing to shift from one maturity sector to another to take advantage of opportunities arising from changes in yields. Therefore, the yield curve is shaped according to the supply and demand of securities within each maturity length. Expectations concerning short-term rates will have no role in determining long-term rates. The choice of investors is an important part of the Market Segmentation theory. According to this theory, the investors need to make their choices beforehand. It has been seen that investors normally want to invest in debt instruments that have shorter-term periods. The main reason behind this is that investors like

to have investment Portfolios with a certain amount of liquidity. The short-term debt instruments provide this option. Thus according to the Market Segmentation Theory, the financial market that deals in debt instruments of shorter tenure would experience more demand. As per Market Segmentation Theory, if a particular debt instrument has higher demand, it is supposed to cost more. The yield from the same will however, be relatively low. (Crouhy, 2005).

### 2.2.7 Other Factors Impacting Interest Rates

The liquidity preference analysis seems to lead to the conclusion that an increase in money supply will lower interest rates. This conclusion has important policy implication because it has frequently caused politicians to call for a more rapid growth of money supply in order to drive down interest rates.

An important criticism of the conclusion that an increase in money supply lowers interest rates was raised by Milton Friedman, a Nobel Laureate in economics. He acknowledged that the Liquidity Preference analysis was correct and called the result-that an increase in the money supply (everything else remaining equal) lowers interest rates – the *liquidity effect*. However, he viewed the liquidity effect as merely part of the story: An increase in money supply might not “leave everything else remaining equal” and will have other effects on the economy that may make interest rates rise. If these effects are substantial, it is entirely possible that when money supply increases, interest rates may also increase. In particular, changes in income, the price level, and expected inflation affect the equilibrium rate (Mishkin, 2010):

**Income Effect:** Because an increasing money supply is an expansionary influence on the economy, it should raise national income and wealth. Both the liquidity preference and bond supply and demand frameworks indicate that interest rates will then rise. Thus the income effect of an increase in money supply is a rise in interest rates in response to the higher level of income.

**Price Level Effect:** An increase in the money supply can also cause the overall price level in the economy to rise. The liquidity preference framework predicts that this will lead to a rise in interest rates. Thus the price level effect from an increase in money supply is a rise in interest rates in response to the rise in price level.

**Expected Inflation Effect:** The higher inflation rate that results from an increase in the money supply also affects interest rates by affecting the expected inflation rate. Specifically, an increase in the money supply may lead people to expect a higher price level in the future—and hence the expected inflation rate will be higher. The bonds supply and demand framework has shown us that this increase in expected inflation will lead to a higher level of interest rates, therefore the expected inflation effect of an increase in money supply is a rise in interest rates in response to the rise in the expected inflation rate (Mishkin, 2010).

### **2.2.8 The Monetary authorities and the rate of interest**

The general level of interest rates might change in an economy because the monetary authorities change the rate of interest at which they are prepared to operate in the money market. This is usually done in an attempt to influence the aggregate demand in the economy (and hence the rate of inflation) or the net inflow of short-term capital into the economy (and hence the exchange rate). The ability of the monetary authorities to influence very short-term interest rates in the economy derives from the role of the central bank as the lender of last resort to the commercial banking system. The need for central banks to operate this way arises from the fractional reserve nature of the banking system and the desire of banks to keep the average return on their assets as high as possible. Thus, they seek to economise their holdings of liquid, low-interest assets. However, the fractional reserve system means that banks can easily find themselves short of liquid assets (reserves) as the result of unexpected withdrawal by depositors. The monetary authorities are able to exploit this need of banks to maintain a sufficient stock of reserves by being willing to replenish bank reserves, but only at a price determined by the central bank. This is done through use of the discount window, open market operations and repurchase agreements.(Howels, 2007).



Variations by the central bank in interest (or discount) rate at which it is prepared to lend very short-term to the commercial banks influences the form in which banks hold their assets and, in particular their willingness to make loans to their clients. This then affects the longer-term interest rates. The ability of the central bank to influence the general level of interest rates, does not, however, mean it fully controls rates of interest. There are several reasons for this:

Firstly, the notion that the central bank can influence the willingness of banks to make loans assumes that banks are profit maximisers and thus any small change in the cost of liquidity causes a response from banks. The behavior of banks certainly shows that they are interested in keeping profits high, but they are also likely to have other objectives. For instance, they may wish to maintain their share of the different markets in which they operate. Banks are in competition with each other for both assets (including competition with each other in the house mortgage market) and liabilities (competition for bank deposits). In order to maintain their spread between borrowing and lending rates, banks that cut their lending rates must also cut their deposit rates. It follows that in a period of intense competition for bank deposits, banks might judge that they cannot afford to lower immediately the rates of interest they are offering on deposits. This might cause them not to respond immediately to relatively small changes in the base interest rate of the central bank.(Howels, 2007).

In theory, it should be more difficult for banks to resist attempts by the central bank to push up interest rates, as long as the central bank has the power to induce a genuine shortage of liquidity in the economy. Even here, however, there are limits to the power of the central bank. In developed and more sophisticated financial markets, banks have considerable ability to overcome shortages in liquidity without resorting to borrowing from the central bank. There is a second quite different difficulty. When we consider the process by which banks become more or less willing to make loans, we imply 2 things: that the demand curve for loans did not shift and; that the market for loans was genuinely competitive i.e banks are prepared to lend to anyone prepared to pay the market rate of interest. Of course, in practice, the demand for loans does shift and the competition is not necessarily perfect and banks discriminate between borrowers. (Saunders & Cornet, 2011).

### 2.3 Empirical Studies

There have been extensive studies on the determinants of interest rate spreads.

Dermiguc- Kunt and Huizinga (1998), Moore and Craigwell (2000) and Sologoug (2006) note that the specific characteristic of commercial banks that are usually theorized to have an impact on their spreads include the size of the bank, ownership pattern, the quality of the loan portfolio, capital adequacy, overhead costs, operating expenses, and share of liquid and fixed assets. In an extended study of 80 countries for the period 1988 to 1995, Dermiguc- Kunt and Huizinga (1998) employed bank characteristics, macroeconomic conditions, explicit and implicit bank taxation, deposit insurance regulation, nature of financial structure, and several underlying legal and institutional indicators. This study finds higher operating costs as responsible for higher spreads.

Robinson (2002) further notes that the incidence of fraud, the ease with which bad credit risks survive diligence, and the state of corporate governance within banks all lead to higher operating costs, asset deterioration and ultimately, wider interest rate spreads.

Studies on small island developing states (SIDS) further note that interest rate spreads are widened by scale diseconomies due to the small size of markets (Dermiguc-Kunt and Huizinga, 1998); Moore and Craigwell, 2000; Robinson, 2002; Jayaraman and Sharma, 2003 and Chirwa and Mlachila, 2004. Of these factors, evidence has been found that interest rate spreads (as proxied by Net Interest Margins) are increased by greater market power of commercial banks (Barajas et al,2000); poorly developed banking sectors (Dermiguc-Kunt and Huizinga, 1998); high reserve requirements (Barajas et al,2000); and inefficiency of the legal system and high corruption Dermiguc-Kunt and Huizinga, 1998).

Ngugi, (2000) analyzed the interest spread in Kenya from 1970 to 1999 and found out that interest rate spreads increased because of yet- to-be gained efficiency and high intermediation costs. Increase in spread in the post-liberalization period was attributed to the failure to meet the pre-requisites for successful financial reforms, the lag in adopting indirect monetary policy tools, and reforming the legal system and banks' efforts to maintain

threatened profit margins from increasing credit risk as measured by non-performing loans to total advances.

Employing a sample of 2279 banks from 36 Western and Eastern European countries over the years 1994 to 2001, Claeys and Vennet (2004) investigated the determinants of bank interest margins through panel data estimation techniques. They considered degree of concentration, real short-term interest rates, degree of operational efficiency, capital adequacy, market share, proportion of demand and savings deposits to total deposits and the degree of bank enterprise. The results revealed that the concentration, operational efficiency, capital adequacy and risk behavior are important determinants of margins both in Western and Eastern Europe.

Siddiqui (2012) employed panel data models to examine bank specific determinants of interest rate spread using a sample of 14 out of 22 commercial banks in Pakistan for the period 2000 to 2008. He concluded that rising administrative costs, non-performing loans and soaring return on Assets (ROA) significantly cause an increase in interest rate spreads.

Kimutai, (2003) concluded that “macroeconomic as well as a set of structural factors have been responsible for the inefficiencies and hence individual bank interest rates spreads in Kenya. According to his study, Treasury Bill rates are predictors of banks' interest spread in the short-run but not in the long-run”.

Ngugi, (2004) concluded that “wide interest spreads are explained by an imperfect credit market that is characterized by credit, interest rate, and liquidity risk” Other factors include capital costs, operational costs, costs of financial innovation, limited diversity of banks' assets portfolio, weak management, and failure to maintain price stability. Therefore to narrow the interest rate margins, efforts must be made to deal with the problem of non-performing loans and to make the credit market competitive.

Much closer home, using international comparisons and a unique set of bank-level dataset on the Ugandan banking system over the period 1999 to 2005, Thorsten and Heiko (2009)

explore the factors behind consistently high interest rate spreads and margins. International comparisons revealed that the small size of Ugandan banks, persistently high Treasury bill rates, and institutional deficiencies explain large proportions of the high Ugandan interest-rate margins. The Ugandan study confirms the importance of macroeconomic factors, such as high inflation, high T-bill rates and exchange rate volatility. The study also finds evidence of small size and the high cost of doing business as explaining persistently high spreads and margins; smaller banks and banks targeting the lower end of the market incur higher costs and therefore higher margins. Spreads and margins also vary significantly with the sectoral loan portfolio composition of banks.

These studies all show that bank-specific factors impact significantly on commercial banks' net interest margins. Notwithstanding this, Brock and Franken (2002) note that the results of many other studies suggest that individual bank characteristics are often not tightly correlated with interest rate spreads. It is asserted that this may be because spreads are largely determined at industry level, thus making individual bank characteristics more relevant to other variables, such as bank profitability. Macroeconomics factors have also been shown to explain significant variation in commercial bank interest rate spreads.

Brock and Franken (2003) quote from a Moody's report which argues that "macroeconomics factors are certainly among the most influential; sources for variations in credit spreads". Chirwa and Mlachila (2004) concur and assert that macroeconomic instability and the policy environment have important impacts on the pricing behavior of commercial banks. They note that the macroeconomic variables typically thought to be determinants of interest rate spreads include inflation, growth of output, and money market real interest rates. The macroeconomic variables which have been empirically shown to increase interest rate spreads include: high and variable inflation and real interest rates (Dermiguc-Kunt and Huizinga, 1998); interest rate uncertainty – proxied by inter-bank interest rate volatility (Brock and Franken, 2002); and a high share of commercial bank public sector loans (Randall, 1998).

In addition to interest rate volatility on account of macroeconomic instability, government restrictions on the banks are responsible for increasing net interest margins. According to Saunders and Schumacher (2000), regulatory framework, market structure, and a risk premium are the main source of increasing net interest margins. The regulatory components as per this study are in the form of interest-rate restrictions on deposits, reserve requirements and capital –to – asset ratios. The higher the number of restrictions, the higher the monopoly power of the banks to escalate the net interest margins.

Tenant and Folawewo (2007) examined the macroeconomic and market determinants of interest rate spreads in low and middle income countries. In their paper, market determinants are captured using three variables – the structure and development of the banking sector (proxied by bank/GDP ratio and real per capita/GDP); proscribed reserve requirements (proxied by the ratio of reserves to deposits) and the impact of the market size (proxied by population size). Market economic determinants are captured using inflation rate (proxied by the annual percentage change in the CPI), extent of government dependence on the domestic banking sector for financing of its deficit (proxied by public sector borrowing as a percentage of total loans), the cost faced by commercial banks when borrowing from central banks (proxied by the discount rate), and the Treasury Bill Rate. The implication of their findings is that many of the factors commonly believed to be critical determinants of interest rate spreads may not be as relevant as perceived. For example, whilst macroeconomic instability has long been held to be a critical cause of high interest rate spreads, their results showed that one of the most common indicators of such instability, the volatility of the exchange rate does not have a significant impact on the banking sector spreads in middle and low income countries. Also of interest is the fact that of the three macroeconomic-policy variables widely touted as having important impacts on banking sector spreads, they found two (extent of public sector borrowing and discount rate) to be statistically significant whilst one (Treasury Bill Rate) was found to be insignificant. The clear implication is that ‘soft’ measures by governments, such as signaling and moral suasion, will have little, if any, impact on interest rate spreads in environments where there are persistent factors causing spreads to be high.

## 2.4 Conclusions from Literature Review:

There are many theories and empirical studies regarding interest rates, and interest rate spreads.

Firstly, Keynesian economists have generally held that monetary policy operates through the effect of interest rates on the level of investment and hence on the level of aggregate demand. Thus, a government wishing to reduce inflationary pressures in the economy will need to raise interest rates in order to reduce investment (and expenditure on consumer durables). Secondly, it is usually accepted that interest rates on assets of different maturities are important to different groups of economic agents. In particular, much bank borrowing is for short periods and so it (and hence bank lending and bank deposits and the rate of growth money supply) will depend on what happens to short-term interest rates. Again the international flow of short-term funds (hot money) will depend on what happens to short-term interest rates in different countries. However, the raising of funds for long-term investments projects is held to be related more to long-term rates of interest.(Howels, 2007).

If we accept a strong version of the expectations hypothesis, we shall believe that the monetary authorities need only bring about a small change in interest rates at the short end of the market and this will quickly feed through to the other interest rates and have the desired effect on investment. But if we accept something more like the segmented market approach, we shall argue that long-term rates may be affected by the government monetary policy only to a very limited extent, and perhaps only very slowly .Consequently, supporters of the notion of market segmentation are very skeptical of the ability of the monetary policy to influence aggregate demand and tend instead to be supporters of fiscal policy. Monetarists believe that monetary policy does not only operate through interest rate changes. Nonetheless, they do see the interest rate channel as a powerful one because, they argue that small changes in interest rates are rapidly communicated from one part of the market to another. (Saunders & Cornet, 2011).

An approach used in much of the literature is to classify determinants of commercial banks' interest rate spreads according to whether they are bank-specific, industry (market) specific

or macroeconomic in nature. From amongst the bank specific factors, studies have singled out high operating cost, non-performing loans, and banks' desire to enjoy high return on assets (Siddiqui, 2012). The market specific determinants of commercial bank interest rate spreads highlighted in the literature typically include lack of adequate competition in the banking sector and consequent market power of commercial banks, the degree of development of the banking sector, and explicit and implicit taxation –such as profit taxes and reserve requirements (Ngugi, 2000). The macroeconomic variables typically thought to be determinants of interest rate spreads include inflation, interest-rate uncertainty, public domestic sector borrowing, discount rates and treasury bill rates.(Tennant and Folawewo, 2007).

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

The formidable problem that follows the task of defining the research problem is the preparation of the design of the research project, popularly known as the "research design". Decisions regarding what, where, when, how much, by what means concerns an inquiry or a research study constitute a research design.(Kothari 2004).

This chapter sets out various stages and phases that were followed in completing the study. It involves a blueprint for the collection, measurement and analysis of data. Specifically the following subsections will be included; research design, target population, data collection and finally data analysis.

#### **3.2 Research Design**

A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. (Claire et al 1962).

The study is a descriptive correlational research design, which according to Kothari (2004), is used when the researcher wants to establish the relationship between two or more variables. The researcher uses theories or at least hypotheses to account for the forces that cause a certain phenomenon to occur. In descriptive as well as in diagnostic studies, the researcher must be able to define clearly, what he wants to measure and must find adequate methods of measuring it along with a clear definition of 'population' he wants to study. Since the aim is to obtain complete and accurate information in the said studies, the procedure to be used must be carefully planned.



### 3.3 Population and Sample

The research is an empirical study carried out as a census survey of all commercial banks registered and operating in Kenya as of December 2011 (according to the CBK Report). Due to the small number (43), and the desire to comprehensively assess market structure, a census is considered appropriate.

### 3.4 Data Collection

Secondary data was collected from the Central Bank of Kenya, Central Bureau of Statistics and Banks' Published Financial Statements, for the period 2007:1 to 2011: 12.

The data was collected using the form in Appendix 1.

### 3.5 Data Analysis

The Data obtained was analyzed using multiple linear regression techniques. The model in its simplified form takes the following form:

$$Y = \beta_0 + \beta_1 + \beta_2 X_2 + \dots + \beta_n X_n + C$$

Where: Y is the ex post spread of interest (dependent variable)

$X_{1-n}$  represents factors affecting the interest spread (independent variables).

$\beta_0$  is a constant, the value of Y when all X are zero.

$\beta_{1-n}$  is the regression co-efficient or change introduced in Y by each X and

C is an error term.

The relationship between the banking sector IRS and its market, macroeconomic and bank-specific determinants was specified as follows:

$$IRS_{it} = \beta_0 + \beta_1 INFL_t + \beta_2 CBR_t + \beta_3 TBR_t + \beta_4 COST_t + \beta_5 CRR_t + \beta_6 INTER_t + \beta_7 CLR_t + \beta_8 HHT_t + e_t$$

Where,

*IRS* is the Interest rate spread (SP) is the dependable variable as defined by the difference between the average commercial bank lending rate and the deposit rate.

*INFL* is the inflation rate (calculated as the annual percentage change in the consumer price index).

*CBR* is the Central Bank Rate used as a proxy for discount rate.

*TBR* is the 91 day Treasury Bill Rate used as a proxy for government borrowing.

*COST* is the operational expenses of banks, as a percentage of total income.

*CRR* is Cash Reserve Ratio i.e, the unremunerated required reserve requirement.

*INTER* is the interbank rate.

*CLR* (Short form for Credit Loss Ratio) is a proxy for default risk measured by total income statement charge (Specific Debt Provisions)/ Total Loans and Advances.

*HHT* is the Herfindahl Hirschman index used as a proxy for measuring market structure. This is an index that is often used as a measure of bank concentration and takes into account both the number of the institutions and their relative size. The index is calculated by squaring the market share of each firm competing in the market and then summing the resulting number. Market Share Index used is the ratio of Net Total Assets for individual bank/Total Banking Sector Assets.

*t* represents the time periods.

*e* is the error term.

The data was analyzed using statistical software, specifically, R and presented in form of tables and graphs.

### **3.5.1 Postulations of the Model**

A rise in (fall) in the inflation rate, Treasury Bill Rate, Operating Costs to income ratio, and Cash Reserve Ratio, all things constant is expected to lead to increase (decrease) in the interest rate spread. The higher (lower) the Inter-bank and Central Bank Rates, the higher (lower) the interest rate spread. The greater (lesser) the Credit Loss Ratio, the higher (lower) the interest rate spread. Finally, the more (less) competitive the banking system is, the lower (higher) the interest rate spread.

The model was subjected to econometric analysis using R Software. This statistical package can subject the model to a number of tests including Autocorrelation and Stationarity.

The signs expected of the parameters to be estimated are:

$$\begin{array}{lll} \beta_0 > 0 & \beta_4 > 0 & \beta_7 > 0 \\ \beta_1 > 0 & \beta_5 > 0 & \beta_8 > 0 \\ \beta_3 > 0 & \beta_6 > 0 & \end{array}$$

### 3.6 Estimation Procedure

The model was estimated using balanced panel data estimation. Asteriou, 2006 suggests that panel data models are more efficient when studying financial institutions as they control the chance of biased results by providing more degrees of freedom on pooling data. The models are used in three specifications: common constants; allowing for fixed effects, and allowing for random effects.

In the first attempt, the model was estimated using a system of generalized least squares (GLS), with period seemingly unrelated regressions, which is expected to simultaneously correct for both cross-section heteroscedasticity and autocorrelation. Next, the appropriate stochastic assumptions of the regressors on the components of the error term were assessed. This is very crucial for the estimation of the parameter  $\beta$ . The t-test was used to test the hypothesis on whether the variables were significant in predicting interest rate spread.

#### 3.6.1 Testing overall utility of the model

To measure how well the model fits the data, the Multiple Coefficient of Determination, R Squared was used. The higher the R Squared, the better the model fits the data.

The normality further turned out to be significant when the residue was subjected to Shapiro test, with a high p-value as shown below:

shapiro-wilk normality test

data: x.gls\$resid  
w = 0.9668, p-value = 0.1015

Based on the above p-value, we fail to reject normality as was hypothesized. This further signifies randomness, which subsequently signifies independence.

From my summary using gls, the Akeik Information Criterion (AIC) was 42.44364. Comparing this result to the ordinary least squares regression whose AIC value was 74 is further evidence in favour of the GLS. i.e a model with the smallest AIC value is normally a better fit. When the data was detrended using the first difference, it turned out to be stationary with corelogram whose ACF's were all insignificant across the lags.

### 3.6.2 Assumptions of the Liner Classical Regression Model

These were all confirmed to hold as follows:

Error term is normally distributed with mean zero and variance  $(\sigma)^2$ ,

Error terms are random

IRS, the dependable variable is normally distributed

The independent variables are Independent Identically distributed (iid's)

## **CHAPTER FOUR**

### **DATA ANALYSIS AND FINDINGS**

#### **4.1 Introduction;**

The objective of this study was to establish the determinants of interest spreads in Kenya. Determinants from previous studies were used to guide the choice of independent variables, but instead of focusing on the customary spreads or margins of individual banks, the spreads for the banking sector as a whole were examined. Monthly data on the change in overall consumer price index (inflation), 91 day treasury bill rates, inter-bank rate, cash reserve ratio, Central Bank Rate, credit loss ratio (measured by specific provisions to total loans), the ratio of operating costs to total income, and the Herfindahl- Hirschman index (a proxy for market structure) for the entire banking sector were used as independent variables. This study relies on R Statistical Package for data analysis.

A regression analysis was set out between interest rate spread per month as the dependable variable, and the various independent variables above. The dependent variable, bank interest rate spread, was defined as the difference between bank lending and deposit rates. Ideally, it is measured as the difference between the average interest rate earned on loans and the average interest rate paid on deposits for individual commercial banks (Sologoub 2006). Data on lending rates and deposit rates is obtained from the Central Bank of Kenya Website.

#### **4.2 Regression Results:**

The independent variables i.e., Inflation, 91 day treasury bill rate, inter-bank rate, cash reserve ratio, Central Bank Rate, credit loss ratio (measured by specific provisions to total loans), the ratio of operating costs to total income, and the Herfindahl- Hirschman index were regressed against the interest rate spread per month.

A summary of the Regression Results is indicated below:

## GLS Regression results

### Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	-4.51966	3.49588	-1.293	0.20189
CPI..Inflation.	-0.01524	0.01126	-1.353	0.18194
X91.Day.Tbill	-0.07813	0.02397	-3.259	0.00199 **
Interbank.Rate	0.03376	0.02168	1.558	0.12552
CRR	-0.44202	0.31158	-1.419	0.16209
CBR	0.24147	0.03677	6.566	2.64e-08 ***
CLR	-1.46361	0.32229	-4.541	3.45e-05 ***
COST.INCOME.RATIO	0.04995	0.05026	0.994	0.32506
HHI	116.86077	57.88032	2.019	0.04876 *

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.2375 on 51 degrees of freedom

Multiple R-squared: 0.918, Adjusted R-squared: 0.9052

F-statistic: 71.4 on 8 and 51 DF, p-value: < 2.2e-16

### Correlation:

	(Intr)	CPI..I	X91.D.	Intr.R	CRR	CBR	CLR	COST.I
CPI..Inflation.	0.666							
X91.Day.Tbill	-0.356	-0.440						
Interbank.Rate	-0.320	-0.147	-0.237					
CRR	0.101	-0.474	-0.039	-0.095				
CBR	0.306	0.260	-0.388	-0.661	0.047			
CLR	0.928	0.782	-0.315	-0.205	-0.163	0.211		
COST.INCOME.RATIO	-0.730	-0.680	0.141	0.394	0.453	-0.294	-0.752	
HHI	-0.719	-0.209	0.327	0.160	-0.694	-0.204	-0.562	0.067

### Standardized residuals:

	Min	Q1	Med	Q3	Max
	-2.78281952	-0.49069730	0.07591398	0.37863197	2.77594430

Residual standard error: 0.2458602

Degrees of freedom: 60 total; 51 residual

Based on the data at hand, the most parsimonious model would therefore be

$$IRS = -4.52 - 0.08 (91.\text{Day Tbill}) + 0.24 (\text{CBR}) - 1.46(\text{CLR}) + 116 (\text{HHI}).$$

The coefficient of determination (R Squared) was 0.918, implying that the model performed well in terms of explaining the spread as a function of 91-day Treasury bill rates, central bank rate, credit loss ratio and the market structure.

### 4.3 Summary of findings and Interpretation of Results

The t-statistics indicate that only four out of the eight variables being the 91-day t-bill rate, Central Bank Rate, Credit Loss Ratio and to a lesser extent the Herfindahl – Hirschman index, are significant at the 5% significance level. Changes in overall CPI (Inflation), interbank rate, cash reserve ratio and cost to income ratio were found to be insignificant and were therefore omitted from the model.

CLR was the most significant determinant of Interest Rate Spread (IRS) with a P-Value of 0.000. CBR was the second most significant determinant of Interest Rate Spread (IRS) with a P-Value of 0.0001. HHI was the least significant determinant of Interest Rate Spread (IRS) with a P-Value of 0.0118. These results can be interpreted as follows:

- i. Interest Rate Spread (IRS) stands -4.73461, if all the other factors are zero
- ii. Holding other factors constant, for every 1% increase in the 91. Day T-bill, interest rate spread decreases by 8%.
- iii. Holding other factors constant, for every 1% increase in Central Bank Rate, interest rate spread increases by 24%.
- iv. Holding other factors constant for every 1% increase in Credit Loss Ratio, interest rate spread decreases by 146%.
- v. Holding other factors constant, for every 1% increase in HHI, interest rate spread decreases by 116%.

The Central Bank rate thus plays the most significant role in determining interest rate spread (IRS). This is closely followed by the 91 Day Tbill rate and finally the HHI Index. Inflation, Interbank rate, cash reserve requirements and cost to income ratio were not significant in the model with negative correlation coefficients, which was against expert opinion since previous studies have found a significant positive relationship.

These findings are discussed in detail below:

#### **4.3.1 Inflation:**

The results suggest that much of the debate on the impact of inflation especially last year may not be highly relevant to banking spreads, as whilst the inflation rate may impact the absolute lending and deposit rates, there is no evidence of a transmission mechanism by which this effect is translated into a widening of banking sector spreads. A caveat must, however, be noted, as the above argument does not hold true if there is a lag between the adjustment in deposit and lending rates. Banks are often accused of quickly adjusting lending rates upwards relative to deposit rates whenever the inflation rates rise. It must, however, be noted that the coefficients for the inflation rate are low in both the first-differenced and levels estimations (approximately 0.02). This suggests that anti-inflationary measures will have to be stringent if they are to cause an appreciable reduction in interest rate spreads.

#### **4.3.2 Treasury Bill Rate:**

The results of other macro/policy variables show that a rise in the Treasury bill rate reduces the interest margin as it serves as a diversifying asset for the banks. Banks diversify their asset portfolio in an attempt to maintain their profit margins. Therefore, *flight for capital* as banks invest in government securities is a rational decision especially when banks are faced with a highly risky credit market. However, this reduces the intermediation role of banks and therefore the flow of funds to the private sector. In the recent past, government has attempted to make the Treasury bill market unattractive to the banks by keeping very low interest rates. However, with the need to finance fiscal deficits occasioned by the high wage bill, it is inevitable that government will be forced to borrow from the domestic markets.

#### **4.3.3 Interbank Rate:**

Inter-bank rate was found to be insignificant during the period under study and was therefore excluded from the reported results. This is at variance with the comments attributed to Kenya Bankers Association and a further study is recommended, noting that this rate seems to be highly correlated with inflation, Credit Loss Ratio, Cost to income ratio and the market structure as proxied by the HHI.



#### **4.3.4 Cash Reserve Ratio:**

The Cash Reserve Ratio was also found to be insignificant during the period under study. These results suggest that reserve requirements may have been ascribed too large a role in explaining the high levels of interest rate spreads in Kenya countries, as the much criticized implicit financial tax has not been shown to have a large or highly significant impact on the level of banking sector spreads over the last 5 years inspite of a significant reduction in the ratio from 6% in 2007 to 4.5% in 2009. This is possibly explained by a movement away from using reserve requirements to finance budget deficits or to control money supply, and towards setting such requirements based on international prudential benchmarks. This tendency would reduce the importance of this variable to the level of banking sector spreads. Changes in reserve requirement ratios would, however, suggest a movement away from international benchmarks (which do not change very frequently or erratically), and may imply a reversion (albeit temporary) to the use of such requirements as distortionary implicit financial taxes. Such changes in this ratio have been shown to have larger and more significant impacts on the annual changes in interest rate spreads in other developing countries.

#### **4.3.5: Central Bank Rate:**

An interesting finding is the fact that the Central bank rate is not only consistently statistically significant, but has the largest coefficient of the macroeconomic policy variables. The central bank rate is the rate charged by central banks when commercial banks borrow from them. Much of the recent newspaper articles suggest that the central bank rate is not an important monetary policy tool, and that banks routinely ignore the signaling effect of this rate.

However, these results suggest that this rate is undoubtedly an important factor in determining the size of the banking sector interest rate spreads. Governments and central banks should therefore carefully consider the level at which they set their discount rates, as it can have significant feedback impacts on economic variables through the interest rate spreads. If it is indeed a fact that these rates are not being used as a means of controlling the money supply, then they represent a fairly straightforward means by which governments can assist in the reduction of banking sector spreads. In fact, the results suggest that governments

could be more successful in reducing spreads through this means than through anti-inflationary measures, as the coefficients for the discount rate in both the first-difference and levels estimations are larger than those of the inflation variable.

#### **4.3.6: Credit Loss Ratio:**

Also surprising is the impact of the credit loss ratio. The results show that this is a significant determinant, but that the CLR is inversely correlated with Interest rate spreads. First, it is generally acknowledged that wide interest spread is sustained by inefficiency in the credit market. For example, high non-performing loans signal high credit risk to which the banks respond by charging a premium, and this keeps the lending rates high. In addition, a rising volume of loans may not translate into earnings if the market faces financial distress. Banks may respond by sustaining wide interest spread to maintain their profit levels. These results definitely contradict previous studies in this area. The data is quite clear in that a reduction in CLR over the years has not translated into a reduction in spreads. Perhaps the only logical explanation was provided by Ngugi (2004), when she states that "it is however possible that banks with a high proportion of non-performing loans can lower the spread in order to grow out of their troubles, assuming that banking authorities are reluctant to close banks in trouble and may encourage high-risk high growth strategies".

#### **4.3.7: Cost to Income Ratio:**

The results show that this is not a significant determinant for the period under review, but this is understandable given that the cost to income ratio remained fairly constant for 4 of the 5 years under review only reducing in 2011, when other factors, including a very unstable macroeconomic environment were at play.

#### **4.3.8: Herfindhal- Hirschman Index:**

This is a major determinant which is not surprising. Based on the Central Bank Supervision reports for the 5 years under review, control of the market is heavily skewed in favour of the 6 largest banks controlling over 50% of the market share.

#### 4.4 Conclusion

The Central Bank rate plays the most significant role in determining interest rate spread (IRS). This is closely followed by the 91 Day Tbill rate and finally the HHI Index. Even though Inflation, Cost to Income Ratio and Cash Reserve Requirements were insignificant in the model with negative correlation coefficients, this was against expert opinion since previous studies have found a significant positive relationship.

Interestingly the intercept. Inflation, Tbill, CRR and CLR variables all had negative coefficients which is contrary to what was expected noting the hypotheses that all  $\beta > 0$ . With this in mind, the first clear implication of the results is the fact that many of the factors commonly believed to be critical determinants of interest rate spreads have had little impact on interest rate spreads in Kenya over the last five years contrary to popular perceptions. For example, whilst macroeconomic stability has been long held to be a critical cause of high interest rate spreads, the results have shown that one of the most common indicators of such instability, the volatility of the inflation rate, has not had a significant impact on the banking sector interest rate spreads in Kenya.

This is also at variance with previous studies which have established a positive correlation between inflation, default risk and cash reserve requirements on one hand and interest rate spreads on the other hand. In particular, both Kimutai, 2003 and Ngugi, 2004, found the credit risk variable to be positive and significant, implying that when the banking sector is characterized by high levels of non-performing loans, banks tend to keep their profit margin by maintaining a wide spread. Ngugi, 2000 and Ngugi, 2004 had also clearly identified the correlation between operating expenses, cash reserve requirements and interest rate spreads. These negative results may have been due to the inadequate sample size.

## **CHAPTER FIVE**

### **CONCLUSIONS AND POLICY IMPLICATIONS**

#### **5.1 Introduction**

The study was conducted with the aim of achieving the objective of establishing the determinants of interest rate spreads amongst commercial banks in Kenya. A multivariate interest rate spread model was formulated to test the significance of each of the independent variables as determinants of bank's spread. The monthly average data of the variables were regressed against the percentage of interest rate spread for the month as the dependent variable. The study covered the period 2007: 1 to 2011: 12 when the macroeconomic environment was quite volatile, and the debate on interest rate spreads was reignited. Secondary data was obtained from various published sources, but mainly from the Central Bank of Kenya and the Kenya National Bureau of Statistics. The R Statistical Package was used for analysis.

#### **5.2 Conclusions**

The study identifies Central Bank Rate, and Lack of Competition as significant determinants of commercial banks' banking spreads in Kenya over the last 5 years. The Treasury Bill Rate and Credit losses have also contributed to banking sector spreads. The study could not find a strong relationship between operating expenses, cash reserve requirements, interbank rate and credit losses and interest rate spreads as claimed by banks. However, these factors cannot summarily be dismissed, as data limitations restricted the period of study to 5 years, which is not sufficient for long-run regression. It must also be noted that the study period was unique in a sense and hence findings should be put into some context. First, 2007 was an election year, and 2008 and 2009 were all impacted by the effects of the post election violence. When the economy began to recover in 2010, the lagged effects of the global financial crisis began to take effect. This culminated in a hyper inflationary environment in 2011, one analysts have been keen to refer to as a one in 10 event. In spite of the increase in lending rates, the Kenya Bankers Association and Central Bank of Kenya reached a deal to cushion borrowers from adverse effects by holding repayments constant, and not passing on the entire impact of a rise in rates. It would therefore be interesting to see how the same variables perform over the next 5 years.

### **5.3: Recommendations:**

Based on the findings of the study, the recommendations will centre on effective determination of the Central Bank Rate and improving the Competitive environment in the banking sector.

#### **5.3.1: Monetary Policy**

The Central bank rate is set by the Monetary Policy Committee of the Central bank and takes into account the macroeconomic fundamentals such as inflation, exchange rates and balance of payments position/current account deficit. Macroeconomic stability is vital for a successful financial liberalization process, thus policy actions should be taken to ensure sustainable growth of the economy. Stability of key prices, including the exchange rate, commodity prices and their impact on interest rates is crucial.

#### **5.3.2: Treasury Bill Rate**

Conduct of government fiscal policy should be in line with the goals of financial sector reform. If government limits borrowing from the domestic market, banks will perform more of their intermediation process than investing in short term treasury bills, and this could be done by realigning Treasury bill rates with other returns on short-term financial assets and pushing for competitiveness in the market.

#### **5.3.3: Market Structure**

Banks seem reluctant in sharing their supernormal profits with their depositors and customers. This is supported by imperfect and cartelized structure of the Banking sector. The Central bank should promote effective competition in the banking industry through licensing of more deposit taking institutions as well as stringent enforcement of disclosure requirements regarding lending and deposit rates.

### **5.4 Limitations of the Study**

This study was limited to eight variables widely touted in academic literature as determinants of banking sector spreads. This list of variables is by no means exhaustive. In particular,

there are many other variables such as exchange rates, liquidity risk as well as bank-specific variables such as quality of management that were excluded.

The second limitation relates to the period of study. Five years was chosen due to availability of data on the CBK website. However such a short period is insufficient for drawing inferences in the long run. There was also limitation of the actual data sources whilst average lending and deposit rates were used, it may have been more accurate to use actual lending and deposit rates but those are not readily available. Finally, there is limitation of the extent of the disturbance/error term. There may be many other variables such as sentiments that may not be capable of being measures or are simply unknown.

### **5.5 Suggestions for further Research**

It is recommended that other studies are carried out to establish the impact of credit loss ratio on individual banks spreads with specific focus on banks lending in the small and medium enterprise sector, as high losses have been blamed to the relatively large spreads in the sector. Whilst CLR was one of the variables in my study, it is possible that by looking at the entire banks assets, other products may have cross subsidized the high risk ones.

I also think a study incorporations determinants of interest rate spread to the entire financial sector, including micro finance institutions is relevant whilst banks have generally shied away from the informal sector, micro finance institutions continue to thrive, and this is partly attributed to their ability to price to risk.

Further research is required on the impact of information capital on interest rate spreads. Some analysts have claimed that the licensing of credit reference bureau should result in lower spreads.

Finally, whilst Treasury Bill rate was used as a way for fiscal policy, it would interesting to determine how actual government borrowings as a percentage of total banking sector loans and advances, crowded out private sector borrowings and the impact on the spreads.

## APPENDICES

<b>APPENDIX 1: SAMPLE DATA COLLECTION FORM</b>														
Year	Lending Rate	Deposit Rate	Spread	Consumer price index (Measure for Inflation)	Government Domestic Borrowings	Total Operating Expenses (Combined for all Commercial banks)	Total Income (Combined for all Commercial banks)	Unremunerated Required Reserves (Cash Ratio)	Inter-Bank Rate	CBK-Rate	Total Income Statement Provisions	Total Loans and Advances (as at year-end)	Total Assets (as at year-end)	HHI Index (Calculated Separately)
2007														
2008														
2009														
2010														
2011														

### **SOURCES**

Annual Reports of the Central Bank of Kenya  
 Central Bank of Kenya Annual Supervision Reports  
 Commercial Bank Annual Published Financial Statements  
 International Monetary Fund (IMF) Statistics  
 Central Bureau of Statistics Annual Reports

## **Appendix II: Commercial Banks Operating in Kenya as at 31<sup>st</sup> December 2011**

- 1 Kenya Commercial Bank Ltd
- 2 Barclays Bank of Kenya Ltd
- 3 Standard Chartered Bank Ltd
- 4 Co-operative Bank of Kenya Ltd
- 5 CFC Stanbic Bank Ltd
- 6 Equity Bank Ltd
- 7 Citibank, N.A.
- 8 National Bank of Kenya Ltd
- 9 Commercial Bank of Africa  
Limited
- 10 NIC Bank Limited
- 11 Diamond Trust Bank Kenya  
Limited
- 12 I & M Bank
- 13 Prime Bank Ltd
- 14 Bank of Baroda Ltd
- 15 Imperial Bank Ltd
- 16 Bank of Africa Ltd
- 17 Bank of India
- 18 EABS/Ecobank Ltd
- 19 Family Bank Ltd
- 20 Chase Bank Ltd
- 21 Fina Bank Ltd
- 22 K-Rep Bank Ltd
- 23 African Banking Corporation Ltd
- 24 Habib AG Zurich
- 25 Development Bank of Kenya Ltd
- 26 Giro Commercial Bank Ltd
- 27 Guardian Bank Ltd
- 28 Southern Credit Banking Corp. Ltd
- 29 Gulf African Bank Ltd
- 30 Consolidated Bank of Kenya Ltd
- 31 Habib Bank Ltd
- 32 Victoria Commercial Bank Ltd
- 33 Equatorial Commercial Bank Ltd
- 34 Fidelity Commercial Bank Ltd
- 35 Credit Bank Ltd
- 36 Transnational Bank Ltd
- 37 Middle East Bank Ltd



- 38 First Community Bank Ltd
- 39 Paramount-Universal Bank Ltd
- 40 Oriental Commercial Bank Ltd
- 41 Dubai Bank Ltd
- 42 City Finance/Jamii Bora Bank Ltd
- 43 UBA Kenya Limited

**Source:** Directory of Commercial Banks, Financial institutions, Building Societies,  
Mortgages Finance companies and foreign Exchange Bureau,  
Central Bank of Kenya, December 2011

### Appendix III: Data used in the Study

#### MSC PROJECT DATA

YEAR	MONTH	IRS	CPI (Inflation)	91-Day Tbill	Interbank Rate	CRR	<b>CBR</b>	CLR	COST INCOME RATIO	HHI
2007	JAN	9.43	9.70	6.00	7.83	6.00	10.00	4.53	51.20	0.07
	FEB	9.42	6.80	6.22	7.83	6.00	10.00	4.53	51.20	0.07
	MAR	9.37	5.90	6.32	7.83	6.00	10.00	4.53	51.20	0.07
	APR	9.22	5.70	6.65	7.83	6.00	10.00	4.53	51.20	0.07
	MAY	9.23	6.30	6.77	7.83	6.00	10.00	4.53	51.20	0.07
	JUN	8.96	11.10	6.53	7.83	6.00	8.50	4.53	51.20	0.07
	JUL	8.96	13.60	6.52	7.83	6.00	8.50	4.53	51.20	0.07
	AUG	8.73	12.40	7.30	7.83	6.00	8.75	4.53	51.20	0.07
	SEP	8.53	11.70	7.35	7.83	6.00	8.75	4.53	51.20	0.07
	OCT	8.97	10.60	7.55	7.83	6.00	8.75	4.53	51.20	0.07
	NOV	9.06	11.80	7.52	7.83	6.00	8.75	4.53	51.20	0.07
	DEC	9.00	12.00	6.87	7.83	6.00	8.75	4.53	51.20	0.07
2008	JAN	9.41	18.20	6.95	6.73	6.00	8.75	3.89	51.60	0.07
	FEB	9.47	19.10	7.28	6.73	6.00	8.75	3.89	51.60	0.07
	MAR	9.63	21.80	6.90	6.73	6.00	8.75	3.89	51.60	0.07
	APR	9.50	26.60	7.35	6.73	6.00	8.75	3.89	51.60	0.07
	MAY	9.56	31.50	7.76	6.73	6.00	8.75	3.89	51.60	0.07
	JUN	9.58	29.30	7.73	6.73	6.00	9.00	3.89	51.60	0.07
	JUL	9.37	26.50	8.03	6.73	6.00	9.00	3.89	51.60	0.07
	AUG	9.01	27.60	8.02	6.73	6.00	9.00	3.89	51.60	0.07
	SEP	9.04	28.20	7.69	6.73	6.00	9.00	3.89	51.60	0.07
	OCT	9.47	28.40	7.75	6.81	6.00	9.00	3.89	51.60	0.07
	NOV	9.47	29.40	8.39	6.83	6.00	9.00	3.89	51.60	0.07
	DEC	9.98	27.70	8.59	6.67	6.00	8.50	3.89	51.60	0.07

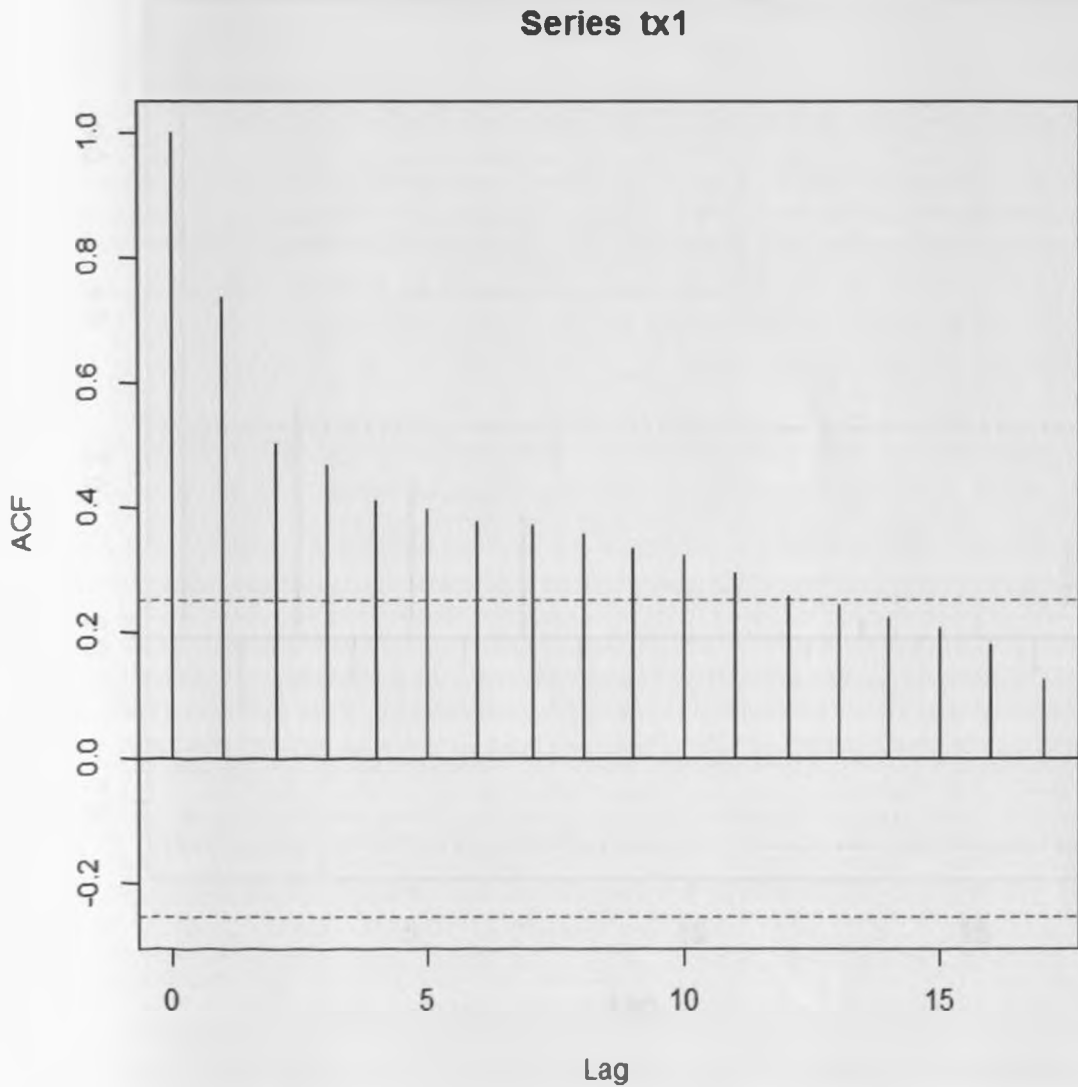
2009	JAN	9.59	21.90	8.46	5.95	5.00	8.50	3.47	51.30	0.066
	FEB	9.44	14.60	7.55	5.49	5.00	8.50	3.47	51.30	0.066
	MAR	9.78	14.60	7.31	5.56	5.00	8.25	3.47	51.30	0.066
	APR	9.59	12.40	7.34	5.81	5.00	8.25	3.47	51.30	0.066
	MAY	9.75	9.60	7.45	6.51	5.00	8.00	3.47	51.30	0.066
	JUN	9.81	8.60	7.33	3.00	5.00	8.00	3.47	51.30	0.066
	JUL	9.70	8.40	7.24	2.69	4.50	7.75	3.47	51.30	0.066
	AUG	9.76	7.30	7.25	3.68	4.50	7.75	3.47	51.30	0.066
	SEP	9.69	6.70	7.29	3.38	4.50	7.75	3.47	51.30	0.066
	OCT	9.75	6.60	7.26	2.57	4.50	7.75	3.47	51.30	0.066
	NOV	9.79	5.00	7.22	3.11	4.50	7.00	3.47	51.30	0.066
	DEC	9.92	5.30	6.82	2.95	4.50	7.00	3.47	51.30	0.066
2010	JAN	9.98	4.70	6.56	3.70	4.50	7.00	3.13	50.00	0.066
	FEB	10.08	5.20	6.21	2.39	4.51	7.00	3.13	50.00	0.066
	MAR	10.06	4.50	5.98	2.21	4.51	6.75	3.13	50.00	0.066
	APR	10.09	3.70	5.17	2.46	4.51	6.75	3.13	50.00	0.066
	MAY	9.88	3.90	4.21	2.16	4.51	6.75	3.13	50.00	0.066
	JUN	9.94	3.50	2.98	1.15	4.51	6.75	3.13	50.00	0.066
	JUL	10.44	3.60	1.60	1.35	4.50	6.00	3.13	50.00	0.066
	AUG	10.44	3.22	1.83	1.66	4.50	6.00	3.13	50.00	0.066
	SEP	10.45	3.21	2.04	1.18	4.50	6.75	3.13	50.00	0.066
	OCT	10.27	3.18	2.12	0.98	4.51	6.75	3.13	50.00	0.066
	NOV	10.41	3.84	2.21	1.05	4.51	6.00	3.13	50.00	0.066
	DEC	10.28	4.51	2.28	1.18	4.51	6.00	3.13	50.00	0.066
2011	JAN	10.60	5.42	2.46	1.24	4.50	5.75	2.43	46.00	0.066
	FEB	10.51	6.54	2.59	1.13	4.50	5.75	2.43	46.00	0.066
	MAR	10.45	9.19	2.77	1.24	4.50	6.00	2.43	46.00	0.066
	APR	10.46	12.05	3.26	3.97	4.50	6.00	2.43	46.00	0.066

MAY	10.37	12.95	5.35	5.52	4.50	6.25	2.43	46.00	0.063
JUN	10.23	14.49	8.95	6.36	4.75	6.25	2.43	46.00	0.063
JULY	10.29	15.53	8.99	8.57	4.75	6.25	2.43	46.00	0.063
AUG	10.25	16.67	9.23	12.46	4.75	6.25	2.43	46.00	0.063
SEP	10.58	17.32	11.93	7.45	4.75	7.00	2.43	46.00	0.063
OCT	10.39	18.91	14.80	14.92	4.75	11.00	2.43	46.00	0.063
NOV	12.77	19.72	16.14	28.89	4.75	16.50	2.43	46.00	0.063
DEC	13.06	18.93	18.30	21.72	4.75	18.00	2.43	46.00	0.063

Sources: Central Bank of Kenya, Kenya National Bureau of Statistics, IMF, International Financial Statistical Year Book, Bank published financials.

## Appendix IV: Regression Results

Figure 2: IRS plotted as a time series data showing Autocorrelation functions



Autocorrelations of series 'tx1', by lag

0	1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17						
1.000	0.736	0.504	0.468	0.412	0.397	0.378	0.373	0.358	0.333	0.324	0.295
0.259	0.243	0.225	0.206	0.181	0.124						

Fig 2 above reveals a decaying ACF with increasing lag signifying a possible AR process.

Figure 3: The partial ACF above in fig 3 is cut at lag 1 signifying an AR(1) process

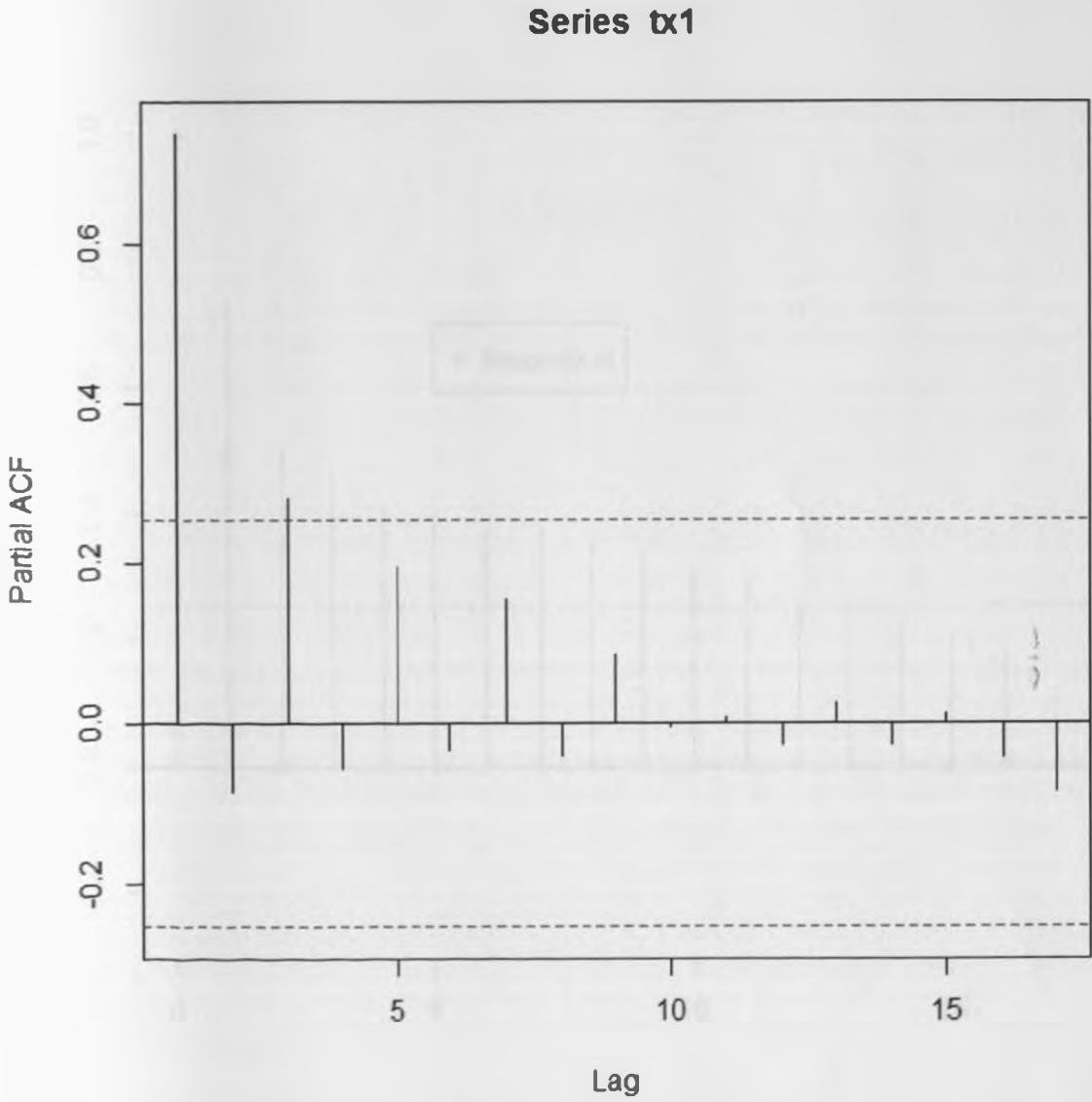


Figure 4: This is an Autocorrelation function superimposed in a theoretical ACFplot

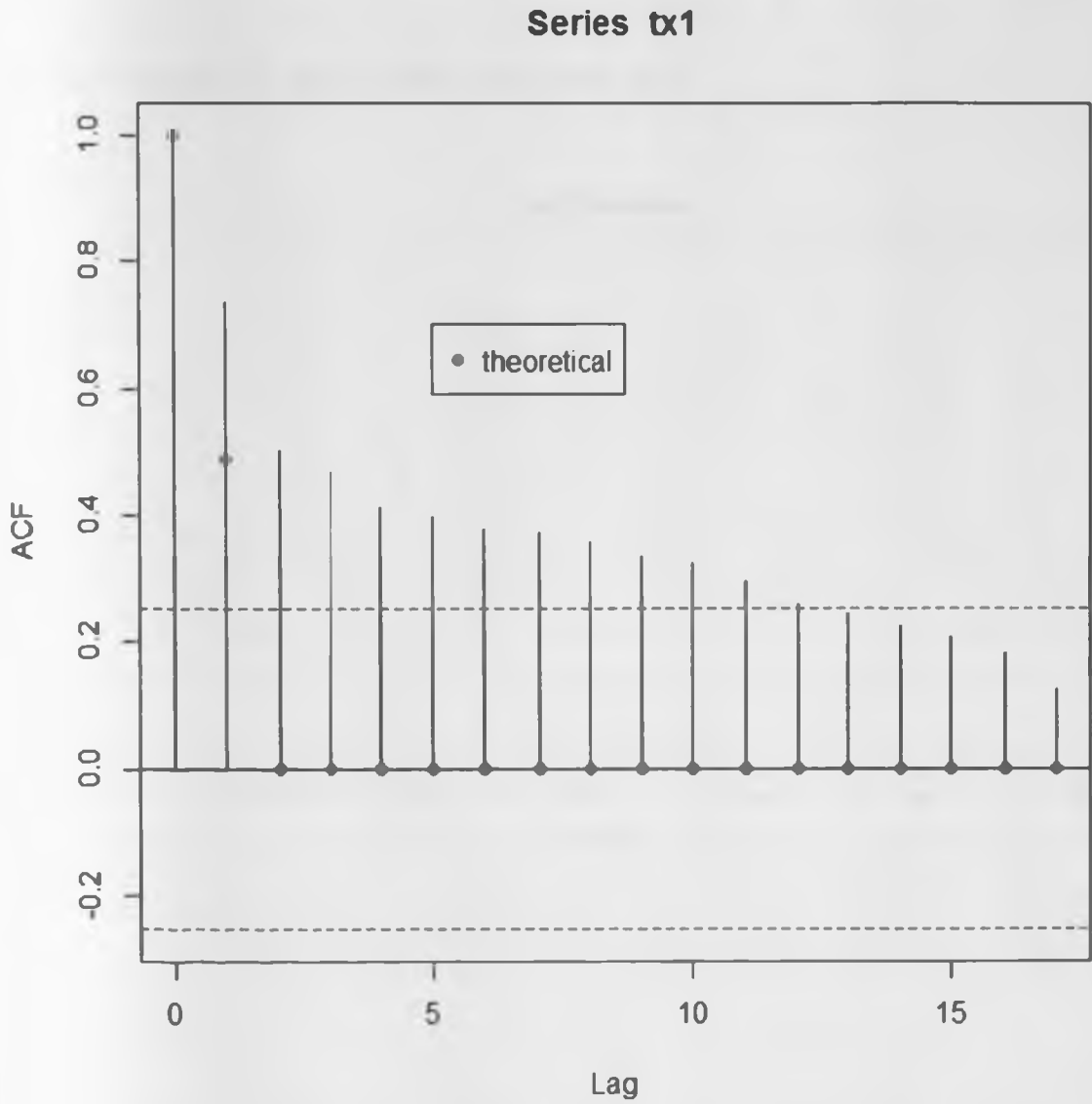
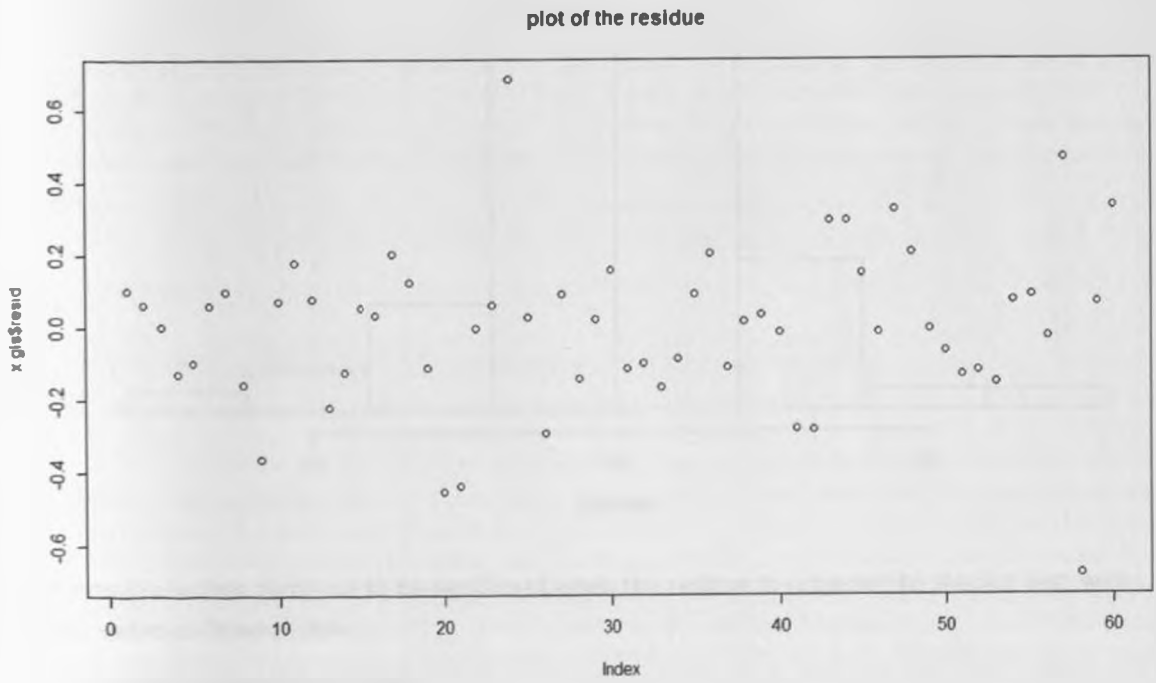


Figure 5: Model Assumption (distribution of error term)

From the fitted values, noise was random and normally distributed as earlier hypothesized.

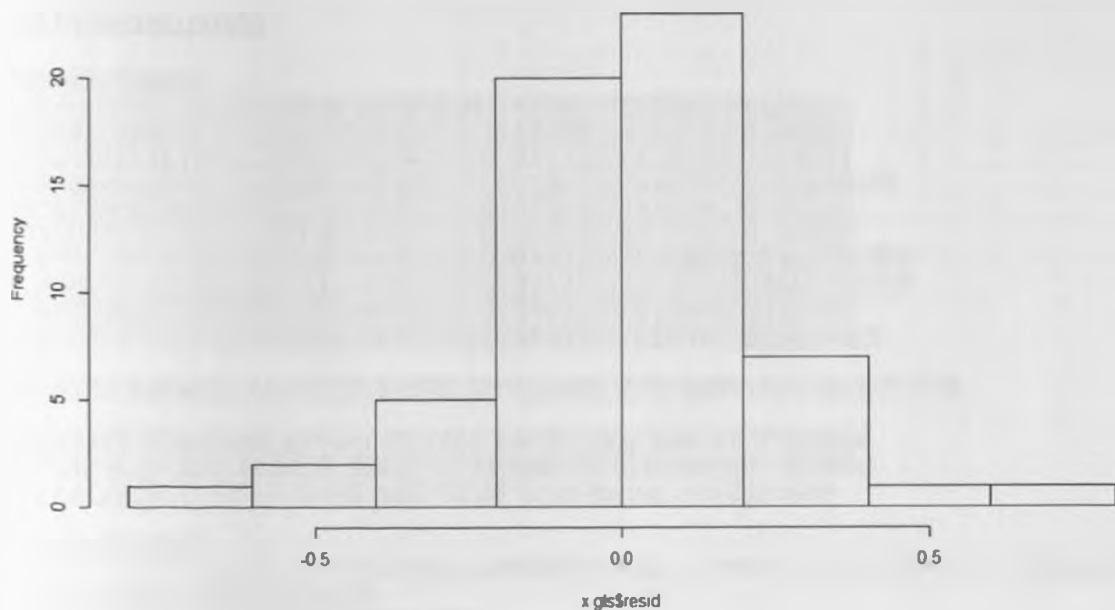
There is completely no specific pattern for the error terms.





Similarly, the error terms are seems to be normally distributed as depicted in the histogram below.

Figure 6: Histograms of the residue



The normality further turns out to be significant when the residue is subjected to Shapiro test, with a high p-value as shown below

Shapiro-wilk normality test

```
data: x.gls$resid  
W = 0.9668, p-value = 0.1015
```

Based on the above p-value, we fail to reject normality as was hypothesized.

This further signifies randomness, which subsequently signifies independence.

### The goodness of fit test

From my summary using gls, the Akeik Information Criterion (AIC) was 42.44364.

Comparing this result to the ordinary least squares regression whose AIC value was 74 is a further evidence in favour of the gls. i.e a model with the smallest AIC value is normally a better fit.

Generalized least squares fit by REML

Model:  $y \sim \text{CPI..Inflation.} + \text{X91.Day.Tbill} + \text{Interbank.Rate} + \text{CRR} + \text{CBR} + \text{CLR} + \text{COST.INCOME.RATIO} + \text{HHI}$

Data: NULL

	AIC	BIC	logLik
	42.44364	63.69372	-10.22182

### GLS Regression results

#### Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	-4.51966	3.49588	-1.293	0.20189
CPI..Inflation.	-0.01524	0.01126	-1.353	0.18194
X91.Day.Tbill	-0.07813	0.02397	-3.259	0.00199 **
Interbank.Rate	0.03376	0.02168	1.558	0.12552
CRR	-0.44202	0.31158	-1.419	0.16209
CBR	0.24147	0.03677	6.566	2.64e-08 ***
CLR	-1.46361	0.32229	-4.541	3.45e-05 ***
COST.INCOME.RATIO	0.04995	0.05026	0.994	0.32506
HHI	116.86077	57.88032	2.019	0.04876 *

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.2375 on 51 degrees of freedom  
 Multiple R-squared: 0.918, Adjusted R-squared: 0.9052  
 F-statistic: 71.4 on 8 and 51 DF, p-value: < 2.2e-16

#### Correlation:

	(Intr)	CPI..I	X91.D.	Intr.R	CRR	CBR	CLR	COST.I
CPI..Inflation.	0.666							
X91.Day.Tbill	-0.356	-0.440						
Interbank.Rate	-0.320	-0.147	-0.237					
CRR	0.101	-0.474	-0.039	-0.095				
CBR	0.306	0.260	-0.388	-0.661	0.047			
CLR	0.928	0.782	-0.315	-0.205	-0.163	0.211		
COST.INCOME.RATIO	-0.730	-0.680	0.141	0.394	0.453	-0.294	-0.752	
HHI	-0.719	-0.209	0.327	0.160	-0.694	-0.204	-0.562	0.067

#### Standardized residuals:

	Min	Q1	Med	Q3	Max
	-2.78281952	-0.49069730	0.07591398	0.37863197	2.77594430

Residual standard error: 0.2458602  
 Degrees of freedom: 60 total; 51 residual

there seem to be a correlation between Interbankrates and CPI Inflation, CLR, cost income ratio and HHI

From the above, the above model i.e

$$IRS_{it} = \beta_0 + \beta_1 INFL_t + \beta_2 DISRATE_t + \beta_3 CROWD_t + \beta_4 COST_t + \beta_5 RES_t + \beta_6 INTER_t + \beta_7 CLR_t + \beta_8 HHT_t + e_t$$

Reduces to,

$$IRS = -4.73461 - 0.01628(\text{CPI. Infl}) - 0.07049(\text{x91.Day Tbill}) + 0.02842(\text{Interbank Rate}) - 0.44183(\text{CRR}) + 0.24372(\text{CBR}) - 1.48821(\text{CLR}) + 0.04494(\text{CRI}) + 124.5897(\text{HHI})$$

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