

**EFFECT OF INFLATION AND MARKET STRUCTURE ON  
INTEREST RATES IN KENYA**

**BY**

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## DECLARATION

This project is my original work and has not been submitted for a degree in any other university except the University of Nairobi.

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This research project has been submitted for examination with my approval as the University Supervisor.

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I'm grateful to my supervisor, Mr. Mohamed Mwachiti, for his indispensable advice, flexibility and ceaseless support.

## **DEDICATION**

This work is dedicated to my family and friends.

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## ABSTRACT

The publications relating to determinants of interest rate spreads are diverse in their approaches as well as applications. The relevant publications, approaches and results range from endeavors to establish the elements that define the pure intermediation margin, to investigations that aim to pinpoint if a country's institutional characteristics govern it. This review is considered to understand the phenomenon and gain objectivity into the most fitting perspective for Kenya. This study sought to determine the effect of inflation and market structure on interest rate spread in Kenya. The population for the study was all the 42 commercial banks operating in Kenya as at 31<sup>st</sup> December 2017. The independent variables for the study were inflation as measured by inflation rate on a quarterly basis and market structure as measured by the weighted combination of net assets, deposits and total shareholders' funds for commercial banks in Kenya on a quarterly basis. Interest rate spread was the dependent variable and was measured by lending rate less deposit rate on a quarterly basis. Secondary data was collected for a period of 10 years (January 2008 to December 2017) on a quarterly basis. The study employed a descriptive research design and a multiple linear regression model was used to analyze the relationship between the variables. Statistical package for social sciences version 22 was used for data analysis purposes. The results of the study produced R-square value of 0.748 which means that about 74.8 percent of the variation in interest rate spread of commercial banks in Kenya can be explained by the two selected independent variables while 25.2 percent in the variation of interest rate spread was associated with other factors not covered in this research. The study also found that the independent variables had a strong correlation with interest rate spread ( $R=0.865$ ). ANOVA results show that the F statistic was significant at 5% level with a  $p=0.000$ . Therefore the model was fit to explain the relationship between the selected variables. The results further revealed that only market structure produced positive and statistically significant values for this study. Inflation rate was found to be statistically insignificant determinant of interest rate spread among commercial banks. This study recommended that adequate measures should be put in place to manage the market structure of commercial banks in Kenya as this significantly influences the interest rate spread.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

The term structure of interest rates, i.e., the yield curve, has for a long time evoked interest among monetary policymakers as well as their advisers (Campbell, 2011). The channeling of monetary policy is typically seen as running from short-term interest rates managed by central banks to longer-term rates that impact aggregate demand (Barr and Campbell, 2012). The only grip that central banks have over longer-term rates are due to the fact that the market determines longer term rates as the average expected level of short term rates over a given horizon (abstracting from a term premium and default risk) (Campbell, 2011). On the other hand, the long term bond rate carries a premium for expected inflation which persuades that central banks are dedicated to maintaining low inflation (Barr and Campbell, 2012).

Various points of view support the two above-mentioned uses of the term structure for monetary policy: Hicks' (1939) expectations theory of the term structure supports the first, and Fisher's (1896) decomposition of nominal bond rates into expected inflation and an expected real return supports the second (King, 2013). According to Goodfriend (2013), the basic concepts behind the two views are compatible, however, conflicts arise during interpretation for practice purposes. For instance, is a steepening yield curve indicative of a loss of confidence in the central bank's dedication to low inflation, or does it show that markets anticipate tighter policy evidenced by increasing short term rates pursued by the central bank? Campbell (2011) states that, inasmuch as the yield curve carries information that can be used by monetary policymakers, it needs to be interpreted considering additional

“identifying” conditions, in conjunction with supplementary data on the economy. Some circumstances are likely to attract clearer interpretations compared with others. Besides, there are lots of complications.

Whether we view longer-term interest rates as economic indicators or as an integral part of the transmission mechanism for policy, or both, the term structure’s involvement in the policymaking process is fundamental. Notwithstanding its complexity, the term structure cannot be disregarded.

### **1.1.1 Interest Rates**

Interest rate refers to the price paid by borrowers for using borrowed money (from a lender/financial institutions) or amount paid on borrowed assets (Barr and Campbell, 2012). Essentially, interest rate is the monthly/annual effective rate paid on borrowed money. Supposing that the person is a creditor, interest will be received. Interest rate is normally shown as the percentage of the principal sum (Benninga and Wiener, 2008). In modern financial theory, interest rates and determinants of interest rates are difficult to compute. In spite of the fact that interest rates are hard to compute, they render critical information to economists (Barr and Campbell, 2012).

According to Hull and White (2012), interest rates are material due to three key reasons: a) the modern fixed income market comprises bonds and other derivative securities vulnerable to interest rates; b) interest rates are used in time discounting hence vital in pricing other market securities; c) in making investment decisions which are founded on predictions pertaining to alternate opportunities and the cost of capital - both are dependent on the interest rates. As time goes by, it’s expected that there are movements in or differences

between interest rates. The following variables ultimately affect interest rates: tax treatment, marketability, call or put features, default risk, term to maturity, convertibility, etc.

### **1.1.2 Inflation**

There is no typically recognized definition of inflation since inflation is a blanket term applied in varying contexts. There is also no standard consensus as to what comprises allowable measure of inflation, bad inflation or hyperinflation. However, inflation can be broadly defined as a measure of the general growth of the prices in an economy. Inflation is generally indicated through an inclusive price index, for example, the Consumer Price Index (CPI) (Krugman, Obstfeld and Melitz, 2011). Inflation represents various isolated prices growing together rather than one or two independent prices, such as rising sugar prices in a serene price environment.

CPI reflects an index. It is a single number. CPI does not represent a growth rate. A basic formula is used to translate two index values into a growth rate, which is then used to modify the CPI to an inflation rate. The CPI is derived from extensive repeated studies spearheaded by a government agency.

Conventionally, the study strives to assess and reassess the prices of several items bought by consumers (Hamid, 2011). Typically, the CPI and associated statistics are released on a monthly basis, via press release and posted on the publicly available CPI website.

The inflation rate is typically expressed as an annual increase in price levels (estimated by an index) no matter whether quantified over the short-term. For instance, if it is said that consumer prices rose at an inflation rate of four percent, that essentially means that the CPI

for All Urban Consumers (the most popular index) rose at an annualized rate of approximately four percent (Krugman, Obstfeld and Melitz, 2011).

### **1.1.3 Market Structure**

The structure of the market refers to the number and distribution of firms in a market (Besanko et al., 2007). To capture the structural features within a market, market share and concentration ratios of various kinds are often used. Market share is derived from dividing the bank's share of assets by the total banking sector assets (Ali Mirzaei, Guy Liu and Tomoe Moore, 2011). Concentration ratios are useful to explain competitive performance in the banking industry. Concentration ratios also estimate alterations in concentration that occur when a bank enters or exits the market as well as concentration brought about by a merger (Bikker and Haaf, 2002).

As with delineating markets and defining its boundaries, there are several ways to determine the structure within a given market and calculate the concentration ratios. A highly applicable measure of market structure is the K-bank concentration ratio (Bikker and Haaf, 2002). This is a measure of the combined market share of the K largest firms in a particular market. For example, in a given bank market, the 3-bank concentration ratio represents the combined market share of the three largest banks in that market.

### **1.1.4 Relationship between Inflation and Interest Rates**

Interest rate and inflation are closely related basic macroeconomic variables. According to theories and empirical studies, there exists a causality relationship between interest rate and inflation rate (Majalah, 2002). This relationship can be established using a causality test. Newer causality tests like Hsiao test should be considered as opposed to the Granger causality test which is plagued with difficulty (Wachter, 2006).

Supposing the interest rates in a given economy are fixed by banking regulators, the reaction of inflation on interest rate cannot be accurately substantiated. Given that the cause and effect of interest rate and inflation rate is evident in developed countries, the associated hypothesis test under consideration makes more sense for different countries (Majalah, 2002).

#### **1.1.5 Relationship between Market Structure and Interest Rates**

Market structure refers to the different characteristics of a market, i.e. the number and distribution of banks and the specific attributes of the banks within the market as well as the attributes of the market itself. Performance may be measured in terms of banks' interest rate spreads (Berger et al., 2004). Many studies have been conducted on this topic and empirical evidence show that market concentration has an effect on interest rate spreads.

However, competing theories offer contradictory conclusions in regard to this relationship. For instance, proponents of the Structure Conduct Performance Hypothesis suggest a direct positive relationship between market concentration and interest rate spreads, while those in favor of the Efficiency Hypothesis consider the influence of market concentration on interest rate spreads to be merely spurious (Besanko et al., 2007).

#### **1.1.6 Interest Rates in Kenya**

A number of steps to improve the functioning of the financial markets and decrease the levels of the interest rates in Kenya have been taken. One such measure has been the introduction of the KBRR, which provides a standardised base rate for loans, allowing borrowers to better compare rates across banks and thereby increasing the transparency of the market. Additional measures to improve transparency have also been introduced by banks, notably the recent

introduction of a standardized APR showing the combined annual cost of interest, bank charges and fees (Kenya Bankers Association, 2014). Taken together, these measures should make it easier for borrowers to find the product that is right for them and are expected to exert downward pressure on interest rates, although it is still too early after their introduction for the effect to be clearly observed.

Controls on interest rates have often been cited as a solution to high lending rates in Kenya. Examples include a 2013 Kenyan Parliamentary Budget Office report that suggested pegging deposit rates to lending rates (The East African, 2013), an attempt to amend the Banking Act to include interest rate caps in 2011 (Parliament of Kenya, 2011), and the 2001 Central Bank of Kenya (Amendment) Act, which aimed to cap lending rates at 4 p.p. above the 91-day T-bill rate and put a floor on deposit rates at 4 p.p. below T-bill rates (Kenya Bankers Association, 2014).

Similar measures have also been considered in other countries. However, while such measures have intuitive appeal, there are few examples of them being adopted by regulators in practice. Where they have been implemented, the caps are normally designed to prevent extreme lending and borrowing behaviour rather than to lower the market rate.

## **1.2 Research Problem**

The publications relating to determinants of interest rate spreads are diverse in their approaches as well as applications. The relevant publications, approaches and results range from endeavors to establish the elements that define the pure intermediation margin, to investigations that aim to pinpoint if a country's institutional characteristics govern it. This review is considered to understand the phenomenon and gain objectivity into the most fitting

perspective for Kenya.

Various studies have been conducted in researching the determinants of inflation rate. For example Folawewo and Tennant (2008) found that macroeconomic policy elements such as inflation are influential in expounding variations in interest rate spread in Sub-Saharan Africa. Aboagye et al. (2008) in Ghana and Robinson (2002) in a study on Jamaica, Brock and Rojas-Suarez (2000) in a study on Latin America and Mlachila and Chirwa (2002) in the case of Malawi established a positive and notable impact of inflation on the interest spread. In contrast, however, Crowley's (2007) study on English-Speaking African countries found inflation was negatively related to interest rate spread.

According to Khawaja and Din (2007), the interest spread is influenced by: financial regulations; bank specific factors; market structure of the industry and macroeconomic variables. Sanya and Gaertner (2012) and Grenade (2007) have shown that market concentration reduces competition. Gambacorta (2004) who studied factors explaining cross-sectional differences in bank interest rates of Italian banks noted that the impact of the structure of the banking sector on the spread can be ambiguous. On the other hand, Afanasieff, Lhacer, and Nakane (2002) summarized and analyzed several studies on the pricing power of banks in Brazil and argued that "there exists little evidence to suggest that the high bank spreads practiced in Brazil are the result of weak competition in the banking sector". Bourke (1989), and Moulyneux and Thornton (1992) in a study on concentration of markets found no relationship of concentration in banking sector on interest rate spread. It is against this background that the following questions arose:

a) What is the effect of inflation on the interest rate spread in Kenya? b) What is the effect of



market structure on the interest rate spread in Kenya?

### **1.3 Objective of the Study**

The objective of the study was to determine the effect of inflation and market structure on interest rates in Kenya.

### **1.4 Value of the Study**

This study will enhance the little and scarce information on the analysis of the interest rate structure in Kenya and thus, it will form a strong foundation for future studies in finance. This research will provide useful information for commercial banks, macro and micro credit institutions as well as the Central Bank of Kenya (CBK). It will offer recommendations for improvement in areas where the country is failing as well as show the areas where the country is performing well.

The financial policy makers in the country may use the results of the study to comprehend the factual analysis of the interest rate structure in the country, this will facilitate their ability to come up with strategies to avert the challenges as well as use the recommendations that will be offered to improve on the future analysis of the interest rates within the country. The results of this research will be of value through the addition of research on the scarcely available information in Kenya about the interest rate structure.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter contains a variety of sections. It begins with the theoretical review of the study that explains various theories of the interest rate structure. This is followed by an empirical review that focuses on various aspects that impact the interest rate like inflation, and the market structure. The chapter ends by giving the research gap of the study.

#### **2.2 Theoretical Review**

The yield curve assumes a shape which can be explained by two major theories; the market segmentation theory and the expectation theories. The market segmentation theory proposes that borrowers and lenders position on the yield curve is determined by their specific need to equate their assets and liabilities. According to this theory the shape of the yield curve is determined by the forces of demand and supply at various levels of maturities as participants are assumed to maintain their preferred maturity levels. (Kyle and Xiong, 2001)

The expectation theory on the other hand has three variations with one of them being termed as “pure” and the rest as “biased”. These variations are Pure Expectations Theory (“Pure”), Preferred Habitat Theory (“biased”) and Liquidity Preference Theory (“biased”). The three variations however share a similar assumption that future market expectations of short-term rates can be traced from the short-term forward interest rates.

##### **2.2.1 Market Segmentation Theory**

Market segmentation theory that was developed by Duffee (2002) proposes that the interest rates charged on short-term bonds, intermediate-term bonds and long term bonds should be treated as different items in the various debt securities markets. According to this theory

every market segment is populated by investors who prefer investing in accordance with a specific time frame; short-term, intermediate term or long-term.

Duffee (2002) puts across the idea that there lacks a deep-rooted relationship between the prevailing short term and long term rates. He also states that in order to understand yield curves it is important that one considers the market segmentation theory. This theory is also referred to as the segmented markets theory.

According to Wachter (2006) the market segmentation theory highlights that the attributes of the buyers in the security markets for short-term bonds differ from those interested in long-term bond and should therefore not be interchanged. This line of thought was arrived at after studying the different investment trends such as insurance companies and banks. Banks were found to major in issuing of short-term securities while insurance companies on the other hand favored investment in long-term securities.

In summary, the theory of market segmentation is commonly used when investing in yield curves which are determined by the specific demand and supply forces in the market. Under this theory the returns from a particular category of debt security maturity cannot be effectively used to predict the returns of debt securities in another market.

## **2.2.2 Expectations Theories**

### **2.2.2.1 Pure Expectations Theory (“Pure”)**

Pure Expectations Theory which is also referred to as Unbiased Expectations Theory puts across the idea that the prevailing long-term interest rates can be used to determine the short-term interest rates that can be expected to prevail in the future. According to this theory, an investor who purchases a one-year bond and puts it in a different one-year bond after the investment has run for a period of one year stands to gain returns that are equal to those

earned by an investor who decides at the beginning to invest in a two-year bond. (Gabaix, Krishnamurthy and Vigneron, 2007).

The expectations theory can also be used in some cases to explain the shape of the yield curve. It has however been criticized as when the yield curve is normal the interest rates tend to remain flat indicating some inaccuracy. The theory also tends to reflect the future short-term interest rates as an over-estimate giving incorrect predictions.

Pure expectations theory is anchored on the idea that investing in a two-year bond equals investing in a one-year bond and adding the returns of a one-year bond upon maturity. The theory will be used to enable the study to examine the interest rate yield by measuring the geometric mean of one-year yields over the five year period selected for the study.

#### **2.2.2.2 Liquidity Preference Theory (“biased”)**

Liquidity preference theory is based on an assumption that rational investor chooses short-term bonds over long-term bonds due to the extended uncertainty of long-term periods. As a result, investors expect a liquidity premium for investment in long-term bonds. Therefore investors demand a liquidity premium for longer dated bonds. Liquidity preference theory tends to have a natural bias against a yield curve that is positively sloped. (Kyle and Xiong, 2001).

Duffee (2002) views the liquidity premium theory as an advancement meant to explain the 3<sup>rd</sup> characteristic of the structure of interest rates which states that the longer the maturity of a bond the higher the expected returns from the bond. Some of the risks linked with holding long-term bonds that have been absorbed by this theory include interest rate risk and inflation risk. Under normal market conditions, an increase in the risks leads to a decrease in their

demand in the market increasing the expected returns. The increased returns act as the risk premium that indemnifies investors for the increased risk they are prone to.

In the securities market, a bond's liquidity is measured in terms of the ease of selling the bond. If a bond has a high liquidity then the liquidity risk associated with the bond is minimal and this idea explains the trend of treasuries issued for long term having low returns. Assets whose supply is more than the demand are considered to be illiquid and their price determination poses a challenge because of nonexistent records of past sale prices (Gabaix, Krishnamurthy and Vigneron, 2007).

Similar to the pure expectations theory, the liquidity preference theory maintains that maturities at different levels can be interchanged but adds that this can only be done partially. Long term and short term debt instruments are similar in many ways except the amount of risk premium attached to each of them which results into an upward sloping curve. This difference can also be used to explain the market trend of experiencing higher interest rates when the bond instruments attain their maturity. The yield curve therefor maintains an upward sloping shape despite the interest rates predictions made in the market because of the inherent risk that investors are prone to when buying the bonds at a longer maturity. This will guide this study in examining the effect of risk on the interest rate during the measurement of the geometric means.

#### **2.2.2.3 Preferred Habitat Theory (“biased”)**

The preferred habitat theory, which has been drawn from the expectations theory states that the expected short-term yields can be used to calculate the estimate for long-term yields. The reasoning behind this is that investors in bond instruments are attracted by yields and can

therefore buy bonds at any level of maturity, translating to a flat term structure if there are no expectations in the market of a rise in interest rates (Kyle and Xiong, 2001).

According to (Watcher, 2006) the theory suggests that long-term returns will always be higher than short-term returns because of the additional premium attached to long-term bonds. The premium attracts investors out of their preferred maturity levels into buying long-term bonds.

Kyle and Xiong (2001) support the idea behind this theory that the yield curve represents the interest rates that investors expect to prevail in the future market. They are however against the idea that investors strive to equate their assets and liabilities because different investors are drawn to different holding times with some preferring to hold their bond instruments for longer.

In summary, the preferred habitat theory postulates that although investors use risk and market structure to determine their preferential segment, they can change their trading actions if the move is well compensated for. This theory will guide the study in establishing investor decision-making and the effect their decision has on the interest rate spread.

### **2.3 Empirical Review**

Interest rates affects inflation in various ways and one of them is through user cost of capital. An upward change in the interest rates makes the user cost raise up which translates into an increase in the production costs in the market. This in turn causes the aggregate supply curve to shift to the left side indicating a raise in inflation (Branson, 1979).

Another way that interest rates influence inflation is by affecting the volume of money circulating in the market. Money supply and interest rate are directly correlated. When the

interest rates increase the supply of money in the market also increases. The quantity theory of money states puts across the idea that although an upward change in money supply causes inflation, the affect is more quantifiable in the medium and long-term than in the short-term.

According to Berumont et al. (1999), an increase in the inflation rate definitely affects the interest rate by causing it to increase. Booth and Ciner (2001) did an extensive research in 9 countries in both Europe and the US using co-integration to determine if any relationship exists between interest rate and inflation. The conclusion of their research was that a long-run relationship exists between the two variables. The fact that there is a relationship between interest rate and inflation was also supported by the findings of Brazoza and Brzezina (2001) and Fave and Auray (2002). Million (2003) used United States data to determine if it was true that interest rates and inflation had a long run relationship. From his study he found out that injection of Federal Reserve into the market when the rate of inflation was high served to reduce the interest rate and vice versa. He gave recommendations to the Federal Reserve authorities to regulate the price fixing policies in accordance with the inflation

In order to assess how interest rate spreads change across markets, understanding of the concepts that are used to measure market structure is crucial. The structure of the market refers to the number and distribution of firms in a market (Besanko et al., 2007). In their study on the effect of market structure on banks' profitability, Ali Mirzaei et al. 2011 used market share as the first measure of market structure. Measuring the relative market power, the market share is arrived at by dividing the bank's share of assets with the total assets for all the banks in the market. To capture the structural features within a market, concentration

ratios of various kinds are also often used. Concentration ratios are useful to explain competitive performance in the banking industry. They also measure the changes in concentration which have been caused by the penetration or withdrawal of bank in the market and the concentration changes that can emerge from a merger (Bikker and Haaf, 2002).

As with delineating markets and defining its boundaries, there are several ways to determine the structure within a given market and calculate the concentration ratios. According to (Bikker and Haaf, 2002) the K-bank concentration ratio clearly quantifies the market structure. This is a measure of the combined market share of the K largest firms in a particular market. For example, in a given bank market, the 3-bank concentration ratio is arrived at by combining the individual market share of the three top banks in that particular market.

The market structure and competition intensity can affect the profitability and conduct of its firms profoundly. The performance of various banks in a specific market changes because of different competition intensity and market composition. At various levels of market activity, the competition intensity and thus the performance of the banks in a given market may alter. The empirical literature on the impact of market concentration on bank conduct, especially the effect on loan rates, is comprehensive. As Degryse, Moshe and Ongena (2009) point out; the magnitude of the impact market concentration has on interest rates vary widely in the empirical literature. They consider markets with a HHI below .10 to be competitive and markets with a HHI above .18 to be concentrated, and accept a change in HHI of .10 as a benchmark for marking the transition from a competitive to a concentrated market. A similar



interpretation from the US Department of Justice and Federal Trade Commission, often used in merger transactions, consider markets with a HHI below .10 to be competitive, and those with a HHI between .10 and .18 to be moderately concentrated. Markets in which HHI is in excess of .18 are labeled as concentrated (Beasanko et al., 2007). Regardless of the distinction method one chooses to use, it is evident that the level of market concentration is correlated with performance, and in the case of banks, the interest rate spread. An important note, however, is that the distinctions outlined above are intended to be guidelines for markets in general, not just bank markets specifically.

Kim, Kristiansen and Vale (2005) uses a panel data set of Norwegian banks in the period 1993 - 1998 and find that an .10 increase in HHI results in an increase of 3 basis points (bp) in the loan rate in the relevant period. Sapienza (2002) analyzes the effects of bank mergers on loan contracts. Her findings indicate that an increase in HHI by .10 increases loan rates by 59 bp in the Italian bank market. Further, she reports some interesting findings as to how bank consolidation affects loan rates.

According to Sanya and Gaertner (2012) and Grenade (2007), competition is seen to be reduced significantly by market concentration. Entrop, Memmel, Ruprecht and Wilkens (2012) studied determinants of bank interest margins in Deutsche Bundesbank. According to them the inelasticity of deposit supply and loan demands with respect to the intermediate fees charged influences the competitive structure of the industry

Ahokpossi (2013) concluded from a study that the major factor that seemed to affect the bank spreads in most SSA economies was operating inefficiencies. Brock and Rojas Suarez (2000)

supports this idea by affirming that the high spreads experienced in Latin America were as a result of administrative and other operating costs.

On the contrary, Bourke (1989), and Moulyneux and Thornton (1992) conducted a study on concentration of markets and made a conclusion that there was no co-relation between the interest rate spread experienced in the market and the concentration in banking sector.

Radha (2011) carried out a research on the effect that segmentation in the Kenyan banking sector and deduced that the returns of diversification are absorbed by the increase in costs as a result of exposure more risk.

#### **2.4 Determinants of Interest Rates**

Inflation refers to the general increase in prices in the market which leads to a decrease in the purchasing power of a particular currency (McConnel and Brue, 2008). One of the causes of inflation is aggregate demand being higher than the aggregate supply making the cost of acquiring goods and services higher. The increase in aggregate demand could have resulted from increase in foreign demand, from the government's deficit or from an increase in the interest rates set by the banks (Haberler, 1960). Inflation leads to a price increase of goods and services which makes laborers demand for higher wages to afford the high cost of living. This translates to an increase in the cost of production of these goods and service which is absorbed by the buyers in form of an increase in the selling prices (Krugman, Obstfeld and Melitz, 2011). Some indicators of inflation include Consumer Price Index (CPI), Implicit Price Index (deflator Gross Domestic Product) and Wholesale Price Index (WPI) (Majalah, 2002).

In macroeconomics the real balances are affected by a price level increase implying that the low supply of real money is caused by high prices in the market. According to the Keynesian theory, a lower level of real money supply leads to a disequilibrium as it affects the whole

economy. When there is an increase in the number of bonds being offered in the market, the price of the bonds goes down and the interest rate increases. This implies that inflation rate and interest rates have a positive causal relationship. When the rate of inflation goes up the nominal interest is also expected to increase.

Demirguc-Kunt et al. (2004) carried out a study with the aim of identifying if any relationship exists between market structure, the existent regulatory framework and institutions. During the study the cost of financial intermediation was treated as an overhead of the bank. According to the authors the application of net margin interest rate affects the bank's lending and deposit operations and the intensity of compensation prevailing in the market, while the general and administrative expenses more closely reflect the pure efficiency of the bank. The results however conclude that these variables are affected indifferently in both scenarios.

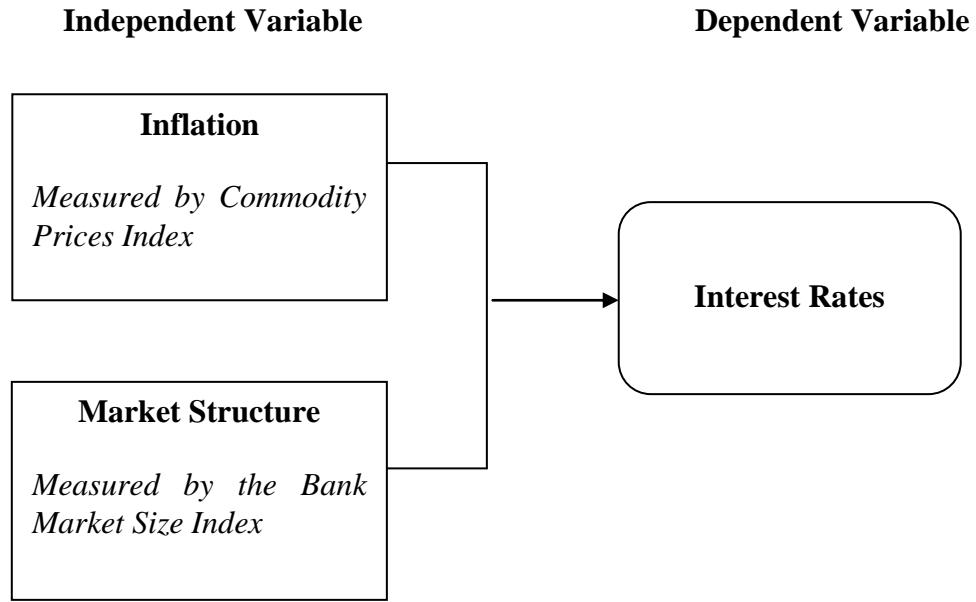
## **2.5 Conceptual Framework**

The primary objective of carrying out this study was to determine how the interest rates in Kenya are affected by inflation and the market structure. The determinants are clustered in two broad categories namely: inflation and market structure. The study indicates that formation of future expectations of changes in inflation and under the markets structure, demand and availability of money depend on the number and type of buyers and sellers and these factors are critical in determining the interest rate.

In the field of macroeconomics, interest rates have a crucial role of determining the Fisher Hypothesis (FH) and Uncovered Interest Rates (UIP). Fisher hypothesis gives the relationship between nominal rates and the expected levels of inflation. It requires adjustment

in the long run of the variables fully, failure to which any permanent changes in the level of inflation or nominal rates could translate to permanent effects on the real market rates creating an inconsistency with the standard model of asset pricing. The hypothesis implies a stationary  $I(0)$  level of interest rates which is considered to be a critical input in the process of determining the price of an asset and in making saving and investment decisions. However, if the nominal rates and inflation level attain a non-stationary  $I(1)$  level, the Fisher Hypothesis should be tested in the long-run under a co-integration framework (Mishkin, 1992). Under the Uncovered Interest Rates it is important to attain a stationary  $I(0)$  level of the short-run nominal rates in order to prove its empirical validity. For the concept behind UIP to hold, it is very crucial that nominal rates in the short-run are mean-reverting since nominal bilateral exchange rates tend to be difference-stationary. Past research dictates that nominal rates in the short-run are mean-reverting in Europe and in the US (Rose, 1988; Stock and Watson, 1988; Wu and Chen, 2001) and this study seeks to examine the existing relationship between inflation and the interest rate on the market structure in Kenya.

Markets structure was explained by market segmentation theory and expectations theory as they explain how demand and availability of money depend on the number and type of buyers and sellers. These theories explain why high interest rates are charged to cushion for loans' and default risks. The theories are relevant in explaining interest rate spread in that inflation, concentration of banking institutions, ownership structure are all affected by the availability of funds, the market segment they are in as well as the tendency of people to hold on to money for transactions, speculative or precautionary motives, this study will examine any linkage between interest rates and market structure and their effect on inflation in Kenya.



**Figure 2.1 Conceptual Framework**

## 2.6 Summary of Literature Review

The relevant literature reviewed indicates the existence of several studies in developed and emerging economies while there was paucity of studies in Africa except handful of them done in Malawi, Ghana, Uganda and a panel data study covering 33 countries in SSA for the period 1988-2005 respectively. This study will replicate such studies in Kenya with a narrowed focus on inflation and market structure only. This study will therefore be driven to fill the identified gap by examining how inflation and the market structure in Kenya affects the interest rates.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter reviews the methodology that was applied to conduct the study. The chapter elaborates on the research design, sampling design, data collection methods and the data analysis methods that were utilized.

#### **3.2 Research Design**

Research design entails the all-inclusive approach a researcher uses to incorporate various elements of the study in such a way that the study addresses the research problem adequately (Maxwell, 2012). The research design outlines the plan for data collection, measurement and data analysis (Krishnaswamy, 2009). This study used a descriptive research design.

A detailed research design ensures a comprehensible narration of the prevailing state of affairs (Kothari, 2004). The study embraced the design because it cannot control the collected data. This design was used to show the relationship between the inflation and interest rate in Kenya as well as the relationship between the market structure and the interest rate structure in Kenya.

#### **3.3 Population of the Study**

The target population for this study was all the banks in Kenya. As at 31 December 2017, there were 8 large, 11 medium and 21 small banks in Kenya. The Central Bank of Kenya classifies banks with a weighted composite index of greater than 5% as large banks (medium banks: 1-5%, small banks: <1%). As at 31 December 2017, tier 1 banks controlled 65.98% of the weighted market share (Tier II banks: 26.10%, Tier III banks: 7.92%). The study focused on all banks as the population is relatively small.

### **3.4 Data Collection**

This study relied on secondary data. This data was vital in the design of related primary research. Secondary data also provided a benchmark against which data collected via primary research can be compared. This study used data collected by government institutions. Official statistics are valuable to researchers as they are readily available and comprehensive and are gathered over a long period of time.

The first panel data that was collected from the Kenya National Bureau of statistics (KNBS) was inflation in Kenya from January 2008 – December 2017 on a quarterly basis. The second data set, interest rate spread was derived from quarterly commercial banks' lending rates minus deposit rates, collected from the Central Bank of Kenya, from 2008 to 2017.

The third set of data that was collected from the Central Bank of Kenya which relate to the market structure in Kenya. The market size index was a weighted combination of net assets, deposits and total shareholders' funds for commercial banks in Kenya over the last 10 years on a quarterly basis as shown in Appendix I. The market size index has been used in previous studies as a measure of the banking market structure. The Central Bank of Kenya also uses the weighted market size index as a measure of the Kenya commercial banks market share landscape which is reflective of the local banking structure.

### **3.5 Data Analysis**

This research set to investigate the relationship between inflation and bank market structure and interest rate spread in Kenya. This relationship was tested using a multiple regression model assuming a linear relationship between the study variables. The following model was used:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon.$$

Where: Y = Interest Rate Spread

X1 = Inflation (CPI)

X2 = Market Structure (Banks Market Size Index)

$\beta_0$  = Exogenous Variable

$\beta_1$  = Degree of Impact by Inflation

$\beta_2$  = Degree of Impact by Market Structure

$\varepsilon$  = Probabilistic error accounting for the variability in *inflation*

The **level of significance** was tested using the f-test and t-test, allowing for a 5% level of significance at 95% confidence level. The f statistic evaluated the statistical significance of the regression equation while the t statistic measured the statistical significance of the coefficients.

The influence of inflation on the interest rate spread in Kenya was tested using the following multiple linear regression:  $Y = \alpha_1 + \beta_1 x_1 + e$ , where Y was the Interest Rate Spread (IRS), X1 was the variable Inflation, and  $\beta_1$  was the coefficient of correlation of inflation. The independent variable (market structure) was held constant. The influence of market structure on the interest rate spread in Kenya was determined by:  $Y = \alpha_2 + \beta_2 x_2 + e$ , where Y was IRS, X2 was the variable Market Structure, and  $\beta_2$  was the coefficient of correlation of market structure. The independent variable (inflation) was held constant.



## CHAPTER FOUR

### DATA ANALYSIS, FINDINGS AND INTERPRETATION

#### 4.1 Introduction

This chapter focuses on the analysis of data collected from the Central Bank of Kenya and Kenya National Bureau of Statistics to establish the effect of inflation and market structure on interest spread in Kenya. By use of descriptive statistics, correlation analysis and regression analysis, the results of the study were presented in table forms as shown in the following sections.

#### 4.2 Diagnostic Tests

The researcher carried out diagnostic tests on the collected data. The null hypothesis for the test was that the secondary data was not normal. If the p-value recorded was more than 0.05, the researcher would reject it. The test results are as shown in Table 4.1.

**Table 4.1: Normality Test**

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Interest rate spread	.161	40	.300	.869	40	.853
Inflation	.173	40	.300	.918	40	.822
Market structure	.178	40	.300	.881	40	.723
a. Lilliefors Significance Correction						

**Source: Research Findings (2018)**

“Both Kolmogorov-Smirnova and Shapiro-Wilk tests recorded p-values greater than 0.05 which implies that the data used in research was distributed normally and therefore the null hypothesis was rejected. This data therefore was appropriate for use to conduct parametric tests such as Pearson’s correlation, regression analysis and analysis of variance”.

### 4.3 Descriptive Analysis

Descriptive statistics gives a presentation of the average, maximum and minimum values of variables applied together with their standard deviations in this study.

**Table 4.2: Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation
Interest rate spread	40	5.5800	12.1700	9.760750	1.6235548
Inflation rate	40	4.0300	16.8300	8.558500	3.7205890
Market Structure	40	2.8635	3.4004	3.157313	.1787485
Valid N (listwise)	40				

**Source: Research Findings (2018)**

Table 4.2 above illustrates the descriptive statistics for the applied variables in the study. An analysis of all the variables was obtained using SPSS software for the period of ten years (2008 to 2017). Interest rate spread had a mean of 9.76 with a standard deviation of 1.623. Inflation rate recorded a mean of 8.559 with a standard deviation of 3.721 while market structure resulted to a mean of 3.157 with a standard deviation of 0.179.

#### 4.4 Correlation Analysis

“Correlation analysis is relayed to find out if there subsists a relationship between two variables which lies between (-) strong negative correlation and (+) perfect positive correlation”. Pearson correlation was employed to analyze the level of association between the interest rate spread and the independent variables for this study (inflation rate and market structure).

**Table 4.3: Correlation Analysis**

		Interest rate spread	Inflation rate	Market Structure
Interest rate spread	Pearson Correlation	1	.791**	.857**
	Sig. (2-tailed)		.000	.000
	N	40	40	40
Inflation rate	Pearson Correlation	.791**	1	.654**
	Sig. (2-tailed)	.000		.000
	N	40	40	40
Market Structure	Pearson Correlation	.857**	.654**	1
	Sig. (2-tailed)	.000	.000	
	N	40	40	40

\*\* . Correlation is significant at the 0.01 level (2-tailed).

**Source: Research Findings (2018)**

The study found out a positive and statistically significant correlation ( $r = .791$ ,  $p = .000$ ) between inflation and interest rate spread. In addition, the study found out that there was a

significant positive correlation between market structure and interest rate spread as evidenced by ( $r = .857$ ,  $p = .000$ ). Although the independent variables had an association to each other, the association was not strong to cause Multicollinearity as all the  $r$  values were less than 0.70. This implies that there was no multi-collinearity among the independent variables and therefore they can be used as determinants of interest rate spread in regression analysis.

#### 4.5 Regression Analysis

Interest rate spread was regressed against two predictor variables; inflation rate and market structure. The regression analysis was carried out at 5% significance level. The critical value obtained from the  $F$  – table was compared with the same acquired from the regression analysis.

The study obtained the model summary statistics as shown in table 4.4 below.

**Table 4.4: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.865 <sup>a</sup>	.748	.734	.8371071	1.796

a. Predictors: (Constant), Market Structure, Inflation rate

b. Dependent Variable: Interest rate spread

**Source: Research Findings (2018)**

R squared, being the coefficient of determination indicates the deviations in the response variable that resulted from variations in the predictor variables. From the outcome in table 4.4 above, the R square value was 0.748, a discovery that 74.8 percent of the deviations in

interest rate spread among commercial banks is caused by changes in inflation rate and market structure of the commercial banks. Other variables not included in the model justify for 25.2 percent of the variations in the interest rate spread of commercial banks in Kenya. Also, the results revealed that there exists a strong relationship among the selected variables (independent) and the interest rate spread as shown by the correlation coefficient (R) equal to 0.865. A durbin-watson statistic of 1.796 indicated that the variable residuals were not serially correlated since the value was more than 1.5.

**Table 4.5: Analysis of Variance**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	76.874	2	38.437	54.851	.000 <sup>b</sup>
	Residual	25.928	37	.701		
	Total	102.801	39			

a. Dependent Variable: Interest rate spread

b. Predictors: (Constant), Market Structure, Inflation rate

**Source: Research Findings (2018)**

“The significance value is 0.000 which is less than  $p=0.05$ . This implies that the model was significant statistically in forecasting how inflation rate and market structure affects interest rate spread among commercial banks in Kenya”.

Coefficients of determination were used as indicators of the direction of the relationship between the independent variables and interest rate spread of commercial banks in Kenya.

The p-value under sig. column was used as an indicator of the relationship significance between the dependent and the independent variables. At 95% confidence level, a p-value of

less than 0.05 was interpreted as a measure of statistical significance. As such, a p-value above 0.05 indicates a statistically insignificant association between the variables which are dependent and the independent variables. The results are as shown in table 4.6

**Table 4.6: Model Coefficients**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-10.344	4.063		-2.546	.015
1 Inflation rate	.094	.069	.216	1.359	.182
Market Structure	6.112	1.443	.673	4.236	.000

a. Dependent Variable: Interest rate spread

**Source: Research Findings (2018)**

From the above results, it is evident that only market structure produced positive and statistically significant values for this study (high t-value 4.236,  $p < 0.05$ ). Inflation rate was found to be statistically insignificant for this study as evidenced by ( $t = 1.359$ ,  $p = 0.182$ ).

The following regression equation was estimated:

$$Y = -10.344 + 0.094X_1 + 6.112X_2$$

Where,

Y = Interest rate spread

$X_1$  = Inflation rate

$X_2$  = Market structure

On the estimated regression model above, the constant = -10.344 shows that if selected independent variables (inflation rate and market structure) were rated zero, the interest rate spread will be -10.344. An increase in market structure by 1 unit will lead to an increase in interest rate spread by 6.112. An increase in inflation rate by one unit would lead to an increase in interest rate spread by 0.094 though this increase is not significant.

#### **4.6 Discussion of Research Findings**

The study pursued to find out the relationship between inflation rate, market structure and interest rate spread among commercial banks in Kenya. Inflation as measured by quarterly inflation rate and market structure as measured by the weighted combination of net assets, deposits and total shareholders' funds for commercial banks in Kenya on a quarterly basis were the independent variables while interest rate spread as measured by lending rate less deposit rate on a quarterly basis was the dependent variable. The effect of each of the independent variable on the dependent variable was analyzed in terms of strength and direction.

The Pearson correlation coefficients between the variables revealed a strong positive correlation existing between inflation and interest rate spread among commercial banks in Kenya. The relationship between market structure and interest rate spread was found to be strong and positive. Although the study revealed a strong positive correlation between inflation rate and market structure of commercial banks in Kenya, the correlation was not strong enough to cause multi-collinearity and so the two variables can be used together in determining their effect on interest rate spread in Kenya.

The model summary revealed that the independent variables: inflation and market structure

explains 74.8% of changes in the dependent variable as indicated by the value of  $R^2$  which implies that there are other factors not included in this model that account for 25.2% of changes in interest rate spread. The model is fit at 95% level of confidence since the F-value is 54.851. This endorses that the multiple regression model is significant statistically, in that it is an appropriate forecast model for explaining how the independent variables selected affects interest rate spread of commercial banks in Kenya.

These study findings are in line with Berumont et al., (1999) who posits that an increase in the inflation rate definitely affects the interest rate by causing it to increase. Booth and Ciner (2001) did an extensive research in 9 countries in both Europe and the US using co-integration to determine if any relationship exists between interest rate and inflation. The conclusion of their research was that a long-run relationship exists between the two variables. The fact that there is a relationship between interest rate and inflation was also supported by the findings of Brazoza and Brzezina (2001) and Fave and Auray (2002). Million (2003) used United States data to determine if it was true that interest rates and inflation had a long run relationship. From his study he found out that injection of Federal Reserve into the market when the rate of inflation was high served to reduce the interest rate and vice versa.

This study is also in agreement with Kim, Kristiansen and Vale (2005) who uses a panel data set of Norwegian banks in the period 1993 - 1998 and find that an .10 increase in HHI results in an increase of 3 basis points (bp) in the loan rate in the relevant period. Sapienza (2002) analyzes the effects of bank mergers on loan contracts. Her findings indicate that an increase in HHI by .10 increases loan rates by 59 bp in the Italian bank market. Further, she reports some interesting findings as to how bank consolidation affects loan rates.



## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter summarizes the findings of the previous chapter, conclusions and limitations encountered during the research study. This chapter also elucidates the policy recommendations that policy makers can implement to achieve the expected interest rate spread of commercial banks in Kenya. Lastly the chapter presents suggestions for further research which can be useful to future researchers.

#### **5.2 Summary of Findings**

The study search for to explore the effect of inflation rate and market structure on interest rate spread of commercial banks in Kenya. The variables that were independent for the study were inflation rate and market structure. The study adopted a descriptive research design. Secondary data was obtained from the Central Bank of Kenya and Kenya National Bureau of Statistics and was analyzed using SPSS software version 22. The study used quarterly data covering a ten years period from January 2008 to December 2017.

From the results of correlation analysis, a strong positive correlation was found to exist between inflation and interest rate spread among commercial banks in Kenya. The relationship between market structure and interest rate spread was found to be strong and positive. Although the study revealed a strong positive correlation between inflation rate and market structure of commercial banks in Kenya, the correlation was not strong enough to cause multi-collinearity and so the two variables can be used together in determining their effect on interest rate spread in Kenya.

The co-efficient of determination R-square value was 0.748 which means that about 74.8 percent in interest rate spread variation among commercial banks in Kenya can be expounded by the two selected independent variables while 25.2 percent in the variation of interest rate spread was associated with other factors not covered in this research. The study also found that the independent variables had a strong correlation with interest rate spread ( $R=0.865$ ). ANOVA results show that the F statistic was significant at 5% level with a  $p=0.000$ . Therefore the model explanation of the relationship between the selected variables was fit.

The regression results show that when all the independent variables selected for the study have zero value the interest rate spread will be -10.344. An increase in market structure by 1 unit will lead to an increase in interest rate spread by 6.112. An increase in inflation rate by one unit would lead to an increase in interest rate spread by 0.094 though this increase is not significant.

### **5.3 Conclusion**

As a result of the study outcomes, the study concludes that interest rate spread among commercial banks in Kenya is significantly affected by inflation rate and market structure of commercial banks in Kenya. The study concluded that market structure had a significant positive effect on interest rate spread. The study therefore concludes that the higher the market structure of commercial banks, the higher the interest rate spread. The study found that inflation rate had a positive but insignificant effect on interest rate spread and therefore it is concluded that higher levels of inflation leads to an increase in interest rate spread though not to a significant extent.

This study concludes that independent variables selected for this study inflation rate and market structure influence to a large extent interest rate spread of commercial banks in Kenya. It is therefore sufficient to conclude that these variables significantly influence the interest rate spread as shown by the p value in anova summary. The fact that the two independent variables explain 74.8% of changes in interest rate spread imply that the variables not included in the model explain 25.2% of changes in interest rate spread.

This finding concurs with the findings of Brazoza and Brzezina (2001) and Fave and Auray (2002) who argued that there is a relationship between interest rate and inflation. Million (2003) used United States data to determine if it was true that interest rates and inflation had a long run relationship. From his study he found out that injection of Federal Reserve into the market when the rate of inflation was high served to reduce the interest rate and vice versa. The study also concurs with Kim, Kristiansen and Vale (2005) who uses a panel data set of Norwegian banks in the period 1993 - 1998 and find that an .10 increase in HHI results in an increase of 3 basis points (bp) in the loan rate in the relevant period.

#### **5.4 Recommendations**

The study established that there was a positive influence of market structure on interest rate spread of commercial banks in Kenya. This study recommends adequate measures to be put in place to manage the deposits, net assets and shareholder funds of commercial banks as they have a positive significant influence on interest rate spread. The management of the banks together with the regulator should ensure a good balance between net assets, deposits and shareholder funds so that the interest rate spread is kept at a level that will encourage savings and borrowings and this will eventually contribute to the growth of the economy.

The study concluded existence of a positive relationship between inflation rate and interest rate spread. This study recommends that a comprehensive assessment of a country's inflation level should regularly be undertaken as a high level of inflation may lead to an increase in interest rate spread and this is likely to discourage economic growth as investors and borrowers are not motivated to invest and to borrow respectively

### **5.5 Limitations of the Study**

“The scope of this research was for ten years 2008-2017. It has not been determined if the results would hold for a longer study period. Furthermore it is uncertain whether similar findings would result beyond 2017. A longer study period is more reliable as it will take into account major economic conditions such as booms and recessions”.

“One of the limitations of the study is the quality of the data. It is difficult to conclude from this research whether the findings present the true facts about the situation. The data that has been used is only assumed to be accurate. The measures used may keep on varying from one year to another subject to prevailing condition”. The study employed secondary data in the public domain, which had already been obtained, unlike the first-hand information presented by primary data. The study also considered selected determinants of and not all the factors affecting the interest rate spread mainly due to limitation of data availability.

For data analysis purposes, the researcher applied a multiple linear regression model. Due to the shortcomings involved when using regression models such as erroneous and misleading results when the variable values change, the researcher cannot be able to generalize the findings with certainty. If more and more data is added to the functional regression model, the hypothesized relationship between two or more variables may not hold.

## **5.6 Suggestions for Further Research**

This study focused on inflation rate, market structure and interest rate spread in Kenya and relied on secondary data. A research study where data collection relies on primary data i.e. in depth questionnaires and interviews covering all the 42 commercial banks registered with the Central Bank of Kenya is recommended so as to compliment this research.

The study was not exhaustive of the independent variables affecting interest rate spread of commercial banks in Kenya and this study recommends that further studies be conducted to incorporate other variables like growth opportunities, industry practices, a firm lifecycle stage, political stability and other macro-economic variables. Establishing the effect of each variable on interest rate spread will enable policy makers know what tool to use when controlling the interest rate spread.

The study concentrated on the last ten years since it was the most recent data available. Future studies may use a range of many years e.g. from 1970 to date and this can be helpful to confirm or disapprove the findings of this study. The study limited itself by focusing on commercial banks. The recommendations of this study are that further studies be conducted on other non-bank financial institutions operating in Kenya. Finally, due to the shortcomings of regression models, other models such as the Vector Error Correction Model (VECM) can be used to explain the various relationships between the variables.

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## APPENDICES

### Appendix I: Data Collection Sheet

<b>Year</b>	<b>Quarter</b>	<b>Inflation Rate</b>	<b>Interest Rate Spread</b>	<b>No. of Banks</b>	<b>Net assets (0.33)</b>	<b>Deposits (0.33)</b>	<b>Shareholders' funds (0.33)</b>