

**ANALYSIS OF INTEREST RATE PASS-THROUGH IN KENYA**

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**DECLARATION**

This is my original work and has never been presented to any university or academic institution for an award of a degree or diploma.

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**APPROVAL**

This research paper has been submitted with our approval as university supervisors.

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Dr. Thomas Ongoro

## **DEDICATION**

This paper is dedicated to my parents, Mr and Mrs Korir, for their unrewardable and invaluable gift of encouragement and tireless effort in ensuring I attained higher education and to my sister Angeline Sareto for her great support.

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My foremost gratitude goes to the Almighty God who enabled me to live and write this project. If it was not for Him I would not have reached this far. Secondly, special thanks go to my supervisors, Mr B.Ongeri and Dr. Thomas Ongoro whose invaluable support has greatly contributed to the project. The great support from my parents, siblings and classmates during this study wouldn't go unmentioned.

## **ABSTRACT**

Low stable inflation is virtually the main policy objective for most of the Central Banks around the world pursued in the context deregulated interest rate regime, globalization and rapid adoption of modern information and communication technologies. As a result, the interest rate channel of monetary transmission mechanism has attracted much more attention than ever before.

This study deals with the interest rate pass-through, which is defined as the degree and the speed of adjustment of retail bank rates to monetary policy interest rate, in all Kenyan banks (large, medium and small banks). The effectiveness of interest rate channel in economy is quantified by analysing the pass-through of policy interest rate changes to retail banking rate and loan and deposit volumes. Short term money market rate has been used as a proxy for the policy rate and various deposit and loan rates of different maturities together with volumes have been used for analysis. Unit root, autoregressive distributed lag model and error correction modelling is applied on the monthly data set (2003-2014) to find the short-run and long-run relationship between the interest rates.

Results indicate that small banks have the most effective interest rate transmission mechanism, followed by medium then large banks. The low level of interest rate pass-through for large banks can be attributed to the high banking sector competition and high switching costs. The mean adjustment lags indicate that, changes in policy interest rate are not fully and frictionlessly transmitted to retail bank interest rates. These results suggest the importance of adopting forward looking approaches by the Central Bank in order to appropriately integrate the estimated lag period required for policy actions to affect the objectives of the Bank.

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## **LIST OF ACRONYMS AND ABBREVIATIONS**

**IPRT**-Interest Rate Pass-Through

**NSE**-Nairobi Stock Exchange

**GDP**-Gross Domestic Product

**GB** – Government Bond

**MMR** - Money Market Rate

**EAC**- East African Community

**SCP**- Structure Conduct Performance

**OMO**-Open Market Operations

**CBK**-Central Bank of Kenya

**ECM**-Error Correction Model

**SVAR**-Structural Vector Autoregression

**CBR**-Central Bank Rate

**ADL**-Autoregressive Distributed Lag

**REPO**-Repurchase Order Agreement

**EMU**-European Monetary Union

**MAL**-Mean Adjustment Lag

**CRB**-Credit Reference Bureau

**FXB**-Forex Bureaus

**DTM**- Deposit Taking Microfinance Institution

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Background of the Study**

There is a consensus in economic literature that, in the long-run, changes in money supply bring about commensurate changes in the price level but no changes in employment, output and wealth creation in general; in the short-run to medium-run, changes in money supply bring about changes in price levels, employment and output through availability of funds for consumption and investment; and that monetary policy has substantial long and variable lags.

In the short to medium-term, wealth creation, and even poverty alleviation can be linked to developments of monetary conditions and policies in an economy. In the long-term, however, growth and economic development would depend on the growth in total factors of production and their productivity. Monetary expansion or contraction can in that long-run only cause either inflation or deflation.

The consensus on the role of money supply in an economy has brought about the emergence of inflation control as one of, if not the primary monetary policy objectives for most Central Banks around the world. The other objective is the stability of economic growth around its long-term potential. Thus virtually all countries are committed to the fight against inflation. Since the early 1990s an increasing number of countries have adopted inflation targeting as the best practice in monetary policy framework and the interest rate channel of the monetary transmission mechanism has attracted a great deal of attention. Countries committed to fight inflation through monetary targeting are forced to reform their frameworks to those which are suitable for discretionary monetary policy management (Kaskende and Brownbridge, 2011). Whatever monetary policy framework is adopted, the challenge remains that of identifying the precise monetary policy transmission mechanism and channels which link monetary policy to

performance in employment and output in the short- to medium-term and inflation control in the long-term.

Understanding the interest rate channel of the monetary policy transmission mechanism is very important. Interest rate pass-through (IRPT) is part of the interest rate channel of the monetary policy transmission mechanism(MPTM).It refers to the degree and magnitude of the adjustment of policy or money market rates transmitted into retail bank rates,(De Bondt, 2005). Interest rate, broadly speaking, is the price paid for borrowed money. It is easier to understand why this is the case for a loan (Mishkin, 2004). It, however, requires a little stretch of imagination to see interest paid on deposits as a loan from depositors to a bank. The market for the banking product determines the interest rate (a price on any of the bank deposit or loan product). The degree of interest rate pass-through is the extent to which changes in the money market interest rates are passed through to reflect the commercial bank rates in the long run. Speed of pass through is the length of time it takes for full adjustments to occur. Factors that affect both the speed and degree of adjustment include inflation, interest rate volatility, competition, financial structure, default risk.

### **1.1.1 Banking, Money and Credit**

A sound and vibrant financial sector, of which the banking sector is the most active player, plays an important role in economic growth and development. Moreover, the sector provides a framework for implementing effective monetary policy. Banks mobilize and allocate financial resources; transform and distribute risks and maturities; invest financial savings; effect payments; and effectively serve as the most important part of the monetary policy implementation infrastructure.

There are two types of banking systems. One is the market based banking system where there is a broad spectrum of financial institutions including commercial banks, cooperative societies, capital and money markets. In this system, banks tend to be less involved in the financing of enterprises and households. A good example of a market-based financial system is the USA. In such a system, investors are very sensitive to interest rates and monetary policy transmission operates strongly through the interest rate channel.

The other type of financial system is the bank-based one in which though comprising the same institutions as the market-based one, commercial banks dominate the financing of businesses. Examples of countries with such financial systems in developed countries are Japan, the European Union countries, emerging markets countries such as Brazil and South Africa, and frontier countries like Kenya. It is noteworthy here that the financial and capital markets in frontier countries are less developed and thus render the interest rate channel of monetary policy transmission less effective. Even then, Kenya and most of the countries, have since the late 1980s and early 1990s, been subjecting their economies to financial sector reforms which are bound to have increased the effectiveness of the interest rate channel of monetary policy transmission.

### **1.1.2 Kenya's Banking Structure and Recent Developments**

In investigating the interest rate pass-through using the Kenyan banking sector as a case study, understanding how bank market structure influences the behaviour of interest rates is important. Bank market structure refers to the different characteristics including: the number and distribution of bank income earning activities, qualities of individual banks and the characteristics of the market itself. Studies generally show that the bank market structure, typified by bank market concentration, affects bank interest rate spreads – the wedge between

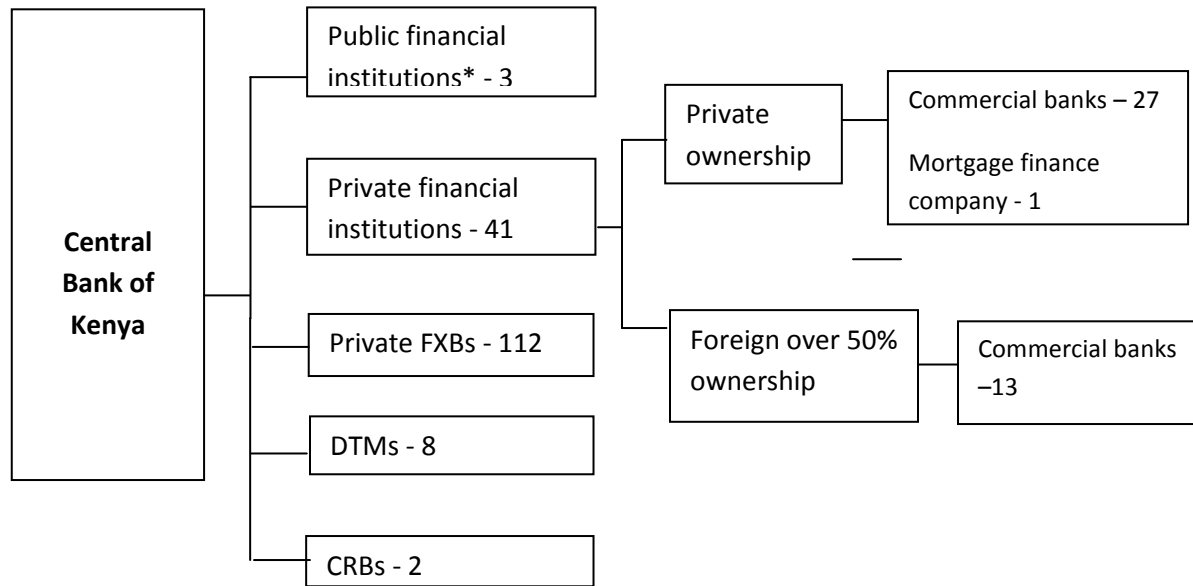
interest rates paid on deposits and interest rates charged on lending: the higher the bank market concentration, the wider the interest rates spread (Freixas and Rochet, 2008).

Recently, the Kenyan banking sector has experienced several developments. Besides the increased scope of competition provided by reform measures particularly deregulation of interest rates in July 1991 and exchange rates in October 1994 there have been other new initiatives in line with Vision 2030 (GoK, 2007). These developments tend to focus on achieving an efficient and stable banking sector. An increasing number of financial institutions have adopted advanced information and communication technology techniques. More banks have rolled out agency banking networks and deposit taking microfinance institutions (DTMs) have operationalized third party agents. In addition, international banking institutions are showing a rising interest in the Kenyan banking industry. Another development is that the credit information sharing regulatory framework widened its scope to comprise sharing of positive credit data and to take into account DTMs in the mechanism (CBK Bank Supervision Annual Report 2012).

Despite the major developments in the banking industry, it would be worthy to note the growth of the industry since the 19th century to the present date (CBK, 2012). The present financial system in Kenya has greatly expanded from a single bank in 1896 to comprise 45 banking institutions (a central bank, 43 commercial banks and 1 mortgage firm). The structure of the Kenyan banking market is illustrated in Chart 1 (CBK, 2012).

Of the 43 commercial banks, 3 are public financial institutions whose shares are held by the government of Kenya. 40 are privately owned financial institutions of which 27 are privately owned and 13 have over 50% foreign ownership. There are also 112 private foreign exchange bureaus (FXBs), 8 deposit taking microfinance institutions (DTMs) and 2 credit reference bureaus (CRBs).

**Chart 1: Structure of the Kenyan Banking Sector – December 2012**



**Source:** CBK Bank Supervision Annual Report (2012)

\*GOK shareholding includes shares held by a state parastatal; Consolidated Bank (77.8%), Development Bank of Kenya (100%), National Bank (70.6%).

Kenya’s financial system can be considered to be moderately developed and fairly diversified as shown in table 1 below. In the table, Credit/ GDP is the total credit extended by financial institutions to the domestic private non-financial sector relative to GDP. It is a measure of the extent of financial deepening. The higher the ratio, the deeper is the financial system. On this basis, Kenya’s financial System is more developed than for the other members of the East African Community (EAC) - Burundi, Uganda, Rwanda and Tanzania.

However, compared with middle income countries like South Africa and Malaysia and developed countries like Germany, Kenya’s system lags behind. Deposit/GDP is the total deposits in financial institutions relative to GDP. It indicates the capability and capacity of the financial system to mobilize financial resources in the economy. A high ratio is always desirable. Considering this ratio, it is evident that Kenya’s financial system is deeper and more

diversified than many other developing countries' systems, but still falls short of those of the middle income, let alone those of developed countries.

**Table 1: Kenya's financial system compared to the selected countries (%)**

Country	Private credit/GDP	Deposit/GDP	Bank concentration
Burundi	16.8	18.8	89.3
Germany	103.8	114.0	48.9
<b>Kenya</b>	<b>33.6</b>	<b>42.5</b>	<b>40.7</b>
Malaysia	106.4	120.9	48.9
Rwanda	10.2	13.5	76.8
South Africa	67.7	59.1	77.8
Tanzania	15.8	26.7	51.2
Uganda	13.8	17.8	55.6

**Source:** Calculated from Beck *et al.* (2013)

Bank market concentration is the degree of dominance of a bank in a given banking activity such as deposit taking or loan extension. The most frequently used measure is that of four bank concentration ratio which measures the share of the total market activity that the largest four banks control. Beck *et al.* (2013), measure bank concentration as the assets of three of the largest banks as a share of assets of all commercial banks. The higher the concentration ratio the less competitive the banking system and the more market power they are able to exercise.

Major drivers of change in the structure of the financial sector including the banking sector include globalization, rapid spread of information and communications technology sector (ICT) and financial sector reforms. Mweha, (2003) points out that financial sector reforms have



particularly sought to have banks play their roles more efficiently. These reforms have included deregulation of interest rates; removal of credit controls; entrenchment of indirect monetary control instruments; removing bank entry barriers; bank privatization; development of money and capital markets; strengthening bank supervision and regulation and liberalization of foreign exchange markets including the current account and financial and capital accounts.

Financial sector reform initiatives have majorly focused on the financial sector institutional framework, macroeconomic stability and monetary policy implemented with indirect instruments. The reforms also aimed at the development and implementation of specific restructuring programmes for weak and insolvent financial institutions (Mwega, 2003). Some of the weak institutions received capital injections from new investors or existing shareholders while others were subjected to statutory management. The government adopted an even better approach when it incorporated the Consolidated Bank of Kenya in 1989. The bank came about through the acquisition of seven insolvent financial institutions, which the government restructured into a commercial bank. It is quite evident that there exist numerous developments in the Kenyan banking sector and thus improving the monetary policy transmission mechanism (Kabubo and Ngugi 1998).

### **1.1.3 Monetary Policy Transmission Mechanism and Interest Rate Pass-Through**

Interest rate pass-through (IRPT) is better understood in the context of the monetary policy transmission mechanism (MPTM). Efficient monetary policy entails transmitting the effect of a policy initiative to output, employment and inflation, the variables of interest to the policy maker. It is therefore necessary to examine the monetary policy transmission mechanism (MPTM) to aid in understanding IRPT (Mishkin, 1996). Essentially, the monetary transmission process begins with a monetary authority, in most cases a Central Bank, announcing a policy

action signaled by the key policy rate– the Central Bank Rate (CBR) in the Kenyan case. The CBK not only signals the monetary policy stance by announcing the CBR but also executes monetary policy consistent with the CBR by engaging in open market operations (OMO) so as to align the money market rates and the policy rates. From this point of view, the effects of such policy changes are brought about through different channels such as the interest rate channel, the credit channel, the exchange rate channel and other asset prices channels (Faure, 2006).

Monetary policy is effective through the interest rate channel when the Central Bank's adjustment of short term interest rates, have an impact on the real interest rates of the commercial banks to their customers and eventually on consumption and investment in the economy (Wang and Lee, 2009). Pass through is what determines the effectiveness of monetary policy instruments and in turn the MPTM.

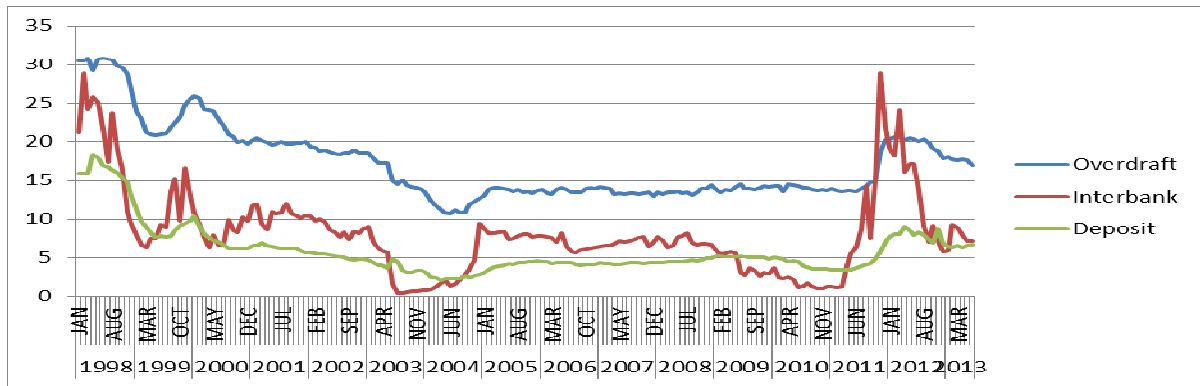
The interest channel of MPTM is considered effective when commercial banks transmit the adjustments of the monetary policy rates in a quick and frictionless manner to borrowers through the retail bank interest rates. Otherwise, if interest rates are sticky/rigid then the interest rate channel is deemed ineffective. How commercial banks respond to monetary shocks from the Central Bank is important and the impact should be large enough to influence aggregate demand, consumption and investment in the economy (Aziakpono and Wilson, 2010).

Complete IRPT (of one) would imply that a financial system has developed to be efficient and competitive. Incomplete IRPT (of less than one) tend to be prevalent in developing economies such as Kenya (Misati *et. al.*, 2011 and John and Pokhariyal, 2013). This implies that their financial system is neither fully developed nor competitive nor efficient.

It is evident from Kenya's interest rate movements that the manifested competitive behaviour and efficiency of banks is far from the perfect competition ideal. Under perfectly competitive interbank market conditions, the CBR as the lowest rate at which the CBK lends to commercial banks for a short term period, say one day, or as is more understood in the banking circles-overnight-forms the likely highest rate at which a bank could borrow from another bank in the interbank market for bank reserves that they use to settle their obligations at the end of each day. Interbank and CBR interest rates, therefore, move very closely together and within very narrow margins of each other. They basically represent the opportunity cost of money in the interbank market. In other words, with perfectly competitive market conditions, the CBK is able to influence the interbank market interest rates, and in turn banks should pass on the changes accordingly to other short term interest rates and from there on to the deposit and lending rates.

In chart 2 below five distinct periods of interest rate developments since 1998 are notable. In March 1999, the graph shows that CBK could have been running relaxed monetary policy going by the very low interbank rate. However, the response by the deposit and overdraft interest rates does not seem to be of the same magnitude. The same is apparent in April 2003 and November 2010. Another distinct phase is between June 2011 and Jan 2012 when the Central bank appears to have tightened monetary policy significantly before easing it through March 2013. All these episodes would tend to demonstrate that pass through from policy rates to retail bank rates is incomplete and this translates to an inefficient monetary policy transmission mechanism.

**Chart 2: Interbank, deposit, and overdraft interest rates in Kenya**



**Source:** Data from the Central Bank of Kenya (2013)

### 1.2 Statement of the Problem

Disquiet over the effectiveness of monetary policy in Kenya culminated in the introduction of Central Bank Rate (CBR) to signal more aggressively its monetary policy stance, besides the monetary targeting framework. CBR application is considered to be consistent with a more developed and liberalized financial systems brought about by the Kenya's financial sector reforms embarked on in 1989 (Mwega, 2003) and peaked with complete deregulation of interest rates in July 1991 and exchange rates in October 1994. The reforms have been executed against a background of rapid adoption of innovative banking products and information and communication technology (ICT) and globalization.

The banking and economic environment has provided scope for banks to set their interbank, deposit and lending interest rates in tandem with the banking market conditions, particularly to reflect the marginal cost or opportunity cost of funds. The CBR is designed to influence interbank, deposit and loan interest rates. The CBR is, therefore, a critical instrument of monetary policy. It is much more appreciated than monetary targets. It is anticipated that a change in the CBR by the CBK can be passed on through to changes in interbank, deposit and lending rates. However, in the recent past, there has been concern in Kenya that that deposit and

lending rates in particular and related costs do not fully move within the shortest time in tandem with the monetary policy rates. As a result the banking system has been seen as a hindrance to achieving the financing of major economic activities and monetary policy effectiveness and therefore the realization of the objectives of Vision 2030.

A Kenya monetary policymaker has to be sure of the influences the monetary policy rate has on the interbank, lending rate and deposit rate and even on the volumes of deposits and loans. Notwithstanding the need for a clear understanding of the monetary policy effects on the economy so as to achieve its intermediate targets and final objectives (Mishkin, 1996) studies on IRPT are not conclusive.

This study, therefore, investigates the translation of the changes in the monetary policy rate to deposit and lending rates and to changes in the volume of deposits and volume of loans as the initial stages of the monetary transmission mechanisms.

### **1.3 Research Questions**

This research aims to answer these three questions namely:

- i. What is the degree and speed of adjustment of retail bank interest rates to policy rate changes?
- ii. What is the degree and speed of adjustment of deposit and loan volumes to monetary policy rate changes?

### **1.4 Objectives of the study**

The general objective of this study is to analyze degree and speed of adjustment of commercial bank interest rate to changes in policy rates in Kenya and its effectiveness on monetary policy.

The specific objectives are:

- i. To estimate the interest rate pass through from policy rate to retail bank interest rates in Kenya.
- ii. To estimate the interest rate pass through from policy rate to deposit and loan volumes in Kenya.
- iii. To suggest policy recommendations based on the results that will be obtained from the study.

### **1.5 Significance of the Study**

This study is significant in three ways. Firstly, it contributes to the existing literature on the magnitude and speed at which deposit and lending rates and deposit and loan volumes respond to adjustments in monetary policy instruments. Secondly, it gives an indication for policy makers on the timing and actual extent of adjustment required in the process of formulating monetary policy. This also provides an appropriate benchmark for monetary policy evaluation particularly answering the question whether monetary policy is tight, neutral or loose. Third, the research findings act as a basis for further research.

### **1.6 Scope and Organization of the Study**

Following this introduction is Chapter two which deals with the review of relevant theoretical and empirical literature on interest rate pass through followed by an overview of the literature. Chapter three is on the study methodology, which highlights the theoretical and empirical framework on which this study is based. Chapter four provides the empirical findings and a discussion of the results. Chapter five discusses the conclusions and recommendations.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.0 Introduction**

This chapter reviews both theoretical and empirical literature on IRPT. Incomplete IRPT has been explained in many ways including, Stiglitz and Weiss (1981) credit rationing in response to asymmetric problems of adverse selection, moral hazard and the adverse customer reaction and collusive pricing behaviour. In the literature the IRPT is analysed in two parts: the short run and long run pass through. The literature posits high long term pass through which is expected to be close to one in theory. When this obtains, more effective interest rate channel is implied. A high degree of competition among banks in the interbank, deposit and loan markets and in other financial markets as well is implied when the pass through closely approaches one. In addition, the speed of changes in lending rates may point to the market expectation of whether monetary policy initiatives are bound to be permanent or whether the markets anticipate those policy initiatives.

This chapter is organized as follows: Section 2.1.1 outlines the monetary transmission mechanism in which the IRPT is an integral part. Sections 2.2 and 2.3 of this chapter present theoretical and empirical literature, respectively while the overview of literature is in section 2.4.

#### **2.1 Theoretical Literature Review**

##### **2.1.1 Monetary transmission mechanism**

One of the principal objectives of the central banks the world over is to devise and execute monetary policy aimed at achieving and maintaining stability in the general level of prices (Central Bank of Kenya, 2013). The process by which the monetary policy is transmitted into

changes in output, employment and inflation, the monetary policy transmission mechanism has received extensive attention in the literature in the recent years.

Samba and Yan (2010), outlines that the monetary policy transmission mechanism as the ways in which monetary policy impacts aggregate demand and prices by influencing investment and consumption decisions in an economy. In many countries, banks are the central players in the monetary policy transmission mechanism which is in various channels, including the traditional interest rate channel. There is, however, no consensus about the nature and comparative strengths of the channels through which the monetary policy changes are transmitted to the real sector Ramlogan, (2004).

In theory, economic agents, particularly bank market participants, take into account monetary policy actions in their decisions. Thus, when the central bank increases its policy interest rate, banks promptly respond with a corresponding increase in their interest rates. Additionally, interest rates should rapidly and frictionlessly react to changes in consumer preferences.

Faure (2006) summarizes the monetary policy transmission mechanism into six stages. First, a change in the Central Bank's lending rate is transmitted to the private bank-to-bank, interbank market. Second, the private bank-to-bank interbank market transfers the change to other market interest rates. The third stage is when changes in market interest rates are transmitted to asset prices, exchange rates and expectations. In the fourth stage, these changes in asset prices, exchange rates and expectations are passed on to aggregate demand. Fifth, changes in aggregate demand are to money supply. Lastly, the changes in money supply are transferred to prices. The scope of this study is to the first and second stages of the transmission process which are relevant for the traditional interest rate channel.

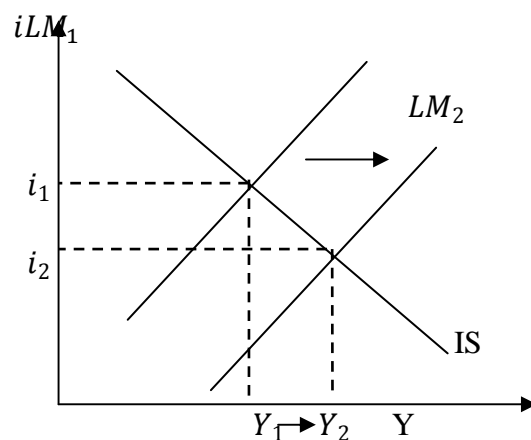


### 2.1.2 Interest Rate Channel of Monetary Transmission Mechanism

Whether a central bank uses a monetary targeting or inflation targeting framework, its monetary policy operations will entail in one way or another, operations that touch on aspects of the balance sheet of the Central bank, which instantaneously affects bank reserves and interest rates. There is, therefore, need to understand interest rate channel of MPTM in the case of Kenya's banking sector. The interest rate channel is the core channel in the monetary transmission mechanism in the Keynesian IS-LM framework.

Under the IS-LM framework where IS denotes investment saving curve and LM denotes the liquidity preference and money curve, explains how interest rates and total output produced in the economy are determined given a fixed price (Mishkin, 2013). Under the IS-LM framework, it is evident that monetary policy instruments (short term interest rates) should impact instantaneously on real variables such as aggregate output and unemployment.

**Figure 1: Effect of Expansionary Monetary Policy**



**Source:** Mishkin, 2013.

For example, when monetary authorities seek to relax monetary policy by expanding the money supply in the economy through open market operations, several effects come into play in a

frictionless manner. The LM curve shifts outwards from  $LM_1$  to  $LM_2$  and interest rates to drop from  $i_1$  to  $i_2$ . With the low interest rates, the cost of investing goes down. This means that investment increases thus causing aggregate output to expand from  $Y_1$  to  $Y_2$ . Expansionary monetary policy, therefore, leads to a fall in real interest rate which lowers the cost of capital. This causes a rise in investment spending which brings about an expansion in aggregate demand and a rise in output. Subsequently, the economy grows at a faster pace, and there is an increase in inflationary pressures.

In a world of rational expectations, sticky prices ensure that expansionary monetary policy, which lowers short-term nominal interest rates, also lowers short term real interest rates. Rational expectations theory states that a short –run effect of an expansionary monetary policy is a higher level of prices but little change is observed with regard to output. These lower interest rates lead to rise in investments which lead to a higher output level.

### **2.1.3 Interest Rate Pass-through**

In figure 1 the interest rate appears to fall instantaneously from  $i_1$  to  $i_2$  following an expansionary monetary policy. For the interest rates to respond as depicted, and thus the monetary policy to be effective, changes in the policy rate should influence the short run money market rates and retail interest rates. A key link in the MPTM process is therefore the interest rate pass-through (IRPT). The IRPT is defined as the degree and the speed of adjustment of retail interest rates due to changes in monetary authorities' policy rate (Aydin, 2007). It is a process where the official interest rate change is transmitted to other interest rates (Sande and Okello, 2013).

It is vital for monetary policy authorities to have a precise understanding of how fast and to what extent a change in the interest instrument alters inflation. This will definitely ensure price stability for inflation targeting. A country's central bank increases the official interest rate when inflation rate is beyond the target band. Changes in money market interest rates then have an effect on the long-term market interest rates and retail banks' interest rates (Hanif and Khan, 2012).

The success of monetary policy in achieving inflation targets and stabilizing inflation is dependent on the stickiness of market interest rates. A quicker, symmetric and IRPT not only strengthens monetary policy transmission but certainly leads to a well functioning, competitive and efficient financial system. Moreover, the interest rates set by banks influence bank profitability and in turn influence the stability of the banking system and consequently affect economic growth. If IRPT is not complete other channels of monetary policy transmission such as the credit, interest rate and exchange rate channels will be to some extent (Egeret and Jamilov, 2013).

#### **2.1.4 Monti- Klein model**

The assumption of perfect competition may not seem really appropriate for the banking sector, where there are important barriers to entry. Imperfect competition –oligopoly is probably more appropriate. The Monti – Klein model considers a monopolistic bank confronted with a downward sloping demand for loans  $L(r_L)$  and upward sloping supply for deposits  $D(r_D)$ . The bank's decision variables are L (the amount of loans) and D (the amount of deposits) since the level of equity is assumed to be zero (Matthews and Thompson, 2008). Assume that the bank takes  $r$  (rate on the interbank markets) as given either because it is fixed by the Central bank or

because it is determined by the equilibrium rate on international capital markets. The bank's profit function is thus given as:

$$\pi = \pi(L, D) = (r_L(L) - r)L + (r(1 - \alpha) - r_D(D))D - C(D, L)$$

Taking into account the influence of loans (L) on lending rate ( $r_L$ ) and deposits (D) on deposit rate ( $r_D$ ). The bank's profit is therefore a sum of the intermediation margins on loans and deposits minus management cost (C).

One may question the practical relevance of the original Monti-Klein model for monopolistic bank, since the banking industry is clearly not controlled by a unique firm. The main interest of the Monti-Klein model is that it can easily be reinterpreted as a model of imperfect (Cournot) competition between finite number N of banks which is more practical in the Kenyan case.

Therefore, the oligopolistic version of Monti-Klein Model sets the maximum profits of a bank as

$$\max_{(D_n, L_n)} \left\{ \left( r_L \left( L_n + \sum_{m \neq n} L_m^* \right) - r \right) L_n + \left( r(1 - \alpha) - r_D \left( D_n + \sum_{m \neq n} D_m^* \right) \right) D_n - C(D_n, L_n) \right\}$$

Freixas and Rochet (2008) underlines that the Monti-Klein model can be reinterpreted as a model of imperfect competition where  $N=1$  imply monopoly and  $N=+\infty$  imply perfect competition. Oligopolistic and monopolistic market structures fall in between the two. A Cournot equilibrium of the banking industry is an  $N$ -tuple of couples  $(D_n^*, L_n^*)_{n=1, \dots, N}$  such that for every  $n$ ,  $(D_n^*, L_n^*)$  maximizes the profit for bank  $n$  (taking the volume of deposits and loans of other banks as given).

### 2.1.5 Theories of interest rate rigidity

Various theories have been resorted to better understand IRPT, rigidity and incomplete pass-through. Below is an outline of some of these theories.

### **2.1.5.1 Adverse Customer Reactions and Collusive Pricing Arrangements**

There are two major theories behind rigidities in deposit and lending interest rates adjustments: the adverse/negative customer reactions and collusive pricing arrangements. A collusive pricing arrangement shows that any pricing arrangement different from the collusive pricing arrangement has an additional cost associated with it. This implies the presence of rigidity in increasing the deposit interest rate and in reducing the lending rate that is deposit rates are rigid upward when the official rate is increased while the lending rates are rigid downward in the case of a decrease in the official rate (Aziakpono and Wilson, 2010).

According to the adverse customer reaction theory, there is rigidity in reducing the deposit interest rate and in increasing the lending rate, that is, the deposit rates will be rigid downward when the official rate is decreased, while the lending rates will be rigid upward in the case of an increase in the official rate (Lowe and Rohling, 1992; Wang and Lee, 2009 and Aziakpono and Wilson, 2010)

### **2.1.5.2 Adverse Selection and Adverse Incentive**

IRPT is also explained by the Stiglitz-Weiss (1981) model. The model explains how a change in the interest rates causes two types of effects: adverse selection and adverse incentive effect. It also explains how the effects relate to the rigidity adjustment of the interest rates. The Stiglitz-Weiss (1981) model explains interest rate rigidity on the basis of asymmetric information. Lowe and Rohling (1992) underlines that in the model, a firm is assumed to know the risks attached to its projects while the banks cannot distinguish between projects. Information asymmetries create an adverse selection problem in the credit market such that higher interest rates tend to attract riskier borrowers. In effect, banks become reluctant to raise lending rates in response to money market rates. The cost to banks not raising the lending rates in response to monetary policy rates

(which reflect marginal cost) increases will be offset by the benefits of not attracting the riskier borrowers.

The adverse selection effect results when the riskiness of a group of credit applicants increases, which then leads to a reduction in less risky borrowers in the market. Adverse incentive effect, or moral hazard effect, occurs because other borrowers are encouraged to choose projects with a higher default probability, that is, the higher the risk, the higher the returns, making riskier projects associated with higher expected returns (Agénor and Montiel, 2008)

## **2.2 Empirical Literature Review**

Most studies on IRPT focus on measuring the degree and speed of IRPT from monetary policy interest rates through short term rates to the retail (deposit and lending) rates and also on the determinants of interest rate pass-through.

Horvath et al. (2005) using error correction (ECM) and threshold autoregressive (TAR) models assessed interest rate pass-through in Hungary. They used monthly aggregate time series data focusing on corporate short term loans and deposits, household short term deposits and Budapest interbank offer rate (BUBOR). Their findings were that money market rates changes caused quick and full adjustment on corporate loans. Adjustment in the household and deposit interest rates was not only sluggish but also incomplete. Using the TAR model they established that the speed of change of retail bank rates is dependent on the sign of yield shocks, volatility and size of money market rates.

By employing an autoregressive distributed lag model, Samba and Yan (2010) sought to uncover the monetary policy transmission mechanism (MPTM) in the Central African Economic and Monetary Community (CAEMC) area by shedding light on the initial stages of MPTM through

the interest rate channel. The study shows that long run pass through from the policy rate to deposit rate is low and incomplete while that of lending rate is higher at about 70% (an overshooting effect in reaction to changes of the policy rates). They attribute stickiness of the deposit rates to the lack of competition and poor financial structure.

To estimate the degree and speed of IRPT in Nigeria and derive dynamic elasticity of pass-through from policy rates into retail rates, Sanusi (2010) employs a structural vector auto regression (SVAR) model. Using monthly data spanning the period from January 2002 to April 2010, he finds that pass through is slow and incomplete. However pass through from the monetary policy rate into the interbank money market rate is relatively faster than that of the bank retail rates. Banking and financial sector reforms need to increase efficiency in the retail (loans and deposits) markets so as to ensure efficiency of monetary policy transmission mechanism in Nigeria.

Bernhofer and Treek (2011) analysed in the Euro area IRPT using monthly data observations on seven interest rate categories for ten Euro area countries spanning through the period January 1999 to November 2009. Using a single ECM, they found out that heterogeneity is more significant in the short run adjustment than in the long run adjustment. They then applied pooled mean group estimation (PMGE) and got varied results. They found that pass-through is more efficient for loans than deposits. Speed of adjustment is highly heterogeneous across different countries and among different interest rate categories. They found no evidence of a rise in efficiency (completeness or high speed of adjustment) of IRPT in the Euro area overtime.

Hanif and Khan (2012) estimated the degree and speed of the IRPT in Pakistan using an unrestricted ARDL model applied to monthly data between July 2001 and August 2011. Their

results show that pass-through from the policy rate into money market rate was fast and almost complete. However, whereas the reflection of the money market rate changes into deposit rates is slow and incomplete, lending rates are less rigid in their responsiveness to changes in the money market rates.

Schluter et al (2012) examined the determinants of the interest rate pass-through to German loan products using time series data ranging from 2003 to 2008. The study applied the two-step Engle and Granger (1987) method together with the simultaneous maximum likelihood error correction estimation model. The study showed that lower loan mark-ups are due to a higher degree of operational efficiency, which involves eased interest rate setting and increased competitive prices.

Sande and Okello (2013) looked at Uganda's IRPT using harmonized monthly data that comprised short-term policy rates, interbank money market rates and retail rates for the period between January 2005 and December 2012, the study employed bivariate co-integration regression method and the associated error correction methodology to estimate IRPT. Their findings revealed that pass through from the REPO rate to the interbank money market rate is complete whereas to the deposit and lending rates is quite incomplete. The authors' conclusion was that the initial stage of monetary policy transmission mechanism (which majorly consists of the interest rate channel) is only effective for banks' wholesale rates and highly ineffective for bank retail rates. Monetary policy rate changes fail to reflect fully to the other retail rates. They attributed this to the inadequate degree of competition in Uganda's banking sector. However, their study failed to address the issue of asymmetries during the business cycles and propagation of policy rates to other money market rates such as bond yields and treasury bills.



Hansen and Welz (2011) examined interest rate pass-through in Sweden before and during the 2007 global financial crisis. They studied the transmission of changes in the monetary policy rate set by the Riksbank into the money market rates and further into the bank retail rates. Before the crisis, there was an effective monetary policy transmission mechanism with a stable spread between money market rates and policy rates. Pass-through from changes in money market rates into retail rates was slow but complete in the long run and this weakened the link between money market rates and policy rates. However, it did not affect pass through to the short term interest rates. However, lack of access to long term funding during the crisis caused interest rate pass-through to long term interest rates to be affected greatly.

Using bank level time series monthly data ranging from 1993 - 2010, Misati et al. (2011) studied the lag structure of the Kenyan interest rate by focusing on IRPT using reparametrized error correction methods and standard ADF methods to establish that long term rates are cointegrated with retail rates and ECM framework for estimation of long-term pass through relationships. According to this recent study, pass through in the Kenyan economy is incomplete both in the short run and the long run. It further reveals through the use of mean adjustment lags that it takes between 11 months to two years for policy rates (repo, interbank and 91 day T-Bill) to be transmitted into retail bank interest rates. In as much as the Central Bank policy rate have been successfully transmitted to short term rates, transmission from short term to long term interest rates remain quite rigid.

To address this problem, this study suggests that Central Banks should adopt strategies that take into account the lag structure of interest rates while setting their policy rates this will enable to achieve their objectives as a bank. Misati *et al.* (2011) paper gives a lot of insight to this study in that it addresses pass-through from policy rates to retail bank rates in the Kenyan economy. It,

however, does not estimate pass through into the loan and deposit volumes which is part of the objectives of this study.

Florian (2013) employs a non-linear autoregressive distributed lag (NARDL) model by Shin (2011) in order to scrutinize the interest rate pass-through in the Euro area particularly Germany, France and Spain. The study investigates the pass through from the policy rate (Euro overnight index average, EUONIA) into deposit rates of three different maturities and incorporates coordinated and consistent data and uses a cointegration structure to estimate not only short-run but also long-run coefficients. The general findings reveal that there is immediate pass through symmetry and no long-run symmetry. There exists a long – run relationship between EUONIA and deposit rates with pass through from EUONIA to deposit rates being one to one in very few cases and incomplete in most.

Jamilov and Egeret (2013) adopt an ARDL specification to analyze IRPT and monetary policy asymmetry for five economies of the Caucasus namely Armenia, Azerbaijan, Georgia, Kazakhstan and Russia. They used country level and bank specific monthly data for the period between December 2007 and December 2009. In all the countries interest rate pass through proved to be not only incomplete but also lethargic except for Russia. Incomplete pass-through indicates a lack of competitiveness coupled by macroeconomic instability in the banking sector. They find that asymmetric adjustments exist, but their size is insignificant.

In a study undertaken in Kenya regarding the two stage interest rate pass-through process, John and Pokhariyal (2013) applies an Auto Distributed Lag (ADL) model using monthly data. During the first stage where transmission is from the monetary policy rate, Central Bank Rate (CBR), to the money market rates (Repurchase agreement (REPO), Treasury bill (T bill) and interbank

rates). They found that; it took 7 days for CBR to be transmitted to REPO, 3 months from CBR to T bill and 12 months from CBR to interbank rates. In the second stage is where transmission occurs from money market rates to retail bank rates, the authors find that there is also incomplete interest rate pass through in this stage for all the rates. Their proposition is the adoption of other monetary transmission channels in Kenya.

### **2.3 Overview of the Literature**

Overall the literature reviewed show that the IRPT can be best analyzed by looking at banks as oligopolistic firms, with each bank seeking to maximise profits through the optimal purchasing of deposits at deposit interest rates and then lending them at lending interest rates. In this case study, given that the Kenyan banking system is oligopolistic, the best approach is to use an oligopolistic version of the Monti – Klein model as described by Freixas and Rochet (2008) and Matthews and Thompson (2008).

Interest rates on deposit and loans and the deposit and loan volumes used to investigate the IRPT are monthly observations on all banks. The time series data usually manifest non-stationary behaviour. This fact of non-stationarity dictates the appropriate estimation strategy for this study. The empirical literature shows cointegration based methods such as the autoregressive distributed lag (ADL) model, have been popular in examining the degree and speed of IRPT. To characterize relationships where two non-stationary set of time series data shares common long term equilibrium, studies use error correction modelling techniques. The above reviewed literature show that recent advances in IRPT investigations in many countries have found the ADL approach to cointegration and ECM modelling as the most effective in empirical estimation.

Empirical studies have been done on interest rate pass through mainly in developed and emerging economies. Recently studies have emerged on African countries, particularly South Africa and West Africa. They are also beginning to emerge in East Africa. Nevertheless there has been no significant studies in developing economies have been done to examine explicitly the pass through of policy rates into loan volumes. This forms the basis of the study methodology and extends the existing empirical literature on interest rate pass-through in Kenya.

## CHAPTER THREE

### METHODOLOGY

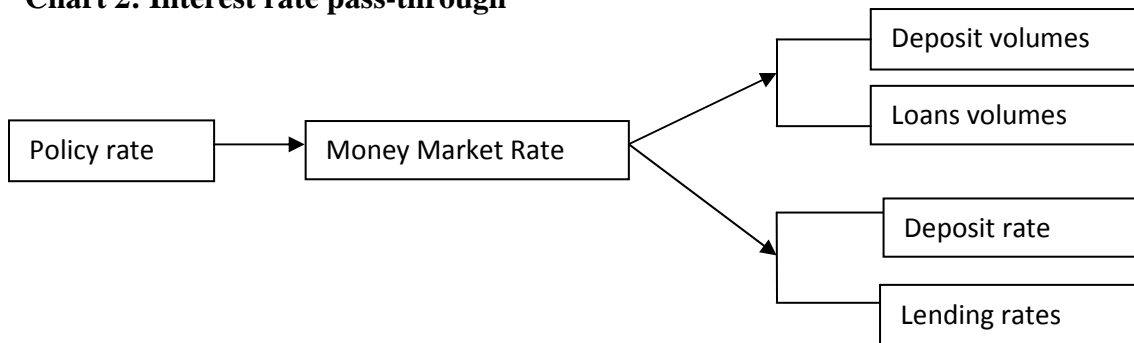
#### 3.1 Introduction

This chapter presents the methodology that is adopted. It includes the research design, the theoretical framework, the empirical model, the model specification, estimation technique, definition and measurement of variables, data sources, collection and analysis.

#### 3.2 Research Design

This research is non – experimental by design. Secondary time series data on interest rates paid on deposits, interest rates charged on loans, amount of deposits and amount of loans of all the 43 banks in Kenya is used. Monthly data running from January 2003 to March 2014 is considered. Policy rate changes are followed by changes in the short term interest rates. These are then expected to be transmitted into retail bank interest rates and changes in volumes of deposits and loans.

**Chart 2: Interest rate pass-through**



*Source: Own chart*

#### 3.3 Theoretical Framework

The bank profit maximization Monti – Klein model has been extensively used to develop the link between policy interest rate and lending interest rate (Freixas and Rochet, 2008). It has proven extremely flexible and, therefore, capable of nesting all the four market structures: perfect competition, monopolistic competition, oligopolistic competition and a monopoly. Most authors

have adopted the framework either directly or with some alterations to suit their studies (Maudos and Guevara, 2004; Kam and Smithin, 2010). This study, following Misati, *et al.* (2011), uses similar techniques to construct a framework for analysing the relationships between interest rates.

The bank pays a deposit interest rate at a rate  $r_D$  and extends loans at an interest rate  $r_L$ . Costs of managing deposits and loans are also incurred by the bank. In the case of a negative settlement balance, (S), the commercial bank seeks a way out for liquidity from the Central bank. A punitive interest rate,  $r_p$ , known as a policy rate is charged by the Central bank.

Since  $\mu$  is the cost of managing loans, then the cost function can be represented as  $\mu L$ . Considering that Kenyan banks are oligopolistic and therefore exercise market power in interest rate setting, a modified Monti-Klein model in Freixas and Rochet (2008) which assumes a downward sloping demand function for loans and upward sloping deposit function is applied in this study. Thus a bank's profit function is as follows:

$$\pi(D, L) = r_L L - r_D D(L + R - S) - r_p \sigma(S - R) - \mu L \quad (1)$$

The bank's assets (loans and reserves) are the choice of variables of the bank. Differentiating equation (1) with respect to loans (L) and reserves (R) gives:

$$r_L - r_D = \mu, \quad (2)$$

$$r_D = \sigma r_p, \quad (3)$$

Where,  $\sigma$  is the compulsory reserve ratio and  $r_p$  is the punitive interest rate. Therefore the deposit rates are a function of policy rates.

From equations 2 and 3 the relationship between lending and policy rates is;

$$r_L = \mu + \sigma r_p, \quad (4)$$

Money market conditions are influenced by central banks which in turn affect the money market interest rates this is the first stage of IRPT. On the other hand, adjustments in money market interest rates influences retail bank interest rates and this constitutes the second stage of IRPT.

### 3.4 Empirical Framework

The modified Monti-Klein model specified in the theoretical framework provides a basis for the empirical model used in the study. Following De Bondt (2005), equation 4 is the basic equation in IRPT analysis. Letting  $r_L = BankR_t$  and  $r_p = MMR_t$  following the equation to be estimated is:

$$BankR_t = \alpha_0 + \alpha_1 MMR_t + \varepsilon_t, \quad (5)$$

Where,

$BankR_t$  = Bank i's interest rates at time t

$MMR_t$  = Policy rates at time t

$\alpha_0$  = Constant

$\alpha_1$  = Degree of the pass-through in the short-run

$\varepsilon_t$  = Error term

According to the empirical literature the standard methodology proposes that equation 6 is transformed into an ADL specification and reparameterized as an ECM (Ming-Hua *et al.*, 2008 and Beng *et al.*, 2006). The ADL model is specified as:

$$BankR_t = \alpha_0 + \alpha_1 MMR_t + \alpha_2 BankR_{t-1} + \alpha_3 MMR_{t-1} + \varepsilon_t \quad (6)$$

Equation 7 is then reparameterized as an ECM to obtain the following estimating equation with both short-run and long-run parameters (Hendry, 1995).

$$\Delta BankR_t = \alpha_0 + \alpha_1 \Delta MMR_t + \beta_3 (BankR_{t-1} - \beta_2 MMR_{t-1}) + \varepsilon_t \quad (7)$$

Where  $\beta_3 = \alpha_2 - 1$ ,  $\beta_2 = \left( \frac{\alpha_1 + \alpha_3}{1 - \alpha_2} \right)$

$\alpha_1$  = degree or size of pass through in the short-term (within a month in our case).

$\beta_2$  = degree or size of the pass-through in the long run

$\beta_3$  = speed of adjustment to the long-run value.

The absolute size of  $\beta_3$  indicates how fast a disequilibrium in the retail interest rate settings will be removed. The average number of months required to reach this long run value is obtained by calculating the mean adjustment lag (MAL). According to Ming-Hua et al. (2008) the MAL is a measure of the speed with which retail rates respond to movements in policy rates, in this case,

$$1 - \left( \frac{\alpha_1}{\beta_3} \right)$$

In order to meet the second objective which is to estimate IRPT from policy rates to deposit and loan volumes, similar techniques will be applied on quantities of loans and deposits rather than interest rates of the same.

$$VolD_{it} = \gamma_0 + \gamma_1 MMR_t + \varepsilon_t, \quad (5a)$$

$$VolL_{it} = \lambda_0 + \lambda_1 MMR_t + \varepsilon_t, \quad (5b)$$

The ADL model is specified as:

$$VolD_{it} = \gamma_0 + \gamma_1 MMR_t + \gamma_2 VolD_{it-1} + \gamma_3 MMR_{t-1} + \varepsilon_t \quad (6a)$$

$$VolL_{it} = \lambda_0 + \lambda_1 MMR_t + \lambda_2 VolL_{it-1} + \lambda_3 MMR_{t-1} + \varepsilon_t \quad (6b)$$

Equations 7a and 7b is then reparameterized as an ECM to obtain the following estimating equations with both short-run and long-run parameters

$$\Delta VolD_{it} = \gamma_0 + \gamma_1 \Delta MMR_t + \rho_3 (VolD_{it-1} - \rho_2 MMR_{t-1}) + \varepsilon_t \quad (7a)$$

$$\Delta VolL_{it} = \lambda_0 + \lambda_1 \Delta MMR_t + \mu_3 (VolL_{it-1} - \mu_2 MMR_{t-1}) + \varepsilon_t \quad (7b)$$

Where  $VolD_{it}$  is the volume of deposits of bank i at time t

$VolL_{it}$  is the volume of loans of bank i at time t

To calculate the degree and speed of pass through the following equations are used;

$$\rho_3 = \rho_2 - 1, \quad \rho_2 = \frac{(\gamma_1 + \gamma_3)}{1 - \gamma_2}.$$



$$\mu_3 = \mu_2 - 1, \quad \mu_2 = (\lambda_1 + \lambda_3) / (1 - \lambda_2).$$

Where  $\rho_2$  and  $\mu_2$  refer to degree of pass through in the long run for deposit and loan volumes respectively and  $\rho_3$  and  $\mu_3$  refer to speed of adjustment to the long run value for deposit and loan volumes respectively.

However, in this case, the empirical results will focus particularly on the degree of pass through to deposit and loan volumes in the short-term  $\gamma_1$  and  $\lambda_1$  or the size of the pass-through to both deposit and loan volumes within a month in our case. The degree of the pass-through in the long run or the size of the pass-through in the long run or in steady state is obtainable from  $\rho_2$  and  $\mu_2$  and the speed of adjustment to the long-run value is captured by  $\rho_3$  and  $\mu_3$ . The absolute size of  $\rho_3$  and  $\mu_3$  indicates how fast a disequilibrium in the deposit and loan volumes settings will be removed. The average number of months required to reach this long run value is obtained by calculating the mean adjustment lag –MAL. The MAL is a measure of the speed with which deposit and loan volumes respond to movements in policy rates, in this case,  $1 - \left(\frac{\gamma_1}{\rho_3}\right)$  and

$$1 - \left(\frac{\lambda_1}{\mu_3}\right)$$

### 3.5 Definition and Measurements of Variables

The data set used in the study comprises interest rates on deposits and loans, deposit and lending volumes and an indicator of policy rates. Linkages of policy and market rates to lending and deposit rates are separately examined.

#### Interbank rate

It is the rate at which commercial banks lend to each other for specified short period of time.

This is a money market rate used as a proxy for the policy rate as the sample period runs from January 2003 to April 2014. During this period the Central Bank Rate (CBR) was only operational from 2006 hence the need of a proxy that moves closely together with CBR.

### **Deposit rate**

The rate of interest paid by financial institutions to depositors over a period of time that the money is on deposit.

**Fixed deposit rates** - Deposit rates of different maturities are used: 0-3 months and over 3 months fixed deposit rate. It is expected that pass-through for fixed deposit rates in the short-run is less than one and approaches one in the long-run.

**Saving deposit rate**- This is the rate paid by banks on deposits by the general public. It is usually subject to specified withdrawals per week. It is expected that pass-through for saving deposit rates in the short-run is less than one and approaches one in the long-run.

### **Lending rate**

This is the interest rate charged by banks on loans.

**Fixed lending rates** – lending rates of different maturities are used: 0-5 years and over 5 years lending rates. Pass-through for fixed lending rates is expected to be one in the long-run and is less than one in the short run.

**Overdraft:** The interest rate paid on an extension of credit from a lending institution when an account reaches zero. An overdraft allows the individual to continue withdrawing money even if the account has no funds in it. Pass-through for overdraft is expected to be one in the long-run and is less than one in the short run.

### **Volume of deposits**

This is the quantity of deposits of each bank at time period t. Pass-through into quantities of deposits is expected to be close to one in both the short-run and the long-run.

### **Volume of loans**

This is the quantity of deposits of each bank at time period t. It is expected that pass-through into volume of loans is less than one in the short-run and is one in the long-run.

## **3.6 Pre-estimation Techniques and Econometric Issues**

The specified empirical equation will be estimated using the Engle –Granger OLS approach to obtain the pass-through coefficient as long as the two non- stationary interest rate series co-integration. Time series testing procedures are complex due to the presence of unit roots in the variables. This is why it is important to use an error correction model so as to analyse interest rate pass through in Kenya.

### **3.6.1 Unit root testing**

Over time, economic time series data may exhibit a trend or unit root(s). A stationary time series is whereby its mean and variance do not vary systematically over time. This implies that the underlying stochastic process that generated the series is invariant with time. When using non-stationary series in econometric analysis the results tend to be ambiguous and produce spurious regression results that suggest statistically significant relationships when in real sense there are no meaningful relationships between the variables (Gujarati, 2003). The Augmented Dickey-Fuller (ADF) test will be used to test for the existence of systematic and linear relationships between past and present values of variables. ADF regression takes the following form:

$$\Delta Y_t = \beta_1 + \beta_2 T + \delta Y_{t-1} + \sum_{i=1}^m \Delta Y_{t-i} + \varepsilon_t$$

Where  $T$  is the time trend and  $\varepsilon_t$  is the error term. The null hypothesis is  $\delta = 0$ , that is, there exists a unit root in  $Y_t$ . Accepting the null hypothesis confirms the presence of unit root. This study will use the equation above because it ensures that the deterministic components are well handled.

### **3.6.2 Cointegration Analysis and Error Correction Modelling**

A linear combination of two or more non-stationary series may yield a stationary series. If such a linear combination exists, then the non-stationary series are said to be cointegrated meaning that the non-stationary series move closer together over time and the difference between them is stable (Engle and Granger, 1987). The resulting linear combination is called a cointegrating equation and may be interpreted as a long-run relationship between the variables. Following Engle and Granger (1987) the cointegrating regression is specified as follows;

$$x_t = \alpha_0 + \alpha_1 z_t + \varepsilon_t$$

The residual of the equation  $\varepsilon_t = (x_t - \alpha_0 - \alpha_1 z_t)$  is simply the  $1(1)$  series. If the residuals from the linear combination of non-stationary series are themselves stationary, then the  $1(1)$  series is cointegrated and the residuals taken from the cointegrating regression as valid which are then built into an Error Correction Model (ECM). An ECM is a restricted autoregression that has cointegration restrictions built into the specification, so that it can be used for cointegrated non-stationary time series. The cointegrating term is known as the error correcting term and it shows the speed with which short-term deviations are corrected gradually towards the long-run equilibrium. To examine the long and short-term dynamics in a single statistical model, this study adopts an Autoregressive Distributed Lag (ADL) model reparametrized as an ECM.

### **3.6.3 Autoregressive Distributed Lag (ADL)**

An Autoregressive Distributed Lag (ADL) or Bounds Testing approach to cointegration and Error Correction Modelling will be adopted by this study in order to examine the long-run and short-run equilibrium relationship among the selected variable in Kenya during the sample period 2003-2012. Peseran and Shin (1999) introduced and Peseran, Shin and Smith (2001) extended the ADL modelling approach. The approach simultaneously estimates the short and long –run elements, eliminating the omitted variables and autocorrelation problems. Besides, the Wald F-statistic used in the Bounds test has a non-standard distribution under the null hypothesis of non-cointegration relationship between examined variables irrespective of whether the underlying variables are  $I(0)$ ,  $I(1)$  or fractionally integrated. Moreover, once the orders of lags in the ADL model has been appropriately selected, the cointegration relationship can be estimated using the Ordinary Least Squares (OLS) method. The ADL Unrestricted Error Correction Model (UECM) is used in the study.

### **3.7 Data types and sources**

So as to analyze the relationship between money market rates and bank retail rates, the study uses monthly aggregate data covering the period January 2003- April 2014. All the data is obtained from the Central Bank of Kenya database. The choice of the starting period reflects the period when the CBK was trying to relax interest rates and raise the amount of credit available in the private sector in order to prime up the economic growth rate.

## **CHAPTER FOUR**

### **RESEARCH RESULTS**

#### **4.1 Introduction**

As mentioned in chapter three, four tests were done in order to interpret the interest rate data that we have for Kenyan banks: Unit-Root Testing, Level/Degree of Integration, Cointegration Testing and Autoregressive Distributed Lag Model.

#### **4.2 Unit-root Testing**

As all interest rate time series need to be tested for unit root, the basic assumption for calculating pass-through by Error Correction Modeling is that each series is non stationary, and that there is a long term relationship between the various interest rates i.e. they are cointegrated. Unit root testing has been done for the bank's interest rates together with the market rates for each loan/deposit category for a given period.

For the ADF unit-root test, the null hypothesis of unit root cannot be rejected for any of the variables. This is a first sign for non-stationarity of interest rates in the analyzed period. It is therefore appropriate to model the interest rates using an error-correction framework when there is a cointegration relationship between bank rates and market rates.

The results for the unit root tests are summarized in the table below.

**Table 2: Unit root testing**

Banks	Unit-Root Test	ADF Test Stats	Test critical values: 1%	Test critical values: 5%	Test critical values: 10%	Durbin Watson Stats	Stationary
Large Banks	IBR	-1.178164	-3.495677	-2.890037	-2.582041	1.999917	Non stationary
	FD03	-1.559615	-3.494378	-2.889474	-2.581741	1.911789	Non stationary
	FDOV3	-1.558505	-3.494378	-2.889474	-2.581741	1.734746	Non stationary
	SD	-1.32556	-3.494378	-2.889474	-2.581741	2.001329	Non stationary
	OD	-1.634423	-3.494378	-2.889474	-2.581741	1.608003	Non stationary
	LR05	-1.081766	-4.048682	-3.453601	-3.1524	1.799916	Non stationary
	LROV5	-1.514631	-3.494378	-2.889474	-2.581741	1.990599	Non stationary
	VoID	-1.224784	-3.501445	-2.892536	-2.583371	2.224726	Non stationary
	VoIL	-1.351299	-3.493129	-2.888932	-2.581453	2.103588	Non stationary
Medium Banks	IBR	-1.178164	-3.495677	-2.890037	-2.582041	1.999917	Non stationary
	FD03	-0.816653	-2.586753	-1.943853	-1.614749	1.854806	Non stationary
	FDOV3	-1.772917	-3.492523	-2.888669	-2.581313	1.895469	Non stationary
	SD	-1.570396	-3.493129	-2.888932	-2.581453	1.978961	Non stationary
	OD	-2.647166	-4.046072	-3.452358	-3.151673	1.727153	Non stationary
	LR05	-1.987313	-3.493129	-2.888932	-2.581453	2.066547	Non stationary
	LROV5	-1.986585	-3.493129	-2.888932	-2.581453	1.952472	Non stationary
	VoID	-2.527367	-3.493129	-2.888932	-2.581453	1.856744	Non stationary
	VoIL	-1.145187	-3.493129	-2.888932	-2.581453	2.245185	Non stationary
Small Banks	IBR	-1.178164	-3.495677	-2.890037	-2.582041	1.999917	Non stationary
	FD03	-2.308866	-3.495021	-2.889753	-2.58189	2.023176	Non stationary
	FDOV3	-1.771813	-3.493747	-2.8892	-2.581596	2.112415	Non stationary
	SD	-1.704143	-3.493747	-2.8892	-2.581596	2.072585	Non stationary
	OD	-2.547201	-3.493129	-2.888932	-2.581453	1.982667	Non stationary
	LR05	-1.987313	-3.493129	-2.888932	-2.581453	2.066547	Non stationary
	LROV5	-1.986585	-3.493129	-2.888932	-2.581453	1.952472	Non stationary
	VoID	-2.527367	-3.493129	-2.888932	-2.581453	1.856744	Non stationary
	VoIL	-1.606732	-3.493747	-2.8892	-2.581596	2.034052	Non stationary

Source: Author's calculations

### 4.3 Level- degree of Integration

Another requirement for error correction model specification and the cointegration evaluation is the degree of integration for the given variables. In order to measure the degree of integration, unit-root testing is done at 'level', 'the first difference' and 'the second difference' for all the variables.

The results of levels of integration for individual variables are given in the following table. It can be seen that all the variables are non-stationary at ‘level’ and stationary for ‘the first difference’ that is they are integrated of order 1; I (1).

**Table 3: Degree- level of integration testing**

Banks	Degree of integration	Unit-Root			Degree of integration
		Level	First difference	Second difference	
Large banks	IBR	Non stationary	Stationary	N/A	I(1)
	FD03	Non stationary	Stationary	N/A	I(1)
	FDOV3	Non stationary	Stationary	N/A	I(1)
	SD	Non stationary	Stationary	N/A	I(1)
	OD	Non stationary	Stationary	N/A	I(1)
	LR05	Non stationary	Stationary	N/A	I(1)
	LROV5	Non stationary	Stationary	N/A	I(1)
	VoID	Non stationary	Stationary	N/A	I(1)
	VoIL	Non stationary	Stationary	N/A	I(1)
Medium banks	IBR	Non stationary	Stationary	N/A	I(1)
	FD03	Non stationary	Stationary	N/A	I(1)
	FDOV3	Non stationary	Stationary	N/A	I(1)
	SD	Non stationary	Stationary	N/A	I(1)
	OD	Non stationary	Stationary	N/A	I(1)
	LR05	Non stationary	Stationary	N/A	I(1)
	LROV5	Non stationary	Stationary	N/A	I(1)
	VoID	Non stationary	Stationary	N/A	I(1)
	VoIL	Non stationary	Stationary	N/A	I(1)
Small banks	IBR	Non stationary	Stationary	N/A	I(1)
	FD03	Non stationary	Stationary	N/A	I(1)
	FDOV3	Non stationary	Stationary	N/A	I(1)
	SD	Non stationary	Stationary	N/A	I(1)
	OD	Non stationary	Stationary	N/A	I(1)
	LR05	Non stationary	Stationary	N/A	I(1)
	LROV5	Non stationary	Stationary	N/A	I(1)
	VoID	Non stationary	Stationary	N/A	I(1)
	VoIL	Non stationary	Stationary	N/A	I(1)

**Source: Author’s calculations**

#### 4.4 Cointegration Testing

Table 4.4 below summarizes the results for the cointegration tests. For banking interest rates on saving deposits and lending rates, the null hypothesis of no-cointegration cannot be rejected even



at the 10% level. Bank interest rates seem to be cointegrated with corresponding market rates. In the specification model, Engel-Granger cointegration test is used to conclude cointegration. The results from both of these tests are summarized in the following table:

**Table 4: Engel-Granger Cointegration Test Stats**

Banks	Granger Cointegration Test	Trace Test			
		Stationarity	Level of Integration	OLS Residual Stationarity	Cointegration
Large Banks	FD03	Non stationary	I (1)	Stationary	Yes
	FDOV3	Non stationary	I (1)	Stationary	Yes
	SD	Non stationary	I (1)	Stationary	Yes
	OD	Non stationary	I (1)	Stationary	Yes
	LR05	Non stationary	I (1)	Stationary	Yes
	LROV5	Non stationary	I (1)	Stationary	Yes
	VoID	Non stationary	I (1)	Stationary	Yes
	VoIL	Non stationary	I (1)	Stationary	Yes
Medium Banks	FD03	Non stationary	I (1)	Stationary	Yes
	FDOV3	Non stationary	I (1)	Stationary	Yes
	SD	Non stationary	I (1)	Stationary	Yes
	OD	Non stationary	I (1)	Stationary	Yes
	LR05	Non stationary	I (1)	Stationary	Yes
	LROV5	Non stationary	I (1)	Stationary	Yes
	VoID	Non stationary	I (1)	Stationary	Yes
	VoIL	Non stationary	I (1)	Stationary	Yes
Small Banks	FD03	Non stationary	I (1)	Stationary	Yes
	FDOV3	Non stationary	I (1)	Stationary	Yes
	SD	Non stationary	I (1)	Stationary	Yes
	OD	Non stationary	I (1)	Stationary	Yes
	LR05	Non stationary	I (1)	Stationary	Yes
	LROV5	Non stationary	I (1)	Stationary	Yes
	VoID	Non stationary	I (1)	Stationary	Yes
	VoIL	Non stationary	I (1)	Stationary	Yes

Source: Author's calculations

#### 4.5 Autoregressive Distributed Lag Model

As per the above analysis, it has been proven that there is cointegration between the various fixed deposits and the money market rates. Hence, short and long term relationship for interest rate pass-through for these products will be analyzed now. They are the calculation of the short and long term pass-through equation using autoregressive distributed lag model (ADL) and error correction modeling. The results are detailed in table 4.5.

**Table 5: Pass-through Statistics Summary**

Banks	Pass through stats	Markup ( $\alpha_0$ )	Short Term	Long Term		
			Degree of pass through ( $\alpha_1$ )	Degree of pass through ( $\beta_2$ )	Rate of adjustment ( $\beta_3$ )	Mean Adjustment Lag (Months)
						$1 - \left( \frac{\alpha_1}{\beta_3} \right)$
Large banks	FD03	0.241	0.122	0.93	-0.129	6.8
	FDOV3	0.545	-0.162	0.552	-0.203	5.7
	SD	0.103	-0.142	-0.590	-0.089	15.9
	OD	1.446	0.036	0.607	-0.117	8.2
	LR05	3.028	0.051	0.693	-0.205	4.6
	LROV5	2.344	0.061	0.841	-0.170	5.5
	VoID	341294.637	-0.001	-0.375	-0.008	12.5
	VoIL	439123.602	-0.14	0.645	-0.002	15.7
Medium banks	FD03	0.219	0.169	1.248	-0.137	6.1
	FDOV3	0.167	0.121	1.458	-0.296	9.2
	SD	0.650	-0.128	0.239	-0.297	4.1
	OD	1.448	0.248	1.195	-0.431	5.3
	LR05	1.831	0.268	1.148	-0.462	4.5
	LROV5	1.255	0.232	1.234	-0.328	6
	VoID	31908.86	0.003	0.2	-0.005	19.4
	VoIL	113960.12	-0.008	0.15	-0.001	17.3
Small banks	FD03	0.363	0.150	1.311	-0.132	6.4
	FDOV3	0.412	0.124	1.259	-0.116	7.6
	SD	1.518	-0.035	0.468	-0.529	2
	OD	1.994	0.010	0.953	-0.149	6.6
	LR05	1.530	0.116	1.145	-0.131	6.7
	LROV5	1.402	0.116	1.295	-0.115	7.7
	VoID	38245.78	-0.008	0.500	-0.012	8.4
	VoIL	206289.18	0.026	0.442	-0.086	11.3

Source: Author's calculations

#### 4.6 Regression results and discussion

In Table 5, the estimates of the speed of adjustment are both negative and statistically significant. This shows that the mean of the lending and deposit rates regress to their long run equilibrium values. In all cases, the results indicate that less than 5% of the disequilibrium gap in the lending rates is corrected within one month.

The average number of months required to reach this long run value is obtained by calculating the mean adjustment lag –MAL. The MAL is a measure of the speed with which lending and deposit rates and deposit and loan volumes respond to movements in policy rates.

### **Large banks**

The short-run impact of policy changes ranges between -0.162 and 0.122, thus indicative of incomplete immediate interest rate pass-through effect. The long run impact of policy actions ranges between 0.35 to 0.93 with pass through being almost complete in the following bank products; 0-3 months fixed deposits, 0-5 years loans and over 5 years loans. In the short run pass through is incomplete for both loan and deposit volumes. However, in the long run pass through appears to be incomplete for deposit volumes but approaching 1 (complete pass through) for loan volumes.

It can be observed that the period required from the point the monetary authority takes action to the point the commercial banks respond to the policy signal ranges between 1 year 4 months to 4 months. The average speed for deposit and loan volumes to fully adjust to market rate changes is typically 1 year and half a month and 1 year 3 months respectively.

### **Medium banks**

For medium banks in Kenya, the short run impact of policy changes affecting retail rates ranges between -0.128 and 0.268. This shows that interest rate pass through is incomplete in the short run. On the other hand, pass through impact in the long run ranges between 0.15 and 1.458 indicating that there are mixed results with pass through being complete for fixed deposits and all the loan products. For the volumes however, there exists incomplete pass through for both the deposit and loan volumes.

The Mean adjustment lag (MAL) for deposit and lending rates ranges between 9 months and 4 months for medium banks. It takes 1year 7months and 1year 5months for deposit volumes and loan volumes to adjust to money market rates respectively.

### **Small banks**

In the small banks category, the short run impact ranges between -0.035 and 0.124 This indicates that there is incomplete pass through in the short run. Different results are seen in the long run where the impact ranges from 0.442 and 1.311. Pass through is complete for all the bank products except for saving deposits. As for the volumes, pass through is incomplete for both deposit and loan volumes.

The Mean adjustment lag (MAL) for deposit and lending rates ranges between 8months and 2months for small banks. It takes 8months and 11months for deposit volumes and loan volumes to adjust to money market rates respectively.

## **CHAPTER FIVE**

### **CONCLUSION AND RECOMMENDATIONS**

#### **5.1 Introduction**

The main aspect of interest rate transmission mechanism analyzed in this paper is interest rate pass-through (IRPT) in Kenyan banking. The results and conclusions for each bank category will be highlighted in the following sections.

#### **5.2 Interest Rate Pass-through: Bank Categories**

The primary result of this research is to study the variation in interest rate pass-through for all banks in Kenya across different bank categories; large, medium and small banks. The analysis and their relevant conclusions for each category are as below:

##### **5.2.1 Large banks**

It has been found that among all the bank categories, large banks have the lowest pass-through rate. The long term pass-through rate for all bank products was found to be less than unity which is considered quite low from every standard. Volumes of loans and deposits indicate incomplete pass through both in the long run and short run.

However, the short term rate of adjustment is also at approximately 8% which is very low. This, however, does not imply that the banking system for large banks is particularly inefficient, it can be indicative of a very high degree of competition. However, these banking interest rates do react significantly to misalignments with corresponding market rates and consequently adjust towards equilibrium, but at a slower rate for almost all of the short term interest rate categories.

##### **5.2.2 Medium banks**

Analysis on interest rate transmission mechanism in Medium banks revealed some interesting findings. Although the overall long term pass-through rate is considerably high, but the degree of

pass-through behaviour increases with maturity of its fixed deposits and fixed loans. Volumes of loans and deposits indicate incomplete pass through both in the long run and short run.

Moreover the rate of adjustment is among the highest in Kenya. It is around 23% per month for fixed deposits, 30% for saving deposits and 45% for the lending rates respectively. All these figures are considerably high as compared to the data from other categories. This indicates that the interest rate transmission mechanism is quite effective in medium banks and banks play a pivotal role in the transmission of monetary policy.

### **5.2.3 Small banks**

Small banks have an exceptionally high pass-through rate as compared to the various bank categories. As expected from literature, short term pass-through is incomplete for all bank products. The long term pass-through rate for their fixed deposits, fixed loans and overdraft are unity with an exception of saving deposits. However pass through to the deposit and loan volumes in both the long run and short run is incomplete.

In addition to the above, the rate of adjustment is around 13% per month for fixed deposits, 6% for saving deposits and 14% for the lending rates respectively. All these figures are considerably higher as compared to the data from other bank categories. This indicates a highly efficient interest rate transmission mechanism and a very open market system whereby their policy rate is totally and effectively transferred to the retail banking consumer rates in a shortest period of time.

Inefficiency occurs when it comes to the volumes where pass through is incomplete indicating that the policy rate is not effectively transmitted in the shortest period of time into loan and deposit volumes.

### **5.3 Interest Rate Pass-through: Cross Product Comparison**

In terms of comparison across different banking products, results have been very consistent and they do follow the general economic theory.

The fixed deposit rates are normally the ones having higher long term pass-through and higher speed of adjustment in the short run. The results indicate that the speed of adjustment is the fastest for the 0-3 month deposit rates whereby it slows down with the increase of its maturity to over 3 months and saving deposits. Moreover, the long term pass-through is also more complete for shorter maturity interest rates as compared to the long term deposit rates. This is probably because we are using short term money market rate as our independent variable, so the short term deposit rates are adjusted quickly to market competition, whereas the long maturity rates take some time to change and change is smooth. The long term multiplier for most cases is less than 1 indicating less than full pass-through.

The pass-through is considerably less for the saving deposits rate and lending rates, which indicates that these rates are quite sticky and they do not move quickly to adjust to policy rate changes. The short term speed of adjustment for the saving deposits and lending rates is also quite low as compared to fixed deposit rates.

### **5.4 Recommendations**

Monetary policy affects investment and aggregate demand. It depends on the degree and extent to which changes in policy interest rates are passed through to retail bank interest rates. While the Central Bank policy signals have been quite effectively transmitted to retail rates in the long run, the transmission from the policy rates to retail rates in the long run have remained sticky. Pass-through from policy rates to loan and deposit volumes also remains sticky in both the long and short run. Regardless of the fundamentals of maintaining high lending rates such as inflation

levels, profit margins and credit risks having changed in favour of the commercial banks, commercial banks still maintain high interest rates. This situation frustrates monetary policy makers and creates an unfounded notion that their actions are not effective.

This study provides some insight into the relationship between policy rates and commercial bank interest rates. Findings of this study indicate a sticky interest rate pass through in the short-run. The study indicates stickiness of policy transmission from policy interest rates to commercial bank rates both for the deposit and lending rates and deposit and loan volumes. Inefficiencies in the Kenyan money market are signalled by the sluggishness in policy transmission. This poses serious challenges for implementation of monetary policy thereby rendering monetary policy ineffective in achieving its objectives.

The mean lag adjustment used in the study establishes that the market does not instantaneously adjust their deposit interest rates and lending interest rates to changes in policy rate. This implies that when a monetary policy action is implemented, the retail rates take time before responding. Thus for monetary policy effectiveness, apart from focusing on the other factors that affect complete pass-through, the monetary authority should also adopt forward looking models that facilitate appropriate timing of the policy actions and effectively incorporates expectations of market players.

Conclusions from this study suggest that further research may be necessary on two issues. First is to find the reasons behind the differences in the speed of interest rate adjustment amongst banks. This would advance the identification of prospective explanatory factors of the observed heterogeneity.



Secondly, an analysis on the use of common foreign currency with respect to pass-through for foreign loans/deposits interest rates for different countries. This may assist the local monetary authorities to make comparisons for effective monetary policies.

## REFERENCES

- Adams, R. M. and Amel, D. F. (2011).Market structure and the pass-through of the federal funds rate. *Journal of Banking and Finance*, 35, 1087-1096.
- Agenor, P. and Montiel P.J. (2008).*Development Macroeconomics*. Third Edition, Princeton University Press, New Jersey.
- Aydin, H. I. (2007). Interest rate pass – through in Turkey. CBRT Research and Monetary Policy Department Working Paper No. 07/05.
- Aziakpono, M.J. and Wilson, M.K., (2010). Interest rate pass-through and monetary policy regimes in South Africa. Paper Presented at The CSAE Conference, 21-23 March, Oxford University, UK.
- Beck , T, Demirguc-Kunt, A., Levine,R. E, Cihak, M and Feyen,E. H.B (2013).Financial Development and Structure Dataset (updated April 2013).
- Beng, S., Liu, M.And K. Shrestha (2006).Monetary transmission via administered interest rate channel. *Journal of Banking and Finance*, Vol. 30, No. 5, pp. 1467-1484.
- Bernhofer, D. and van Treek, T. (2011). New evidence of heterogeneous bank interest rate pass-through in the euro area. *Macroeconomic Policy Institute Working Paper No. 12/2011*.
- Central Bank of Kenya, (2012).Central Bank Supervision Annual Report. Available at [www.cbk.go.ke](http://www.cbk.go.ke) accessed on 12/11/2013.
- Central Bank of Kenya, (2013).Central Bank Supervision Annual Report. Available at [www.cbk.go.ke](http://www.cbk.go.ke) accessed on 03/03/2014.
- De Bondt, G. (2002). Retail bank interest rate pass-through: New evidence at the euro area level. *European Central Bank Working Paper No.136*.
- De Bondt, G. (2005). Interest rate pass-through: Empirical results for the Euro area. *German Economic Review*, 6, 37 – 78.
- Engle, R.F. and Granger, C.W.J., (1987). Cointegration and error correction: Representation, estimation and testing. *Econometrica*, 55: 251–276.

Faure, A. P., (2006)The transmission of monetary policy under the repo system in South Africa: An empirical analysis. *The South African Journal of Economics*, 73: 657 – 675.

Florian, V. (2013).Interest rate pass-through in the EMU: New evidence from nonlinear cointegration techniques for fully harmonized data. *Journal of International Money and Finance*, 37(C), 1-24.

Freixas, X. and Rochet, J., C. (2008).*Microeconomics of Banking*, 2<sup>nd</sup> edition, The MIT Press, Cambridge.

Government of Kenya (2003). Economic Recovery Strategy for Wealth and Employment Creation (ERS)

Government of Kenya (2007), Kenya Vision 2030 (popular version).

Hanif, M. N. and Khan, M. U. H. (2012). Pass-through of State Bank of Pakistan policy rate to market interest rates: An empirical investigation. Munich Personal RePEc Archive available at <http://mpa.ub.uni-muenchen.de/39587/> retrieved on 24<sup>th</sup> August 2013.

Hansen, N. and Welz, P., (2011). Interest rate pass-through during the global financial crisis; The case of Sweden, OECD Economics Department Working Papers, No 855, OECD Publishing.

Horvath, C., Kreko, J. and Naszodi, A., (2005). Interest rate pass-through: The case of Hungary.Magyar Nemzeti Bank Working Paper 2004/8.

Hendry, D. (1995). Dynamic Econometrics. Oxford University press.

Jamilov, R. And Egert, B., (2013). Interest rate pass-through and monetary policy asymmetry: A journey into the Caucasian black box. CESIFO Working paper No. 4131. Available at [www.CESifo-group.org/wp](http://www.CESifo-group.org/wp) retrieved on 10<sup>th</sup> August 2013.

John, M. and Pokhariyal, G. P. (2013).Two stage interest rate- pass through in Kenya. *Journal of Emerging Trends in Economics and Management Sciences*, 4(1): 54-61 available at [www.jetems.scholarlinkresearch.org](http://www.jetems.scholarlinkresearch.org) accessed on 20/08/2013.

Kabubo, J. and Ngugi, R., (1998). Financial sector reforms and interest rate liberalization: The Kenya Experience. African Economic Research Consortium, Paper No 72, Nairobi March 1998

- Kam, E. and Smithin, J. (2010). A simple theory of banking and the relationship between commercial banks and the Central Bank. *Journal of Post Keynesian Economics*, 34(3), 545-549.
- Kaskende, A., and Brownbridge, N., (2011). The effects of monetary policy changes on market interest rates in South Africa: An event study approach. *International Review of Economics and Finance*, 15, 487–504.
- Lowe, P. and Rohling, T., (1992). Loan rate stickiness: Theory and evidence. Research Discussion Paper, Reserve Bank of Australia.
- Maudos, J. and Guevara de, J. F. (2004). Factors explaining the interest margin in the banking sectors of the European Union. *Journal of Banking and Finance*, 28, 2259-2281.
- Matthews, K. and Thompson, J. (2008), *The Economics of Banking*, 2<sup>nd</sup> edition, John Wiley and sons Ltd, Hoboken.
- Ming – Hua, L., Margatis, D. and Tourani – Rad, A. (2008). Monetary policy, transparency and pass – through of retail interest rates. *Journal of Banking and Finance*, Vol 32 (4), 501-511.
- Misati, R.N., Nyamongo, E.M., and Kamau, A.W. (2011). Interest rate –pass through in Kenya, *International Journal of Development Issues*, 10(2), 170-182.
- Mishkin, F. (1996). The channels of monetary transmission: lessons from monetary policy. Working Paper series, No.5464, Cambridge, Massachusetts: NBER.
- Mishkin, F.S., (2004). *The Economics of Money, Banking and Financial Markets* (Alternate Edition). Harlow: Addison-Wesley, pp. 617–630.
- Mishkin, F.S., (2013). *The Economics of Money, Banking and Financial Markets*, 10<sup>th</sup> ed. Harlow: Addison-Wesley.
- Mwega, F. M, Mkandawire T, Soludo C. (2003) Financial Sector Reform in Eastern and Southern Africa, *African Voices on Structural Adjustment in Sub - Saharan Africa*. Third World Press, Inc., Johannesburg.
- Pesaran, M.H. and B. Pesaran, 1997, Working with Microfit 4.0: An interactive econometric software package (DOS and Windows versions), (Oxford University Press, Oxford).

- Ramlogan, C. (2004). The transmission mechanism of monetary policy: Evidence from the Caribbean. *Journal of Economic Studies*, 31, 435-448.
- Samba, M. C. and Yan Y. (2010). Interest rate pass through in the Central African Economic and Monetary Community (CAEMC) area: Evidence from ADRL analysis. *International Journal of Business and Management*, 5(1).
- Sande, D. and Okello, J.A. (2013). Interest rate pass-through in Uganda. Bank of Uganda Working paper No. 02/2013.
- Sander, H. and Kleimeier, S., (2004). Convergence in Euro-Zone retail banking? What interest rate pass-through tells us about monetary policy transmission, competition and integration. *Journal of International Money and Finance*, 23: 461– 492.
- Sanusi, A.R. (2010). Interest rate pass-through and the efficiency of monetary policy in Nigeria 2002-2010. A paper submitted for presentation at the 1<sup>st</sup> National Conference on State of the Nigerian Economy, Bayero University, Nigeria: November 4<sup>th</sup> – 6<sup>th</sup>, 2010 available at <http://ssrn.com/abstract=1782172>.
- Schulter, T., Wendels, H., Busch, R. and Sievers, S., (2012). Determinants of the interest rate pass-through of banks: Evidence from German loan products. Dutsche Bundesbank Discussion Paper 2012/26.
- Shin, Y., Yu, B. and Greenwood, N. M. (2011). Modelling asymmetric cointegration and dynamic multipliers in a nonlinear ARDL Framework. W.C. Horrace and R.C. Sickles, eds., Forthcoming.
- Stiglitz, J. and Weiss, A., (1981). Credit Rationing in markets with imperfect information. *The American Economic Review*, 53 (June): 393–410.
- Wang, K-M. And Lee, Y-M., (2009). Market volatility and retail interest rate pass through. *Economic Modelling*, 26: 1270–1282.

## APPENDICES

### Appendix I: Small Banks

	Deposit volumes	Loan volumes	Deposit rates			Lending rates			Interbank rate
			0-3months	Over 3 months	Savings	overdraft	1-5 years	Over 5 years	
Dec-02	2,288,371	1,923,345	7.34	7.36	4.63	17.34	16.98	17.74	8.69
Jan-03	2,258,298	1,938,521	7.30	7.41	4.44	17.39	17.16	17.61	9.04
Feb-03	2,269,812	1,936,221	7.29	7.03	4.44	17.28	16.24	17.73	7.06
Mar-03	2,265,215	1,982,883	6.79	6.63	4.42	17.00	16.66	17.67	6.22
Apr-03	2,244,521	2,034,862	6.76	6.58	4.35	16.57	16.39	16.48	5.88
May-03	2,255,678	2,049,753	6.22	6.45	3.96	15.97	16.40	16.33	5.67
Jun-03	2,028,317	1,559,729	5.77	5.62	3.73	15.29	16.02	15.87	1.62
Jul-03	2,123,278	1,647,969	4.63	4.92	3.45	15.19	15.98	14.69	0.45
Aug-03	2,136,686	1,543,236	4.24	4.85	3.31	14.85	13.98	14.81	0.43
Sep-03	2,125,640	1,634,081	3.51	3.93	3.25	13.74	13.51	14.30	0.54
Oct-03	2,162,696	1,724,011	3.54	3.93	3.24	13.52	13.74	14.64	0.69
Nov-03	2,304,263	1,715,527	3.86	4.16	3.02	13.42	13.91	14.71	0.73
Dec-03	2,228,274	1,765,021	3.65	4.14	3.02	14.01	13.74	14.73	0.81
Jan-04	2,380,772	2,130,175	3.66	4.01	2.66	13.66	13.43	14.32	0.82
Feb-04	2,071,329	1,429,866	3.42	4.23	2.72	14.69	12.72	12.05	0.9
Mar-04	2,083,637	1,702,348	3.33	4.03	2.77	14.87	13.82	13.23	1.27
Apr-04	2,085,067	1,715,994	3.28	4.03	2.77	14.86	11.78	13.50	1.72
May-04	2,133,853	1,775,133	3.07	4.08	2.70	14.45	10.70	12.89	2.05
Jun-04	2,171,080	1,815,850	3.01	3.81	2.68	14.48	10.37	12.70	1.29
Jul-04	2,210,620	1,744,196	2.83	3.69	2.71	13.91	10.27	11.87	1.52
Aug-04	2,206,422	1,837,215	3.03	3.92	2.43	13.70	12.79	11.93	2.1
Sep-04	2,088,329	1,708,111	3.28	3.87	2.58	13.41	12.59	11.13	2.95
Oct-04	2,212,337	1,743,297	3.32	4.06	2.50	13.03	12.62	11.62	3.56

Nov-04	2,241,315	1,747,037	3.34	4.05	2.50	13.66	13.06	12.13	4.66
Dec-04	2,240,744	1,771,300	3.73	4.89	2.57	14.01	13.63	12.36	9.41
Jan-05	2,244,423	1,758,064	4.45	4.88	2.83	14.33	13.26	12.34	8.72
Feb-05	2,233,234	2,215,590	5.06	5.60	2.83	14.60	13.27	12.65	8.14
Mar-05	2,231,677	1,866,702	5.33	5.80	2.96	14.05	13.53	12.85	8.13
Apr-05	2,250,747	1,940,526	5.75	6.01	2.98	14.63	13.79	13.03	8.28
May-05	2,247,152	1,901,545	5.76	6.00	2.98	14.59	13.81	13.30	8.3
Jun-05	2,255,396	1,873,800	5.88	6.14	3.02	14.17	13.86	13.72	7.37
Jul-05	2,298,710	1,905,722	6.07	6.17	3.04	14.09	13.92	13.71	7.51
Aug-05	2,164,910	1,906,747	6.09	6.35	2.93	14.10	14.23	13.43	7.77
Sep-05	2,290,657	1,926,886	6.10	6.40	3.14	11.48	14.42	13.54	8.03
Oct-05	2,327,433	1,948,460	6.15	6.55	3.07	14.54	14.29	13.18	7.98
Nov-05	2,349,098	2,012,294	5.81	6.64	3.06	14.66	13.48	12.70	7.64
Dec-05	2,393,429	2,090,532	6.06	6.48	3.03	14.53	14.26	13.20	7.79
Jan-06	2,403,993	2,187,928	6.20	6.51	3.05	14.67	14.32	13.35	7.78
Feb-06	2,397,499	2,176,832	5.90	6.34	3.07	14.80	14.80	13.55	7.73
Mar-06	2,450,284	2,086,954	6.27	5.56	3.06	14.79	14.86	13.61	7.52
Apr-06	2,436,407	2,239,370	6.25	6.58	3.06	14.77	14.71	13.59	6.97
May-06	2,480,877	2,208,128	5.79	6.34	3.38	13.24	13.42	12.58	8.11
Jun-06	2,547,060	2,121,145	5.82	6.61	3.16	14.41	14.72	13.69	6.41
Jul-06	2,578,579	2,175,023	6.29	6.48	2.98	14.03	14.23	13.33	5.74
Aug-06	2,564,091	2,186,078	5.79	6.29	2.99	14.81	13.38	13.46	5.66
Sep-06	2,585,551	2,127,303	5.98	6.52	3.00	14.81	13.63	13.41	6.02
Oct-06	2,614,108	2,171,041	5.96	6.49	2.99	14.86	14.42	13.06	6.08
Nov-06	2,639,747	2,248,137	6.10	6.81	2.99	14.82	14.36	13.12	6.18
Dec-06	2,717,178	2,309,887	6.14	6.59	2.98	13.82	13.92	13.11	6.34
Jan-07	2,451,192	1,969,971	5.70	6.32	3.07	14.38	12.98	11.80	6.43
Feb-07	2,726,431	2,306,392	6.11	6.64	3.07	15.51	14.39	12.87	6.52
Mar-07	2,797,423	2,354,101	6.25	6.77	3.14	14.89	14.01	13.07	6.55
Apr-07	2,880,067	2,392,535	6.18	6.67	3.05	15.02	13.75	13.07	6.81

May-07	2,851,338	2,440,638	6.18	6.78	3.13	15.11	14.26	13.37	7.11
Jun-07	2,874,146	2,455,540	6.30	6.98	6.74	15.39	14.45	13.50	6.98
Jul-07	2,882,000	2,382,457	6.00	6.95	2.92	15.32	15.82	13.55	7.07
Aug-07	2,622,793	2,425,639	5.29	5.98	2.93	15.22	14.59	12.21	7.38
Sep-07	3,068,906	2,457,173	6.05	6.85	2.93	14.45	13.82	12.70	7.59
Oct-07	3,114,638	2,484,628	6.01	6.94	2.88	14.45	13.82	12.65	7.65
Nov-07	3,081,925	2,601,363	6.18	6.93	2.90	14.11	12.85	12.14	6.5
Dec-07	3,065,594	2,557,221	6.18	6.81	2.82	14.26	13.89	12.35	7.05
Jan-08	3,127,751	2,663,167	5.90	6.75	2.83	14.17	13.58	13.21	7.66
Feb-08	3,144,635	2,651,321	6.21	6.94	2.88	14.33	13.50	12.91	7.18
Mar-08	2,302,510	1,921,866	5.08	5.64	2.35	13.59	12.71	10.95	6.35
Apr-08	3,125,168	3,117,639	6.00	7.07	2.89	14.74	13.50	13.03	6.59
May-08	3,025,545	3,249,518	6.08	7.18	2.86	14.88	14.44	13.06	7.72
Jun-08	3,375,158	5,127,557	6.09	7.24	2.65	14.36	13.29	12.74	7.79
Jul-08	3,314,976	5,185,099	6.22	7.33	2.82	14.72	13.70	13.38	8.07
Aug-08	2,952,955	5,568,579	5.89	7.47	2.63	15.06	12.60	12.80	6.92
Sep-08	3,363,591	8,265,465	6.56	7.72	2.92	15.14	14.43	13.40	6.7
Oct-08	3,397,140	3,319,123	6.42	7.82	2.88	15.39	14.19	13.37	6.81
Nov-08	3,511,554	3,070,164	6.72	8.19	2.86	15.38	14.20	13.24	6.83
Dec-08	3,573,021	3,059,845	6.73	8.18	3.23	15.31	14.38	13.46	6.67
Jan-09	3,580,054	3,041,376	6.70	8.27	3.13	15.36	14.26	13.85	5.95
Feb-09	3,619,483	3,250,442	6.62	8.07	3.09	14.85	14.35	13.70	5.49
Mar-09	3,636,984	3,103,223	6.45	8.26	3.07	15.10	14.67	14.42	5.57
Apr-09	3,652,598	3,260,100	6.77	8.09	3.05	15.08	14.32	14.64	5.81
May-09	3,718,691	3,232,564	6.87	8.36	3.01	15.36	14.73	14.68	5.55
Jun-09	3,781,644	3,250,976	6.94	8.47	2.99	15.38	14.67	14.59	3.08
Jul-09	3,915,188	3,317,756	6.37	8.60	2.89	15.62	15.02	15.01	2.69
Aug-09	4,011,323	3,257,962	6.02	7.65	2.69	15.45	15.06	14.59	3.68
Sep-09	4,049,168	3,245,846	6.38	8.41	2.85	15.50	14.89	14.75	3.38
Oct-09	4,092,860	3,327,577	7.03	8.37	3.11	15.66	14.73	14.72	2.57



Nov-09	4,226,013	3,342,024	6.84	8.62	3.05	15.91	14.57	14.39	3.11
Dec-09	4,368,579	3,471,608	7.26	6.11	3.10	15.66	14.50	14.45	2.95
Jan-10	4,543,938	3,470,658	7.17	8.36	3.05	15.65	14.72	14.21	3.69
Feb-10	4,590,888	3,515,875	6.98	8.60	3.08	16.34	14.50	14.79	2.39
Mar-10	4,725,222	3,587,803	7.02	8.71	3.04	15.39	14.84	14.34	2.21
Apr-10	4,795,886	3,655,445	6.97	8.42	3.01	16.62	15.11	14.75	2.46
May-10	4,882,220	3,730,120	6.39	7.79	2.87	16.39	15.31	15.22	2.16
Jun-10	5,042,345	3,817,931	6.25	7.37	2.86	17.05	15.25	14.81	1.15
Jul-10	5,135,683	3,855,391	6.38	7.18	2.94	17.68	14.78	14.00	1.35
Aug-10	5,243,951	3,887,718	6.29	7.08	2.88	16.83	14.17	14.76	1.66
Sep-10	5,329,775	3,910,141	6.07	6.78	2.86	16.88	15.65	13.81	1.18
Oct-10	5,565,658	3,981,443	5.95	6.98	2.86	16.16	14.87	14.22	0.98
Nov-10	5,615,355	4,073,552	5.97	6.92	2.97	16.13	14.09	13.15	1.01
Dec-10	6,472,671	4,583,855	6.89	7.67	3.31	15.04	14.64	14.06	1.18
Jan-11	6,520,935	4,610,384	6.68	7.21	3.39	15.14	15.61	14.27	1.24
Feb-11	6,619,840	4,673,415	7.22	7.56	3.68	17.15	15.21	14.14	1.13
Mar-11	6,865,154	4,775,361	6.60	7.04	3.22	15.90	15.03	13.73	1.24
Apr-11	6,333,022	4,431,677	6.06	6.87	2.83	15.04	14.35	12.95	3.97
May-11	6,449,772	4,491,358	5.97	6.67	2.69	14.82	14.06	13.07	5.54
Jun-11	6,567,581	4,567,215	5.96	6.72	2.77	14.86	14.23	13.03	6.36
Jul-11	6,536,847	4,671,420	6.12	6.98	3.05	15.88	14.53	13.28	8.61
Aug-11	6,616,002	4,803,120	6.03	7.15	2.81	15.85	14.59	13.31	14.29
Sep-11	6,794,864	5,030,358	6.13	7.62	2.96	15.81	14.72	13.35	7.46
Oct-11	6,839,941	5,137,445	6.63	7.97	2.90	16.32	14.74	12.46	14.95
Nov-11	6,842,381	5,187,920	9.22	9.68	3.74	17.63	17.44	15.99	28.9
Dec-11	7,074,119	5,334,086	10.89	11.19	3.86	19.73	18.41	16.69	21.75
Jan-12	7,122,504	5,246,008	11.44	12.15	4.09	19.11	18.57	17.79	19.27
Feb-12	7,197,280	5,029,896	12.55	12.99	4.27	19.56	19.44	17.37	18.15
Mar-12	6,781,784	4,804,553	12.39	12.97	3.70	18.77	18.99	16.21	24.02
Apr-12	7,344,409	5,348,785	12.45	13.04	4.02	19.60	19.61	17.76	16.15

May-12	7,553,646	5,308,189	12.19	13.07	4.06	20.28	19.94	18.03	17.16
Jun-12	7,759,405	5,427,773	12.19	13.06	3.74	19.05	20.21	18.92	17.09
Jul-12	7,838,721	5,428,374	11.64	12.10	3.75	19.54	20.57	18.98	13.71
Aug-12	7,924,803	5,477,306	11.38	12.15	3.75	19.70	20.74	18.11	8.97
Sep-12	8,130,899	5,536,354	10.96	12.18	3.66	19.15	19.77	18.34	7.02
Oct-12	8,181,797	5,521,085	10.24	11.79	3.38	18.10	19.25	17.25	9.14
Nov-12	8,334,986	5,609,953	9.72	11.60	3.17	19.01	18.25	16.47	7.14
Dec-12	8,289,300	5,721,339	9.16	10.67	3.35	18.61	18.09	16.51	5.84
Jan-13	8,340,327	5,702,814	8.96	9.84	3.38	18.00	18.61	16.45	5.86
Feb-13	8,444,131	5,793,607	8.65	9.72	3.30	18.31	17.20	16.85	9.25
Mar-13	8,463,653	5,771,488	8.63	10.59	3.37	18.08	17.65	16.71	8.93
Apr-13	8,507,481	5,918,393	8.05	8.99	3.19	18.75	18.67	17.42	7.9
May-13	8,657,775	5,914,255	8.64	9.48	3.11	18.32	17.84	17.05	7.16
Jun-13	8,725,783	6,128,597	8.45	9.48	3.25	17.88	17.90	16.90	7.14
Jul-13	8,891,829	6,321,091	7.96	8.84	3.05	18.22	18.20	17.29	7.93
Aug-13	8,927,820	6,415,117	7.68	8.62	2.99	17.78	17.83	17.18	8.88
Sep-13	8,903,896	6,612,925	7.57	8.34	3.00	17.28	17.66	16.65	7.52
Oct-13	8,834,612	6,700,006	7.76	8.52	3.05	17.64	17.58	16.93	10.66
Nov-13	11,043,328	8,919,767	8.26	8.87	3.04	17.46	17.84	16.22	10.77
Dec-13	8,257,077	5,894,434	6.65	7.20	3.00	16.37	16.90	16.13	8.98
Jan-14	9,141,930	6,896,600	8.00	8.40	3.06	17.14	17.29	16.05	10.43
Feb-14	9,323,005	6,852,050	8.13	8.43	3.05	17.36	16.92	15.80	8.83
Mar-14	9,408,392	6,898,801	7.88	8.55	3.13	17.99	16.93	15.28	6.47
Apr-14	9,500,090	6,958,100	7.90	8.41	3.03	17.34	17.15	15.38	7.4

Source: Central Bank of Kenya Database, (2002-2014).

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## Appendix II:

### Medium Banks

	Deposit volumes	Loan volumes	Deposit rates			Lending rates			Interbank rate
			0-3months	Over 3 months	Savings	overdraft	1-5 years	Over 5 years	
Dec-02	4,407,643	3,056,027	5.36	5.98	3.44	14.05	14.82	13.39	8.69
Jan-03	4,432,695	3,110,908	5.38	5.80	3.54	14.01	14.75	16.15	9.04
Feb-03	4,498,435	3,048,850	5.35	5.75	3.40	13.88	14.26	16.21	7.06
Mar-03	4,623,290	3,222,659	4.86	5.44	3.53	12.26	13.82	16.28	6.22
Apr-03	4,570,780	3,388,783	4.43	5.00	3.01	12.68	13.64	16.04	5.88
May-03	4,639,830	3,546,123	4.09	4.87	2.98	11.80	13.06	14.89	5.67
Jun-03	3,955,566	2,678,703	3.44	4.59	3.64	12.74	12.94	14.78	1.62
Jul-03	4,355,242	2,837,459	2.90	4.00	2.10	12.22	12.24	14.07	0.45
Aug-03	4,549,334	2,574,707	2.42	3.51	2.13	12.49	11.04	14.04	0.43
Sep-03	4,603,390	2,657,700	2.08	2.96	1.97	12.00	13.24	13.96	0.54
Oct-03	4,996,512	2,791,404	1.89	2.67	1.26	11.93	14.13	14.10	0.69
Nov-03	5,197,617	2,837,300	1.88	2.52	1.26	12.33	12.86	14.00	0.73
Dec-03	5,021,047	3,084,600	1.76	2.59	1.24	12.46	11.24	13.48	0.81
Jan-04	5,292,741	4,871,437	1.72	2.54	1.25	12.16	10.81	13.19	0.82
Feb-04	6,544,747	4,606,032	2.36	3.17	2.22	11.83	11.92	11.78	0.9
Mar-04	6,566,392	4,792,278	2.47	3.02	2.19	12.02	10.75	11.94	1.27
Apr-04	6,675,819	4,635,397	2.47	3.03	2.14	11.91	11.07	11.59	1.72
May-04	6,993,845	5,162,360	2.36	4.05	2.14	11.43	11.63	11.67	2.05
Jun-04	7,059,017	5,421,909	2.74	2.99	2.13	12.69	12.09	11.71	1.29
Jul-04	6,903,163	4,951,857	2.86	2.97	2.09	11.98	11.63	11.16	1.52
Aug-04	7,603,968	5,575,197	2.84	4.12	1.97	12.21	11.69	12.13	2.1
Sep-04	7,702,227	6,052,848	3.03	3.26	1.98	11.40	11.87	12.32	2.95
Oct-04	7,478,135	6,160,126	3.23	3.35	2.07	12.14	11.50	12.29	3.56
Nov-04	7,494,308	6,252,182	3.49	3.57	2.05	12.29	11.42	11.56	4.66

Dec-04	7,474,726	6,052,240	4.65	3.91	2.30	12.96	12.33	10.88	9.41
Jan-05	7,637,048	6,095,153	5.74	4.68	2.66	13.63	13.91	10.25	8.72
Feb-05	7,743,869	6,315,948	6.04	5.27	2.65	13.81	14.03	10.41	8.14
Mar-05	8,356,806	6,544,193	6.13	5.08	2.81	14.59	14.03	11.04	8.13
Apr-05	8,226,571	6,534,063	6.25	5.42	2.92	14.58	14.24	11.52	8.28
May-05	8,435,006	6,630,842	6.45	6.17	2.92	15.56	14.29	11.92	8.3
Jun-05	8,492,138	6,556,167	6.52	6.54	2.73	15.28	14.54	11.98	7.37
Jul-05	9,118,771	7,186,286	6.63	6.90	2.75	14.82	14.58	12.32	7.51
Aug-05	9,401,151	7,269,144	6.63	6.87	2.66	14.66	14.72	11.75	7.77
Sep-05	9,562,190	7,349,951	6.73	7.14	2.63	14.41	14.67	12.38	8.03
Oct-05	9,582,406	7,514,640	6.81	7.18	2.59	14.43	14.59	12.32	7.98
Nov-05	9,758,329	7,722,517	6.70	7.36	2.66	13.90	13.56	11.55	7.64
Dec-05	9,795,333	7,694,400	6.74	7.32	2.86	14.50	14.25	11.82	7.79
Jan-06	9,912,518	7,867,255	6.78	7.40	2.21	14.02	14.29	10.49	7.78
Feb-06	9,814,069	8,107,790	6.74	7.34	2.45	14.48	14.12	11.30	7.73
Mar-06	9,801,861	7,956,922	7.03	7.44	2.34	14.93	13.72	11.77	7.52
Apr-06	9,901,334	8,414,184	6.87	7.34	2.28	15.47	14.04	13.46	6.97
May-06	10,891,566	8,686,894	6.42	7.04	2.40	15.47	15.32	13.51	8.11
Jun-06	10,872,625	8,526,299	6.92	7.16	2.13	15.25	14.01	13.55	6.41
Jul-06	11,867,557	9,048,605	6.29	6.88	2.23	14.67	15.22	13.91	5.74
Aug-06	11,805,916	9,461,089	5.96	6.63	2.27	14.90	15.06	13.91	5.66
Sep-06	11,857,039	9,921,404	5.81	6.59	2.28	15.13	15.06	13.21	6.02
Oct-06	12,092,529	9,751,202	5.92	6.70	2.29	15.30	15.04	13.07	6.08
Nov-06	12,506,841	9,777,238	5.77	6.67	2.27	15.90	15.14	12.92	6.18
Dec-06	12,614,960	9,838,075	5.70	6.77	2.28	15.84	14.92	13.03	6.34
Jan-07	12,632,017	10,123,461	5.88	6.71	2.43	15.71	14.81	11.87	6.43
Feb-07	12,314,482	9,914,826	5.87	6.25	2.54	15.63	14.67	12.30	6.52
Mar-07	12,222,701	10,188,930	5.83	7.18	2.27	15.28	14.74	11.72	6.55
Apr-07	12,047,393	10,190,041	5.36	6.59	2.13	14.44	14.41	11.76	6.81
May-07	13,237,763	8,090,850	6.01	7.14	2.47	14.46	14.19	11.70	7.11

Jun-07	13,306,588	8,735,134	5.92	7.07	2.38	14.50	14.27	11.77	6.98
Jul-07	13,846,159	8,637,802	6.04	7.02	2.97	13.97	14.33	11.87	7.07
Aug-07	14,214,914	8,543,750	6.23	6.89	2.73	14.02	14.26	11.64	7.38
Sep-07	14,171,454	8,862,490	5.77	6.83	2.77	14.74	14.23	11.26	7.59
Oct-07	14,283,713	8,955,440	5.81	6.77	2.69	13.88	14.42	11.84	7.65
Nov-07	13,990,294	9,423,393	5.83	6.88	2.68	14.77	14.31	11.96	6.5
Dec-07	14,879,100	6,440,486	5.29	6.02	1.92	13.86	13.72	12.64	7.05
Jan-08	14,992,024	10,249,479	5.52	6.08	1.92	14.01	14.32	12.46	7.66
Feb-08	15,275,223	10,385,549	5.93	6.86	2.45	13.95	14.30	13.48	7.18
Mar-08	13,755,865	9,333,626	5.57	6.54	2.54	13.15	13.62	13.20	6.35
Apr-08	19,313,885	12,109,185	6.06	7.04	2.69	14.21	13.72	13.90	6.59
May-08	22,753,582	12,217,609	6.12	7.16	2.69	13.99	13.70	13.01	7.72
Jun-08	15,889,904	11,420,947	6.36	7.46	2.66	13.00	14.31	13.76	7.79
Jul-08	16,663,527	11,654,168	6.37	7.68	2.66	13.37	14.26	12.92	8.07
Aug-08	16,716,612	11,625,802	6.57	7.56	2.66	13.37	14.29	13.01	6.92
Sep-08	17,790,106	10,962,625	6.37	7.49	2.72	14.08	13.45	13.20	6.7
Oct-08	18,342,900	12,396,500	6.29	7.52	2.76	13.43	14.63	13.45	6.81
Nov-08	17,826,244	12,729,546	7.16	7.95	2.49	12.99	14.76	13.70	6.83
Dec-08	18,789,227	12,930,093	7.32	8.01	2.52	13.57	15.22	12.74	6.67
Jan-09	18,920,760	13,290,159	7.16	8.01	2.47	13.51	14.53	13.23	5.95
Feb-09	18,907,817	12,748,889	7.06	8.06	2.52	13.48	14.38	13.92	5.49
Mar-09	19,266,033	12,890,852	7.08	7.78	2.41	13.41	14.60	14.13	5.57
Apr-09	19,030,844	13,458,485	7.06	7.76	2.39	13.43	14.81	14.12	5.81
May-09	19,514,497	13,407,289	7.03	7.75	2.44	13.56	14.87	14.34	5.55
Jun-09	20,530,479	13,345,282	6.91	7.79	2.38	13.49	14.37	14.29	3.08
Jul-09	20,104,137	13,580,847	6.76	7.61	2.43	13.40	14.43	13.07	2.69
Aug-09	20,648,868	13,818,919	6.65	7.85	2.57	13.47	14.30	13.10	3.68
Sep-09	20,248,185	13,977,016	6.60	7.60	2.59	13.47	14.03	12.94	3.38
Oct-09	20,527,384	14,343,835	6.53	7.92	2.59	13.87	14.35	13.33	2.57
Nov-09	22,259,720	14,772,440	6.86	8.02	3.03	14.43	14.29	13.17	3.11

Dec-09	21,392,848	14,753,245	6.80	8.03	2.95	14.47	14.20	13.05	2.95
Jan-10	22,333,242	14,857,391	6.64	7.59	3.01	14.44	14.15	12.89	3.69
Feb-10	23,101,191	14,966,502	6.56	7.84	2.55	14.50	14.44	13.21	2.39
Mar-10	23,899,705	15,587,587	5.95	7.12	1.80	14.43	14.55	13.14	2.21
Apr-10	24,272,535	15,793,107	6.36	7.23	2.61	14.71	14.71	12.94	2.46
May-10	25,082,516	16,025,434	6.66	7.32	2.80	14.63	14.79	12.82	2.16
Jun-10	25,611,325	16,050,603	6.10	6.93	2.50	13.86	14.54	12.52	1.15
Jul-10	26,139,523	16,588,390	5.32	6.50	2.66	13.73	14.47	12.54	1.35
Aug-10	27,207,117	16,393,489	5.04	6.26	2.62	13.73	14.15	12.56	1.66
Sep-10	27,173,510	16,659,165	4.40	5.65	2.51	13.60	14.30	12.54	1.18
Oct-10	26,504,812	17,335,093	4.59	5.77	2.07	13.27	14.13	12.42	0.98
Nov-10	26,196,299	17,512,726	4.79	5.80	1.99	13.50	14.17	12.51	1.01
Dec-10	28,028,878	18,516,427	5.38	6.44	1.88	12.86	13.99	11.65	1.18
Jan-11	29,569,217	19,086,669	5.37	6.32	1.82	13.42	13.99	10.91	1.24
Feb-11	30,221,336	20,242,879	6.07	6.47	1.80	12.91	14.16	12.06	1.13
Mar-11	29,535,382	20,282,117	5.31	5.87	1.81	13.76	14.52	12.81	1.24
Apr-11	28,268,534	19,098,292	5.08	5.38	1.96	12.90	14.21	12.36	3.97
May-11	28,474,479	19,441,896	5.27	5.50	1.85	13.09	14.28	12.36	5.54
Jun-11	29,027,783	20,448,702	5.52	5.78	1.93	12.89	14.08	12.94	6.36
Jul-11	29,410,325	21,589,078	6.43	6.01	1.96	13.71	14.90	12.52	8.61
Aug-11	29,589,363	21,413,858	6.93	6.44	2.15	14.55	15.01	12.93	14.29
Sep-11	29,582,629	22,903,126	7.41	7.06	2.38	14.80	15.07	13.31	7.46
Oct-11	30,586,071	23,135,080	9.63	7.85	2.28	14.85	16.47	15.44	14.95
Nov-11	30,807,299	23,168,882	11.27	9.79	2.40	19.88	19.77	18.53	28.9
Dec-11	31,320,928	23,982,372	13.61	11.60	2.17	20.18	20.55	19.61	21.75
Jan-12	31,202,964	24,124,793	14.32	12.23	2.16	20.22	20.91	19.28	19.27
Feb-12	31,431,041	23,989,117	14.57	12.69	2.12	21.27	21.12	20.09	18.15
Mar-12	32,388,674	24,080,171	16.68	14.58	1.96	21.89	21.64	21.09	24.02
Apr-12	32,922,710	23,962,193	16.51	14.83	3.44	21.11	20.73	19.58	16.15
May-12	33,944,447	23,529,520	15.62	14.84	2.12	20.89	20.34	19.25	17.16

Jun-12	35,304,129	24,240,498	15.23	14.66	1.95	21.61	20.29	19.48	17.09
Jul-12	36,425,606	24,480,410	14.11	14.41	1.95	21.02	19.99	18.60	13.71
Aug-12	36,861,635	24,364,876	13.01	13.79	1.92	21.67	19.66	18.41	8.97
Sep-12	37,773,888	24,250,293	11.83	13.87	2.02	21.48	19.51	18.11	7.02
Oct-12	38,626,451	25,144,078	11.25	12.88	2.24	20.60	18.58	17.81	9.14
Nov-12	39,107,271	25,457,293	10.82	12.59	2.24	20.41	18.21	16.98	7.14
Dec-12	39,021,080	25,475,180	10.26	12.03	1.68	17.77	17.56	15.63	5.84
Jan-13	38,926,492	25,956,435	9.93	11.66	1.91	18.17	17.25	15.05	5.86
Feb-13	38,747,078	26,552,265	9.66	11.26	1.87	16.65	15.99	13.74	9.25
Mar-13	37,887,931	26,955,332	9.47	11.06	1.92	17.60	16.54	14.49	8.93
Apr-13	41,148,283	27,268,210	9.89	10.99	1.92	17.63	16.72	13.94	7.9
May-13	40,272,321	27,820,571	9.93	11.08	2.11	17.62	16.80	14.21	7.16
Jun-13	41,118,661	28,901,667	9.66	11.00	1.89	17.25	16.69	14.20	7.14
Jul-13	41,401,364	29,869,753	8.99	10.30	2.18	17.87	16.17	13.54	7.93
Aug-13	41,926,065	30,466,272	9.79	10.94	2.46	17.56	16.19	13.57	8.88
Sep-13	41,905,794	30,832,131	9.26	9.96	2.37	16.95	16.18	14.23	7.52
Oct-13	42,142,093	31,889,238	9.14	10.08	2.28	17.74	16.82	14.42	10.66
Nov-13	41,245,433	31,856,235	8.78	10.14	2.12	16.46	16.56	13.74	10.77
Dec-13	40,808,172	31,366,133	9.32	9.34	1.74	17.64	16.39	14.51	8.98
Jan-14	44,439,846	32,457,703	9.46	9.87	1.92	17.99	16.58	15.00	10.43
Feb-14	50,414,928	34,322,580	9.44	9.82	1.96	18.37	16.33	14.98	8.83
Mar-14	51,584,506	35,495,891	9.51	9.82	1.90	17.85	15.97	14.80	6.47
Apr-14	52,681,188	33,960,692	9.42	9.75	2.07	18.53	16.00	14.68	7.4

Source: Central Bank of Kenya Database, (2002-2014).

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### Appendix III:

#### Large Banks

	Deposit volumes	Loan volumes	Deposit Rates			Lending rates			Interbank rate
			0-3months	Over 3 months	Savings	overdraft	1-5 years	Over 5 years	
Dec-02	39181610	28700150	5.45	4.94	3.22	15.648	14.784	16.4	8.69
Jan-03	39413062	28783540	5.65	5.20	3.18	15.61	15.37	17.02	9.04
Feb-03	39896281	28657553	5.01	4.62	3.17	15.74	15.71	17.20	7.06
Mar-03	40576879	28805106	3.92	3.16	2.54	13.00	14.01	15.09	6.22
Apr-03	39939606	28768604	4.69	4.38	3.22	15.14	15.35	16.95	5.88
May-03	40914450	28513575	4.22	3.73	3.10	15.22	14.90	16.82	5.67
Jun-03	33983815	22580844	3.85	4.10	3.22	15.83	13.78	15.45	1.62
Jul-03	35603723	22695976	3.16	3.80	1.81	14.83	12.74	15.30	0.45
Aug-03	30126965	22653237	2.37	2.62	1.77	14.68	12.95	15.12	0.43
Sep-03	34002810	22895365	2.01	2.74	1.44	14.18	12.79	15.04	0.54
Oct-03	34903743	22739279	1.89	2.62	1.43	13.81	12.75	14.88	0.69
Nov-03	35268236	23346582	2.54	2.70	1.46	14.58	12.84	14.45	0.73
Dec-03	36116920	23749192	2.52	3.19	1.49	14.41	12.60	14.50	0.81
Jan-04	36517030	22377579	2.19	2.83	1.38	13.62	12.37	14.17	0.82
Feb-04	27335567	17515839	1.46	1.58	1.05	16.12	11.21	11.86	0.90
Mar-04	27886750	17428948	0.80	1.14	1.06	16.89	15.17	13.40	1.27
Apr-04	27886750	17428948	0.80	1.14	1.06	16.89	15.17	13.39	1.72
May-04	29265850	17966494	1.00	0.88	0.84	15.55	14.34	11.89	2.05
Jun-04	28879027	18446388	1.01	0.85	0.68	13.29	14.72	11.84	1.29
Jul-04	28822170	18401788	0.89	0.86	0.97	13.54	14.74	11.33	1.52
Aug-04	29317090	19107808	0.87	1.50	0.96	14.52	14.75	12.25	2.10
Sep-04	29121612	20167261	1.03	0.84	0.94	13.52	13.56	12.58	2.95
Oct-04	29090949	21090837	0.94	0.91	0.94	14.65	14.75	12.86	3.56
Nov-04	17296818	21434857	2.06	1.57	0.85	14.00	13.88	12.80	4.66



Dec-04	28406043	22670839	1.63	1.02	0.76	16.56	16.51	14.69	9.41
Jan-05	28412929	23406684	1.76	1.16	0.68	17.77	15.51	15.01	8.72
Feb-05	28605452	23216504	2.15	4.64	0.64	15.21	14.95	14.35	8.14
Mar-05	28872877	23334622	3.16	2.37	0.70	16.65	15.76	13.88	8.13
Apr-05	28889308	23337187	3.41	2.04	0.65	16.54	15.22	15.10	8.28
May-05	29367248	22387649	3.51	4.40	0.67	16.91	15.55	15.82	8.30
Jun-05	27315720	22221460	3.62	2.73	0.57	16.30	15.69	17.72	7.37
Jul-05	26764318	23676390	2.72	4.27	0.59	14.88	15.51	16.90	7.51
Aug-05	27382376	23747813	3.40	4.64	0.62	15.47	15.02	16.28	7.77
Sep-05	27817990	24339388	3.55	4.90	0.60	15.28	14.68	14.79	8.03
Oct-05	28423933	24374635	3.38	5.24	0.60	16.69	15.70	15.65	7.98
Nov-05	28104270	24416388	4.11	4.80	0.76	16.75	16.08	16.14	7.64
Dec-05	28456776	24363255	3.56	4.85	0.74	16.01	16.41	15.84	7.79
Jan-06	27871616	24880535	3.56	5.20	1.26	17.28	16.44	15.18	7.78
Feb-06	28869040	24828300	4.05	5.13	1.39	17.00	15.95	15.89	7.73
Mar-06	29938272	25506116	4.15	4.41	1.16	16.10	16.62	15.42	7.52
Apr-06	29229972	25820986	3.87	3.35	1.18	16.60	16.87	15.88	6.97
May-06	30070256	25767641	3.96	4.74	1.37	16.75	17.07	15.92	8.11
Jun-06	31019951	25715051	4.01	4.25	1.35	17.56	16.62	15.79	6.41
Jul-06	31611839	25062915	3.86	4.69	1.35	16.93	16.64	15.90	5.74
Aug-06	31803074	25159851	3.69	4.24	1.27	16.19	16.33	15.22	5.66
Sep-06	31788798	25885553	3.98	4.11	1.30	16.48	16.41	14.52	6.02
Oct-06	31922828	25939724	3.81	4.20	1.16	16.53	16.43	14.76	6.08
Nov-06	31630338	26633500	3.95	4.14	1.31	16.58	16.64	14.57	6.18
Dec-06	30469007	26311710	4.06	4.33	1.27	16.85	16.38	16.55	6.34
Jan-07	31143089	27339039	4.11	4.33	1.34	16.63	20.94	15.03	6.43
Feb-07	31414832	27686827	4.27	4.37	1.33	17.26	17.65	15.89	6.52
Mar-07	32879763	28159225	4.34	3.50	1.39	17.11	16.31	15.78	6.55
Apr-07	32706624	28220761	4.10	3.63	1.33	17.42	16.08	15.23	6.81
May-07	33249672	27736074	3.99	3.98	1.35	17.49	15.75	15.45	7.11

Jun-07	33966248	29555519	4.09	2.86	1.79	17.63	15.81	15.60	6.98
Jul-07	33592560	29879276	4.08	3.02	1.81	17.52	13.91	14.33	7.07
Aug-07	33531426	30756133	4.06	2.84	1.76	16.42	14.83	14.74	7.38
Sep-07	33735373	30016391	4.08	4.16	2.64	16.75	13.94	15.46	7.59
Oct-07	34462711	29111782	3.85	2.84	1.81	17.10	13.86	13.75	7.65
Nov-07	33892780	29012662	3.89	4.10	2.72	16.76	16.32	15.13	6.50
Dec-07	33449251	29238465	3.60	4.26	2.70	17.02	13.60	14.68	7.05
Jan-08	36337771	29674084	4.18	4.71	2.68	16.75	14.34	16.02	7.66
Feb-08	37759782	29669820	4.38	4.38	2.68	18.99	14.65	16.46	7.18
Mar-08	37526774	30628609	4.28	4.89	2.69	19.13	16.13	16.28	6.35
Apr-08	39167522	29331720	4.16	5.00	2.69	18.41	13.38	14.64	6.59
May-08	38504681	30376142	4.64	4.40	2.69	18.00	15.93	16.02	7.72
Jun-08	82611766	51860641	3.45	3.54	3.19	16.60	16.93	16.07	7.79
Jul-08	71400243	52904861	3.45	3.54	3.19	16.58	16.86	16.45	8.07
Aug-08	71086398	53519151	3.45	3.54	3.19	16.63	16.93	15.65	6.92
Sep-08	85064259	55397552	3.44	3.53	3.19	16.58	16.92	16.03	6.70
Oct-08	75203265	57682201	3.46	3.55	3.21	15.21	17.10	15.75	6.81
Nov-08	73985034	57930129	3.75	3.84	2.10	15.25	17.10	15.81	6.83
Dec-08	74782003	59004095	3.87	3.85	2.09	15.24	17.30	17.15	6.67
Jan-09	72950948	60890683	4.15	4.10	2.44	15.27	17.33	17.12	5.95
Feb-09	74331881	62134904	4.48	4.43	2.53	14.71	17.75	17.43	5.49
Mar-09	78207078	64393832	4.34	4.31	2.38	15.17	18.15	17.82	5.57
Apr-09	78895543	62647107	4.54	4.50	2.45	14.69	17.71	17.35	5.81
May-09	79143905	63465336	5.04	4.91	1.88	15.44	17.71	17.31	5.55
Jun-09	77075447	63880736	4.89	4.96	1.85	15.40	17.38	17.49	3.08
Jul-09	81525153	65144736	5.15	5.24	1.82	15.21	17.56	16.80	2.69
Aug-09	84928400	66167636	5.14	5.20	1.81	15.22	17.69	16.92	3.68
Sep-09	86432382	67818378	5.45	5.22	1.76	15.22	17.68	16.92	3.38
Oct-09	87281159	68609934	5.45	5.21	1.77	15.29	17.64	16.91	2.57
Nov-09	88478104	67098393	5.50	5.26	1.76	15.29	17.60	16.88	3.11

Dec-09	93721962	69329089	5.33	5.33	1.77	15.03	17.61	16.86	2.95
Jan-10	98470319	74426230	5.17	5.17	1.85	15.02	17.61	16.83	3.69
Feb-10	101985739	74816957	5.08	5.07	1.81	15.04	17.65	16.81	2.39
Mar-10	105159979	77411976	5.13	5.12	1.79	15.04	17.65	16.80	2.21
Apr-10	104783157	77742549	2.67	4.31	2.60	16.65	17.04	15.91	2.46
May-10	110103720	80716486	4.97	4.96	1.78	16.61	16.98	15.84	2.16
Jun-10	111074534	78346423	4.95	4.95	1.78	16.64	17.03	15.90	1.15
Jul-10	110283014	81230654	2.13	3.08	1.60	16.28	16.15	15.85	1.35
Aug-10	98860648	84029992	2.01	3.07	1.47	16.28	16.15	15.85	1.66
Sep-10	100889972	86195750	1.91	2.82	1.46	16.28	16.15	15.85	1.18
Oct-10	100715601	86754258	1.85	2.69	1.47	16.18	16.15	15.83	0.98
Nov-10	100040564	87519144	1.75	2.63	1.34	16.28	16.15	15.85	1.01
Dec-10	98913094	89077111	1.28	2.43	1.34	16.28	16.13	15.86	1.18
Jan-11	102031551	89247495	1.38	2.42	1.04	16.28	16.13	15.86	1.24
Feb-11	115975832	80738285	1.62	2.34	1.34	16.28	16.13	15.86	1.13
Mar-11	118520065	93377006	1.69	2.32	1.33	16.28	16.13	15.87	1.24
Apr-11	113566238	95790670	1.69	2.32	1.33	16.24	16.17	15.86	3.97
May-11	117526776	98743814	1.76	2.26	1.32	16.20	15.57	15.88	5.54
Jun-11	118411200	100245933	1.31	2.33	1.14	16.21	15.70	15.85	6.36
Jul-11	117898682	102055839	1.75	2.48	1.13	16.31	15.77	15.91	8.61
Aug-11	121202054	104241605	2.83	2.95	1.14	16.34	15.77	15.90	14.29
Sep-11	128229500	106357330	2.80	2.22	1.03	16.38	16.27	15.86	7.46
Oct-11	126178840	109836496	2.83	3.07	1.07	17.03	16.77	15.52	14.95
Nov-11	126758872	109785444	4.62	1.60	1.05	16.99	16.77	15.61	28.90
Dec-11	126345032	111077690	4.79	3.82	1.62	18.42	18.92	17.13	21.75
Jan-12	123580732	99024259	4.17	4.12	1.78	20.06	18.33	17.36	19.27
Feb-12	126516564	113041018	4.62	4.47	1.74	19.75	18.93	17.16	18.15
Mar-12	128587548	101133504	3.67	4.60	1.74	20.27	19.15	17.82	24.02
Apr-12	129947956	112030621	3.89	4.60	1.74	19.73	18.84	17.68	16.15
May-12	132112750	112932546	4.59	4.64	1.67	20.17	18.57	18.24	17.16

Jun-12	135779869	113598537	3.52	1.82	1.25	18.10	19.58	18.78	17.09
Jul-12	132141175	114179562	3.54	4.52	1.51	20.15	19.22	18.19	13.71
Aug-12	136174542	114861218	4.78	4.59	1.53	20.37	19.63	18.23	8.97
Sep-12	141998385	116257408	4.56	4.38	1.36	20.31	18.87	17.54	7.02
Oct-12	141138293	117519905	4.53	4.23	1.33	20.18	18.82	17.59	9.14
Nov-12	143352469	117749764	4.33	4.02	1.33	19.61	18.84	17.61	7.14
Dec-12	140364482	118660476	4.19	3.94	1.33	19.61	18.80	17.63	5.84
Jan-13	140812148	118476078	4.13	3.80	1.35	19.59	18.92	18.05	5.86
Feb-13	141101862	119433937	3.72	3.70	1.24	19.57	18.80	17.68	9.25
Mar-13	139196841	118340676	4.42	4.81	1.18	19.52	18.67	16.51	8.93
Apr-13	143763753	119249341	4.49	4.74	1.19	19.51	18.66	17.16	7.90
May-13	146092215	118957789	3.57	4.54	1.02	19.50	18.68	16.70	7.16
Jun-13	145474322	119373375	5.17	6.26	1.73	22.39	19.08	16.97	7.14
Jul-13	141935560	120948396	5.19	6.37	1.55	22.48	20.71	17.50	7.93
Aug-13	142899535	122554854	5.33	6.19	1.46	21.17	18.33	17.83	8.88
Sep-13	149814101	124423957	5.39	6.17	1.46	22.60	18.35	18.27	7.52
Oct-13	150291626	127069640	5.41	6.02	1.42	22.83	18.32	18.36	10.66
Nov-13	149413719	129070920	6.01	6.11	1.58	22.58	18.13	18.29	10.77
Dec-13	154285916	129252579	5.97	6.00	1.39	22.53	18.12	18.21	8.98
Jan-14	154263940	130787739	5.97	6.02	1.39	22.44	18.21	18.26	10.43
Feb-14	159990261	131545711	6.03	5.91	1.40	22.47	17.76	18.09	8.83
Mar-14	159019820	132661923	5.76	6.08	1.40	22.16	17.56	18.13	6.47
Apr-14	164484090	134680859	5.58	6.18	1.40	22.43	17.91	17.92	7.40

Source: Central Bank of Kenya Database, (2002-2014).

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