The Impact of the Central Bank of Kenya Rate [CBR| on Commercial Banks' Benchmark Lending Interest Rates.

By

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Declaration

I, Michael Mulandi Mbotu acknowledge that this research project in its form and nature, organization, and content is a fruit of my personal effort. To the best of my knowledge and belief it contains no material previously presented for a degree in any other university, except when due reference is made in the text of the project.

Michael Mulandi Mbotu Signature.... 

Reg. No. D61/8747/2006 Date . 

This research project has been submitted with my approval as the university supervisor.

Mr. Moses Anyangu.

Signature. . . . . Date. . . . *l* . *T* . *'* . *J J* .

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Dedication

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Abbreviations

BCEAO-Central Bank for the West African Economic and Monetary Union

BIS-Bank of International Settlements

BOE-Bank of England

BoJ-Bank of Japan

CBK- Central Bank of Kenya

CBN-Central Bank of Nigeria

CBR-Central Bank Rate

CPI-Consumer Price Index

CRR- Cash Reserve Requirement

ECB-European Central Bank

GDP-Gross Domestic Product

IMF-International Monetary Fund

IPO-Initial Public Offering

KNBS-Kenya National Bureau of Statistics

MPC-Monetary Policy Committee

OMO- Open Market Operations

PBC-Peoples Bank of China

RBNZ-Reserve Bank of New Zealand

Abstract

This research project uses a geometric lag regression approach to identify the effects of the Central Bank Rate (CBR) on the Kenyan financial system. This forms the first stage of the interest rate channel of the monetary transmission mechanism, with the second stage explaining the propagation of monetary policy from the financial markets to the real economy. The results indicate that a change in the monetary policy has a significant effect on the money market rate. The change is then propagated through the money market to the commercial banks' loan rate market.

Chapter one gives a historical background of the monetary transmission mechanism, the process by which monetary policy actions influence the economy. A contribution to the literature is provided in terms of a balance between theory and the more technical aspects to the implementation and the transmission mechanism of monetary policy. Contributions to the literature are provided by the findings presented within chapters two, three, and four.

The responsiveness of the commercial banks' lending rates is assessed by regressing the lending rate (L) against a 3-month lagged CBR and a 3-month Lagged Money Supply growth rate (M2), with the commercial lending rate as the dependent variable. In addition to the 3-month lag period the same model was applied to test for CBR responsiveness assuming a 6-month period so that if the responsiveness was not captured with a 3-month lag it would be visible in the 6-month lag failure to which the monetary policy tool could be deemed ineffective within a reasonable time frame.

CHAPTER ONE

Introduction

1.1. Background to the Study

1.1.1. Conceptual Argument

An important part of monetary policy is the monetary transmission mechanism, the process by which monetary policy actions influence the economy. While the transmission mechanism involves a number of channels, including exchange rates, bank credit, and asset prices, most economists consider interest rates to be the principal avenue by which monetary policy affects economic activity. In a simple, stylized view of the interest rate channel, monetary policy first influences bank lending rates and short-term market interest rates. Changes in short-term rates are then transmitted to long-term rates. Finally, economic activity responds as businesses and consumers react to these changes in interest rates.

Developing countries may have problems establishing an effective operating monetary policy. The primary difficulty is that few developing countries have deep markets in government debt. The matter is further complicated by the difficulties in forecasting money demand and fiscal pressure to levy the inflation tax by expanding the monetary base rapidly. In general, the central banks in many developing countries have poor records in managing monetary policy. This is often because the monetary authority in a developing country is not independent of government; so good monetary policy takes a back seat to the political desires of the government or is used to pursue other non-monetary goals. For this and other reasons, developing countries that want to establish credible monetary policy may institute a currency board or adopt dollarization. Such forms of monetary institutions thus essentially tie the hands

of the government from interference and, it is hoped, that such policies will import the monetar>' policy of the anchor nation.

1.1.2. Context of the Study

It is generally believed that monetary policy actions are transmitted to the economy through their effect on market interest rates. According to this standard view, a restrictive monetary policy by the Central Bank pushes up both short-term and long-term interest rates, leading to less spending by interest-sensitive sectors of the economy such as housing, consumer durable goods, and business fixed investment. Conversely, an easier policy results in lower interest rates that stimulate economic activity. Unfortunately, this description of the monetary policy process is difficult to reconcile with the actual behavior of interest rates. Although casual observation suggests a close connection between the actions of the Central Bank and short-term interest rates, the relationship between policy and long-term interest rates appears much looser and more variable (Roley and Sellon, 1995).

The transmission mechanism of monetary policy has always been the focus of theoretical and practical research. The transmission mechanism of monetary policy is a process in which the central bank sets certain goals and uses certain tools to transmit its monetary policy to enterprises and households through financial institutions and markets with the aim of influencing their production, investment and consumption. Generally speaking, to a large degree, whether the transmission mechanism of monetary policy is smooth or not determines whether the goals of monetary policy can be achieved and hence it is of vital importance for macro financial regulation (Yue and Zhou, 2007).

In the transmission process of monetary policy, the central bank chooses a variable aim which is called the intermediate target of monetary policy. The People's Bank of China (PBC) has substituted the money supply for the volume of credit as the intermediate target since 1994 (Yue and Zhou, 2007) while in the US the Federal Reserve Bank uses the overnight interbank lending rate. In Kenya, the Central Bank of Kenya (CBK) has since 2005 adopted the Central Bank Rate (CBR) - which is basically the rate at which the CBK lends to commercial banks as a lender of last resort - as the intermediate target. Because of lags in the transmission process, monetary policy actions affect the economy with a lag. For this reason alone, good monetary policy must be forward looking, aim to influence the future state of the economy, and therefore rely on forecasts (projections).

Central-bank staff and policymakers make projections of the future development of a number of exogenous variables, such as foreign developments, import supply, export demand, fiscal policy, productivity growth, and so forth. They also construct projections of a number of endogenous variables, quantities and prices, under alternative assumptions, including alternative assumptions about the future path of instrument rates (Svensson, 2005).

The policymakers are presented with projections of the most important variables, including target variables such as inflation and output, often under alternative assumptions about exogenous variables and, in particular, the instrument rate (such as the instrument rate being constant, following market expectations, following some arbitrary reaction function, or being optimal relative to a specific objective function). Since the projections of the target variables depend insignificantly on the current

instrument-rate setting and mainly on the whole path of future instrument rates, the policymakers, explicitly or implicitly, actually choose an instrument-rate projection—an instrument rate plan—and the current instrument-rate decision can be seen as the first element of that plan. Finally, the current instrument rate is announced and implemented. In many cases, the corresponding projections for inflation and output or the output gap are also announced (Svensson, 2005).

However, a huge number of recent studies have also reported that, especially in the euro area, shifts in money-market rates, including the policy rate, are not completely passed through to retail lending rates (De Bondt, Mojon, and Valla, 2005). Naturally, since loan rates are determined by commercial banks, the extent to which shifts in money-market rates affect loan rates and thereby the behavior of firms depends on how commercial banks react to the shifts in the money-market rates. If not all of the commercial banks promptly respond to a change in the money-market rates, then a policy shift will not affect the whole economy equally (Kobayashi, 2008).

De Bondt, Mojon, and Valla (2005) argued that retail bank rates are not completely responsive to money-market rates since bank rates are tied to long-term market interest rates even in the case of short-term bank rates. On the other hand, Kleimeier and Sander (2006) emphasized the role of monetary policymaking by central banks as a determinant of the degree of pass-through. They argued that better-anticipated policy changes tend to result in a quicker response of retail interest rates.

The ultimate objective of monetary policy is price stabilization which will hopefully facilitate economic growth (Nagayasu, 2003). Changes in the stance of monetary

policy take place in the market for reserves held by depository institutions. The central bank can alter the supply of reserves either by using open market operations to buv or sell government securities or by altering the amount of reserves borrowed through the discount window. Providing fewer reserves than desired by depository institutions puts upward pressure on the price of reserves—the federal funds rate—while supplying more reserves than institutions desire puts downward pressure on the funds rate (Roley and Sellon, 1995).

In the standard view of the transmission mechanism, the relationship between policy actions and long-term rates is assumed to be straightforward. An increase in the desired level of the CBR causes current short-term rates and expected future short-term rates to rise, which pushes up interest rates across all maturities. Similarly, a decrease in the desired funds rate (CBR) causes current and expected future short-term rates to fall and leads to lower short-term and long-term rates (Roley and Sellon, 1995).

The CBR does not have a very long history as it was instated in 2005 but it is still expected to aid monetary authorities in the transmission of monetary policy. In countries with a greater history of intermediate targeting such as Japan and the US the policy instrument tool is closely followed by financial market players. The Bank of Japan (BoJ) lowered the target rate for uncollateralized overnight calls to close to zero percent in order to provide adequate liquidity to the market. Under this policy, the BoJ provided ample liquidity to the market in order to keep the short-term rate close to zero percent. This policy was abandoned on August 11, 2002 and the target level was

raised to around 0.25 percent when signs of economic recovery were thought to be in sight (Nagayasu, 2003).

On the other hand, the Federal Reserve has for a long time maintained a low interest regime policy, which from the onset appears to have at least partially contributed to the excessive lending, which culminated in a credit crunch in 2008. Strong competition among banks or between banks and other financial intermediaries erodes margins as both loan and deposit interest rates get closer to the interbank rate. To compensate for the fall in profitability, bank managers might increase loan growth at the expense of the (future) quality of their loan portfolios. Excess capacity in the banking industry is then built up. Nevertheless, that will not impact immediately on problem loans, so it might encourage further loan growth (Jimenez and Saurina, 2006).

In a more formalized framework, Heuvel, (2002) shows that the combination of risk-based capital requirements, an imperfect market for bank equity, and a maturity mismatch in banks' balance sheets gives rise to a bank capital channel of monetary-policy. In boom periods, when banks show strong balance sheets and capital buffers, they over-lend. However, as the expansion heads to its end, the surge in loan portfolios erodes much of the capital buffer; at that point, a monetary- shock may trigger a decline in bank profits, stringent capital ratios, and a tightening of lending standards and, subsequently, of loans available to firms and households (Jimenez and Saurina, 2006).

All in all. it is the instrument(s) of monetary policy that serve to signal to the market the expectations and subsequent direction of monetary authorities and consequently financial institutions act accordingly by adjusting their retail interest rates to rise or fall in line with those of the central bank. This responsiveness to shifts in the direction of monetary policy, as indicated by interest rates, is the means by which, in theory, the transmission mechanism is effected (Svensson, 2005).

1.2. Research Problem

In the early 1990s, some central banks adopted numerical inflation or nominal GDP targets as guides for monetary policy in contrast to the conventional choice of interest rate or money stock. Economists and analysts attribute this departure to the unreliability of monetary aggregates as guides for monetary policy (Ovvoye and Onafowora, 2007).

Having introduced the CBR in 2005, the CBK hopes to emulate its older peers in the more developed markets in setting up an effective market signaling instrument of monetary policy that will be generally accepted by financial market players as a result of which, financial markets will be quick to align their retail interest rates with those of the policy rate. Shifts in money-market rates, including the policy rate, are not completely passed through to retail lending rates in the Euro Zone and as such loan rates (retail rates) depend on how commercial banks react to the shifts in money market rates (policy rates); if commercial banks do not promptly respond to a change in money market rates, then a policy shift will not be widely felt in the economy (Kobayashi, 2008).

Lowe (1995) finds that while the response of short-term money market interest rates is rapid and complete, pass-through to other interest rates such as the deposit and lending rates of financial intermediaries appears to be slower in the developed markets. On the other hand, a study by Owoye & Onafowora (2007) appears to validate the use of a simple monetary policy rule, such as that of inflation targeting or monetary targeting, can be effective in emerging market economies like Nigeria if the central bank commits to the rule-prescribed growth targets and minimize the deviations from target levels. However, Mullei (2005) has reservations for monetary policies directly mimicking those of industrialized countries such as those of keeping inflation in single digits.

In view of this state of affairs, an enquiry into the responsiveness of market interest rates (lending rates) to the recently introduced CBR rate, as a key pillar of monetary policy, by the CBK follows naturally. With this phenomenon of policy rate setting being relatively new in Kenya it is safe to say that studies need to be conducted to establish if the CBR is an effective tool of monetary policy.

1.3. Research Objectives

1) To establish the relationship between the CBR and the commercial banks' lending rates.
2) To formally explore the idea that monetary policy actions via the CBR can be expected to have a strong and positive relationship to the commercial banks" lending rates.
3) The study will also examine if trends in money supply have a significant relationship to commercial banks' lending rates.

1.4. Value of the Study

This study stands to benefit a cross-section of players including monetary authorities, lenders, borrowers and investors. With regard to monetary authorities, the study will aid in determining the effectiveness of the CBR as an instrument of monetary policy as a result of which if the CBR is deemed not effective the central bank can be advised to look for alternative policy instruments such as money supply or volume of credit as intermediate targets.

Lenders and borrowers will also be better informed as to whether the CBR serves as an adequate signal to anticipated changes in economic trends as a result of which they ought to adjust their loan positions accordingly.

Investors should be able to discover to what extent changes in CBR are able to cater for anticipated changes in the interest rate regime, especially with regard to bond securities and subsequently be placed to make better investment decisions.

CHAPTER TWO

Literature Review

2.1. Introduction

This chapter will explore the various studies that have been conducted in both the developed and developing countries with regard to how the monetary policy actions of the central bank are transmitted to the financial system. It is divided into; theories behind monetary policy initiatives, objectives of monetary policy, the transmission mechanism of monetary policy, the lags in transmission of monetary policy, empirical theories on monetary' policy and conclusions from the literature review.

2.2. The Theories Behind Monetary Policy Initiatives

According to Wicksell (1898), there is a certain rate of interest on loans which is neutral in respect to commodity prices, and tends neither to raise nor to lower them. This is necessarily the same as the rate of interest which would be determined by supply and demand if no use were made of money and all lending were effected in the form of real capital goods. It comes to much the same thing to describe it as the current value of the *natural rate of interest on capital.*

2.2.1. The Fisher Effect

In his 1911 book *The Purchasing Power of Money,* Fisher gave the quantity theory, as inherited from his classical and pre-classical predecessors, its definitive modem formulation. In so doing, he accomplished two tasks. First, he expressed the theory rigorously in a form amenable to empirical measurement and verification (Humphrey, 1997). Accordingly, he came up with a mathematical interpretation of the natural rate

of interest in which he presumes nominal interest (Rn) to be a factor of the real rate (r) an inflation premium (Ip) and a risk premium (Rp).

$$Rn = r + Ip + Rp$$

$$Rn = r + Ip + (r \times Ip)$$

From this equation Fisher postulates that a rise in inflation (Ip) will lead to a proportional rise in the nominal interest rate (Rn); this is also known as the Fisher effect. However, the route by which nominal rates adjust to inflation has been largely neglected. Most treatments of this issue presume a priori that the new rate level is the result of both a borrower (demander-of-loans) effect and a lender (supplier-of-loans) effect. Borrowers anticipate an inflation rate that will enhance their profits either by producing a capital gain on assets purchased with the borrowed money or by allowing them to pay off their loans in depreciated dollars. They are, therefore, willing to pay this higher rate on their borrowings. Lenders, by the same token, know that the nominal rate they receive for accepting loans will be reduced in real terms by the inflation rate. Therefore, they will not lend unless they are likewise suitably rewarded. The result is a simultaneous and symmetrical adjustment in both loan demand and supply that bids up nominal rates (Beranek, Humphrey, and Timberlake, 1984).

The relationship between the nominal rate and the expected inflation is not always direct due to other influences such as money supply growth which has a tendency to lower the demand for money as reflected by the real rate of return (r) and subsequently lower the nominal rate (Rn).

2.2.2. The Keynesian "Liquidity Effect"

The tendency for nominal interest rates to lower due to increased money supply is known as the "liquidity effect" and can also be deduced from Fisher's equation. The liquidity effect plays a central role in Keynesian theory of the transmission of monetary policy. It is based on the notion that the demand for money is negatively related to the nominal interest rate. All factors constant, an exogenous increase in the money stock depresses nominal and real interest rates, stimulating aggregate demand. Even though theorists consent to the liquidity effect as a theoretical proposition, it is often challenged on efficacy grounds. It is argued that changes in the money stock do not leave all other things unchanged.

2.2.3. The Modern Quantity Theory of Money

Monetarists, such as Friedman (1968) assert that the liquidity effect is, at best, only temporary; the ultimate effect of more rapid money growth is higher inflation (or, more importantly, expectations of higher- inflation) and, consequently, higher nominal interest rates. The Milton Friedman's (1956) modern quantity theory of money (MQT) posits that nominal income and the price level are determined by the interaction of money supply and money demand. Given a stable demand function, changes in nominal income are determined by changes in the quantity of money. In this case, the increase in nominal interest rates occurs through the inflation channel with inflation rising in response to rising money supply. It is this school of thought evolved into a strong advocacy for monetary targeting and went on to dominate monetary policy action from the 1970s all the way to the 1980s.

Neo-classical economists argue that the real interest rate is determined by basic tastes and technology considerations, which are slow to change. If increases in the money supply primarily affect the market's expectations of inflation, nominal interest rates will rise immediately (Thornton, 1988).

On the whole, the Fisher effect and the liquidity effects appear to be the basis of the two major approaches to monetary policy. The inflationary targeting approach relies on the Fisher effect since measures taken to contain inflation expectations are assumed to enhance the stability of nominal interest rates as reflected by money market rates. On the other hand, money stock (supply) targeting relies on the liquidity effect in which expansion and contraction of money supply levels are used to alter the real rate and by extension lead to an adjustment of the nominal rate.

2.2.4. The Inflation Targeting Theory

In the 1990s, several countries shifted to a new monetary policy regime: an announced quantitative inflation target. The reason for this shift was the unsatisfactory performance under previous regimes. New Zealand, Canada, Australia, and Spain all introduced inflation targets under persistently high inflation; the United Kingdom, Sweden, and Finland did so after having abandoned fixed exchange rates, which had failed to achieve low and stable inflation and had been subject to dramatic speculative attacks. Inflation targeting has received much recent attention, both among policymakers and academicians. In the United States and in Europe it is debated as a possible monetary policy strategy for the Federal Reserve System and the ECB, respectively (Svensson, 1998).

The hallmark of inflation targeting is the announcement by the government, the central bank, or some combination of the two that in the future the central bank will strive to hold inflation at or near some numerically specified level (Bernanke and Mishkin, 1997). Inflation targeting implies "base drift" of the price level, even if the target is set at zero: if inflation overshoots its target, then the inflation target for the next period is related to the new price level. This base drift means that the price level has a unit root; it also means that the variance of the future price level increases without being bound with the horizon. Therefore, to say that (successful) inflation targeting leads to "price stability" is therefore not quite correct. Nevertheless, the terminology has stuck (Svensson, 1998).

The relative disadvantage of targeting the inflation rate is that unanticipated shocks to the price level may be treated as bygones and never off-set; as a result, forecasts of the price level at long horizons might have a large variance under inflation targeting, which presumably impedes private-sector planning. On the other hand, strict price-level targeting requires that overshoots or undershoots of the target be fully made up, which reduces the variance of long-run forecasts of prices but could impart significantly more volatility into monetary policy in the short run. In practice, central banks tend to compensate partially for target misses, particularly at shorter horizons (Bernanke and Mishkin, 1997).

Genuine price-level targeting is different: monetary policy aims at keeping the price level constant, or around a steady increasing path. Price-level targeting need not imply zero inflation, if a positive inflation rate is deemed desirable. The big difference vis-a-vis inflation targeting is that the variance of the price level does not increase with the

horizon. Thus, the uncertainty about the price level in the distant future is less than under inflation targeting, which should facilitate long-term decisions about savings and investment, and improve resource allocation (Svensson, 1998).

The price index on which the official inflation targets are based is often defined to exclude or down-weight the effects of "supply shocks;" for example, the officially targeted price index may exclude some combination of food and energy prices, indirect tax changes, terms-of-trade shocks, and the direct effects of interest rate changes on the index (for example, through imputed rental costs). Second, as already noted, inflation targets are typically specified as a range; the use of ranges generally reflect not only uncertainty about the link between policy levels and inflation outcomes but is also intended to allow the central bank some flexibility in the short run. Third, short-term inflation targets can and have been adjusted to accommodate supply shocks or other exogenous changes in the inflation rate outside the central bank's control.

A model here is the Deutsche Bundesbank's practice of stating its short-term (one-year) inflation projection as the level of "unavoidable inflation." In the aftermath of the 1979 oil shock, for example, the Bundesbank announced the "unavoidable" inflation rate to be 4 percent, then moved its target gradually down to 2 percent over a six-year period. In other cases, the central bank or government makes explicit an "escape clause," which permits the inflation target to be suspended or modified in the face of certain adverse economic developments (Bernanke and Mishkin, 1997).

2.3. Objectives of Monetary Policy

In recent years, many central banks, especially in the developed world, have tended to galvanize monetary' policy around price stability as a single objective of monetary policy and avoid consideration of other goals such as growth or employment. This is the dominant practice of the Federal Reserve Bank (the Fed), the Bank of England (BOE) and the European Central Bank (ECB). The desire to limit the objectives of monetary policy in this way is based on the near-unanimity among economists and policy-makers that monetary policy cannot affect the long-term growth of the economy.

In this view, efforts to stimulate growth above its potential rate merely leads to higher inflation: accordingly, monetary policy can at most only moderate short run fluctuations in output. Many analysts even doubt that discretionary monetary policy can effectively dampen economic fluctuations. Lags in recognizing turns in the business cycle, and subsequent lags in the response of the economy to changes in monetary' policy, make it difficult to time policy actions accurately enough to moderate business cycles. Moreover, while many central banks may in practice continue to attempt to stabilize output, they find it useful for their public mandate to be restricted to price stability alone, since this reduces their vulnerability to political pressure for expansionary policy (BIS, 1998).

Monetary policy in developing countries may be less able than in industrialized countries to achieve goals other than price stability. In industrialized countries, monetary expansion is generally believed to affect output in the short run, even if

such actions merely lead to changes in the price level over longer periods of time. In many developing countries, however, monetary expansion may lead immediately to higher prices with little even transitional impact on the level of activity. This situation arises when inflationary psychology, usually reflecting a prior history of high inflation, combines with a lack of central bank credibility, so that monetary policy actions generate immediate changes in inflation expectations and, in turn, actual prices (BIS, 1998).

In the case of Kenya, for instance the CBK has adopted an underlying inflation target of 5%, which has over the last several years been surpassed mainly as a result of the oil and food price shocks. Unlike in the developed world, Kenya and other developing markets are not in a position to contain food price inflation through subsidies in addition to their falling victim to the global phenomenon of rising oil prices between 2005 and 2008. As such, the crisis of inflation is normally more severe in developing markets. Further, as highlighted by the BIS, (1998), the presence of shallow and volatile financial markets may further undermine the ability of monetary' policy to influence output in a predictable manner. Under such circumstances monetary policy may be required to concentrate exclusively on the goal of price stability.

The objectives of monetary policy, on the whole, do differ from country to country, with some countries pursuing one key policy instrument while others use several instruments in seeking their monetary policy objectives. The June, 2008 CBK monetary policy statement states that the CBK formulates and conducts monetary policy with the aim of keeping inflation low and stable, thereby contributing to a favorable macroeconomic environment for sustainable economic growth and

employment creation through the use of OMO's, the CBR, the Cash Reserve Requirement (CRR), and Foreign exchange market operations with the CBR becoming the Key policy rate in 2006.

With regard to OMO's, commercial banks obtain intra-day liquidity, on demand, through an intra-day repurchase agreement facility with the Central Bank. A commercial bank with surplus funds, above the minimum CRR, lends surplus liquidity to deficit commercial banks in the inter-bank cash market at, or around, the prevailing interbank rate. Likewise, a commercial bank in deficit, below the amount required and unable to borrow from a surplus commercial bank as needed, turns to the Central Bank as the lender of last resort and borrows at the set CBR discount window.

The Ugandan monetary stance primarily consist of using the Bank rate and Rediscount rate as policy rates to supplement the quantity based instruments flexible exchange rate policy. It is also used as a means of containing instability in the money markets (Bank of Uganda).

The Bank of Tanzania uses a combination of indirect instruments to contain liquidity within desired levels. This includes the sale of Treasury bills and bonds; and sale of foreign exchange. Also, the Bank actively uses Repurchase Agreements (REPOs) to manage short term liquidity movements. The liquidity management effort is further supplemented by periodic adjustments in the pricing of the liquidity windows at the central bank - namely the discount rate and the Lombard rate, to ensure a consistent level of liquidity in the economy (Bank of Tanzania). In October 1989, the BCEAO announced its intention to shift towards using indirect instruments of monetary policy,

based on modifications of the central bank discount rate as the primary policy tool (Shortland, and Stasavage, 2003).

While other central banks adopted numerical inflation or nominal GDP targets as guides for monetary policy since the 1980s and 1990s because financial market innovations and deregulations rendered monetary aggregates less reliable policy guides, the Central Bank of Nigeria (CBN) did not deviate from the conventional monetary aggregate as the appropriate intermediate target. An implicit assumption with respect to this choice is that the intermediate target chosen is measurable, controllable, and predictable. In addition, it is assumed that the money demand function is stable in the conduct and implementation of monetary policy. This is very important because the money demand function is used both as a means of identifying medium term growth targets for money supply and as a way of manipulating the interest rate and reserve money for the purpose of controlling the total liquidity in the economy and for controlling inflation rate (Owoye and Onafowora, 2007).

Beyond the African continent emerging monetary policy stance in emerging markets in Asia also differs. In the Indonesian case reference is made to the multiple objectives of monetary policy to be achieved "primarily through control of monetary aggregates at levels adequate to support the targeted rate of economic growth without giving rise to internal and external macroeconomic equilibrium". In a similar vein, the objective in Thailand is described as "to achieve sustainable economic growth, with a reasonable level of internal and external stability", while in India it consists of ensuring an adequate provision of credit for the productive sectors of the economy without jeopardizing price stability (BIS, 1998).

Going further to the Pacific, under present arrangements, the Reserve Bank of Australia sets a target for its official short-term inter-bank cash rate and fully accommodates the banking system's demand for liquidity. Thus, the conduct of monetary policy is in terms of making liquidity available to the banking system but at interest rates influenced, or set directly, by the Reserve Bank. The demand for liquidity becomes a settlement demand not a reserve requirement demand. While OMO's maintain stability in the Reserve Bank's official short-term inter-bank cash rate, a pre-determined interest rate band of 25 basis points either side of the target rate serves to move the official short-term inter-bank cash rate to its new target. All these facilities ensure the banking system can settle obligations at a cost influenced and set directly by the Reserve Bank (O'Hara, 2005).

In September 2005, in the wake of Hurricane Katrina, which caused major temporary disruptions to the US oil industry, the Reserve Bank of New Zealand (RBNZ) issued the following statement: "Monetary policy will not attempt to offset the unavoidable first round price effects of the oil spike. However, it will be used to resist any flow-through to ongoing price and wage inflation." This statement is representative of the view that monetary policy should be concerned only with containing the second round effects of relative price shocks. This approach can be interpreted as implicitly targeting underlying inflation, whatever the formal target may be. (IMF Working Paper, 2008).

However, inflation targeting has come under severe strain in both developed and emerging markets in the wake of the oil price shock. In the case of South Africa, the

overall index broke through the upper limit of the inflation target. The Minister of Finance and the South African Reserve Bank announced that the targets for 2004 and 2005 would be reviewed upwards from between 3% - 5% to between 3% - 6% (Abedian, 2005/ In Kenya, the underlying inflation by the end of 2008 had crept upwards of 7%, way above the 5% targeted ceiling mainly as a result of the high energy prices.

As for the developed economies, the inception of the global credit crunch in 2008, gave a pointer to the possibility of inflation underestimation especially in the U.S. This is more so as the Fed's monetary policy stance continued to be based on the presumption that underlying inflation continued to be at a maximum of 3% on the basis that the first round price effects (overall inflation) had not sipped through to impact the second round price shocks (underlying inflation). But the collapse in consumption spending in the same year appears to suggest that the first round price shocks, occasioned by rising oil prices, had impacted on the general price levels of consumer goods thereby weakening purchasing power over time until it reached breaking point hence the subsequent recession.

In the late 1970s and early 1980s, a number of central banks world-wide adopted monetary targets as a guide for monetary policy. Monetary targeting is an attempt by central banks to describe or determine the optimum money stock that will yield the desired macroeconomic objectives. In the early 1990s, some central banks adopted numerical inflation or nominal GDP targets as guides for monetary policy in contrast to the conventional choice of interest rate or money stock. Economists and analysts attribute this departure to the unreliability of monetary aggregates as guides for

monetary policy (Ovvoye and Onafowora, 2007). Kenya appears to have continued monetary targeting beyond the 1990s as it continues to set broad Money Supply (M2) targets although it still has an underlying inflation target benchmark of 5%. It is only the recent adoption of the CBR in 2006 that clearly signals, a greater inclination, to pursue an inflation targeting monetary policy stance.

On the other hand, the monetary targeting stance seems to be dogged by imbalances emanating from foreign inflows and outflows, which the Central Bank may not necessarily be able to control. Kenya witnessed an excessive money supply in the advent of both the KenGen IPO in 2006 and the Safaricom IPO in 2008, a good portion of which could be accounted for by foreign fund inflows as a result of which money demand supply imbalance was felt in the form of a low interest rate regime. Likewise, monetary targeting makes monetary policy vulnerable to the political ideology of the day as is evident in economies where government policy favors printing of money to stimulate government spending initiatives without a commensurate rise in economic output.

Overall, the monetary authorities in many industrialized countries have largely abandoned monetary targeting, since changes in the demand for money have caused the relationship between the monetary aggregates, aggregate demand and prices to shift over time. This movement away from targeting has been less pronounced in several emerging economies. Both Brazil and Korea still formulate monetary targets, although they are only indicative and rather broadly defined given the volatility of money demand in recent years (BIS, 1998).

The choice between a policy rule with the interest rate as the instrument and a policy rule with the money base (or some other monetary aggregate) as the instrument is essentially the same choice originally pointed out by Poole (1970). If there is too much uncertainty in measuring the real interest rate or if there are relatively big shocks to investment or net exports, then a monetary' aggregate is the preferred instrument; the same is true if it is difficult to measure the equilibrium real interest rate.

In contrast, if velocity shocks are big then the interest rate is the better instrument. But clearly there are circumstances where real interest rate measurement is difficult and where the overnight nominal interest rate is not a very good guide. Such circumstances may very well be present in emerging market economies measure and risk-premia can be high and variable. Also in a high growth emerging economy, the equilibrium real interest rate may be difficult to determine and measure. With an interest rate rule, uncertainty about the equilibrium real interest rate translates into policy errors. Thus, policy makers in emerging market economies might want to give greater consideration to policy rules with monetary' aggregates, even if rules with the interest rate become the preferred choice (Taylor, 2000).

There are two main approaches to examining the policy options available to central banks. The first approach is to assume the money supply is the instrument of control and exogenously determined by the central bank. Short-term interest rates are a residual outcome of this process. Moreover, the money multiplier represents the parameters to which the central bank manipulates the money supply. On the other hand O'Hara (2005) is inclined to the view that money supply can be considered as an

endogenously determined variable where the money supply is determined by the demand for money and credit. Within this view, the central bank relinquishes control of the money supply and determines a level of short-term interest rates, thus fully accommodating the demand for liquidity. Mosler (2002) again finds similar evidence:

> '"If the federal funds rate trades above its target, for example, it is a simple matter to make funds available at the appropriate interest rate for member banks to borrow on an as-needed basis. There is no functional value to knowing how much the banks need in advance. The Fed can always readily supply, and indeed must supply, any quantity of $US reserves the banks demand at the going rate, or the federal funds rate will not be on target. Payment is notional and effected by simply crediting member bank reserve accounts. There is no inherent constraint on the quantity as the target is the interest rate and the quantity necessarily floats to meet bank demands, so the Fed has no need to 'be prepared" for any quantity demanded, (p 421)"

O'Hara (2005) is also of the view that OMO's are designed to fully accommodate the demand for system-wide liquidity in order to maintain stability in short-term interest rates and neither as a tool to manipulate the money supply or, as the findings suggest, the Reserve Bank's official short-term interest rate(s). This stance appears to be the one favored by the local monetary policy authorities i.e. the CBK.

Exogenous money proponents typically hold strong views that the money supply is determined in a hierarchical process. Such a process begins with the banking system maintaining special accounts with the central bank. The central bank then supplies fixed quantities of reserves, through the instruments of open market purchases and

sales. A portfolio shift is initiated by the banking system where, in the short-run, the supply and demand for base money moves interest rates as commercial banks compete to adjust their disequilibrium positions in light of exogenous changes in their accounts. In the long-run, the banking system has little choice but to re-balance their deposit liabilities relative to the manipulation in the supply of base money (O'Hara, 2005). Perhaps, in adopting a monetary target policy stance the Central Bank of Nigeria is swayed by this point of view.

2.4. The Transmission Mechanism of Monetary Policy

A successful implementation of monetary policy requires an accurate assessment of how fast the effects of policy changes propagate to other parts of the economy and how large these effects are. This requires a thorough understanding of the mechanism through which monetary policy affects economic activity. The process that describes how changes in monetary policy propagate to other parts of the economy is called the transmission mechanism of monetary policy. It describes how changes in policy transmit through the financial system, via financial prices and quantities, to the real economy, affecting aggregate spending decisions of households and firms, and from there to aggregate demand and inflation (O'Hara, 2005).

The transmission mechanism logically involves two stages. The first stage involves the propagation (transmission) of changes in monetary' policy through the financial system. This stage of the transmission mechanism explains how changes in the market operations of central banks transmit through the money market to markets which directly affect spending decisions of individuals and firms, i.e. the bond market and the bank loan market. This involves the term structure, through which short-term

money market rates affect longer-term bond rates, and the marginal cost of loan funding, through which bank loan rates are affected.

The second stage of the transmission mechanism involves the propagation of monetary policy shocks from the financial system to the real economy. This explains how monetary policy shocks affect real production and aggregate prices (Petursson, 2001). Monetary' policy actions are transmitted through an open economy through several different channels. As outlined in Svensson (1999), the most important are:

1. The aggregate demand channel through interest rate changes,
2. The inflation expectations channel, and,
3. The exchange rate channel.

According to Bernanke and Blinder (1992) the first channel is an unconventional (but rather old) view of the monetary transmission mechanism: that central-bank policy works by affecting bank assets (loans) as well as bank liabilities (deposits). The microeconomic justification of this so-called credit view is the observation that, under realistic conditions of asymmetric information, loans from financial intermediaries are "special."

Specifically, the expertise acquired by banks in the process of evaluating and screening applicants and in monitoring loan performance enables them to extend credit to customers who find it difficult or impossible to obtain credit in the open market. As a consequence, when the Central Bank reduces the volume of reserves and therefore of loans, spending by customers who depend on bank credit must fall, and, therefore, so must aggregate demand. In this channel, a shift in policy leads to a

change in the money supply that, for a given money demand, leads to a change in money-market interest rates. Changes in policy and interbank rates lead, in turn, to changes in bank loan rates for borrowers, which may affect investment decisions, and in deposit rates, which in turn may affect the choice between consuming now and later (BIS, 1998).

According to Yuong Ha (2000), a monetary policy tightening through a rise in interest rates makes it more expensive to borrow and consume today relative to the future. This causes a reduction in investment and consumption, that is, a fall in aggregate demand. This fall in aggregate demand below the economy's productive capacity eventually reduces inflation.

With the inflation expectations channel, forward-looking agents perceive that tighter monetary policy will lead to lower inflation in the future. This reduces expected inflation leading to lower inflation outcomes (Yuong Ha, 2000). Policy-induced interest rate changes also affect the level of asset prices - principally those of bonds, equities and real estate - in the economy. Arestis (1996), comments on the arrangements between the production and monetary sectors as follows:

> "The Central Bank administers the level of the discount and commercial banks administer their lending and deposit rates (given banks' uncertain assessment of risk and value of collateral). At this level and structure of interest rates, banks stand ready to provide whatever loans the entrepreneurs' requirements for credit entail, so long as they are in their prearranged credit limits. An increase in the demand for credit leads to an increase in its supply, and thus an increase in the existing money stock, without necessitating a change in interest

rates, unless the Central Bank varies its administered rate, changes of which influence directly changes in administered interest rates via a mark up process. It is the rate of interest that is the control instrument of monetary policy, (p. 120)"

A decline in asset prices may have particularly strong effects on spending when the resultant change in debt-to-asset ratios prevents households and firms from meeting debt repayment obligations; it can have similar effects if it raises fears about the ability to service debts in the future. A substantial fall in stock and bond prices for instance, may reduce the value of liquid assets available to repay loans. As households and firms thus become more vulnerable to financial distress, thev may attempt to rebuild their balance sheet positions by cutting spending and borrowing (BIS, 1998). A classic example of this trend is the housing induced recession that started in the U.S in 2008 as a result of falling housing prices that weakened consumer spending leading to a downward spiral in economic activity.

As Milton Friedman (1968) surmises, the monetary authority can make the market rate less than the natural rate only by inflation. It can make the market rate higher than the natural rate only by deflation. When the monetary authority keeps the nominal market rate for a time below the natural rate by inflation the nominal natural rate rises, and anticipations of inflation become widespread, thus requiring still more rapid inflation to hold down the market rate. Similarly, because of the Fisher effect, it will require not merely deflation but more and more rapid deflation to hold the market rate above the initial "natural" rate.

With regard to the third transmission mechanism, a rise in the real interest rate will lead to an appreciation of the exchange rate. This means that imports become cheaper in domestic currency terms. And since part of the basket of goods and services used in measuring CPI inflation are imports, CPI inflation will fall (Yuong Ha. 2000). However, in small open economies with flexible exchange rates, the exchange rate channel is likely to be particularly important because, in contrast to the other channels described above, it affects not only aggregate demand but also aggregate supply. A loosening of monetary policy, for example, may lead to a depreciation of the exchange rate, an increase in domestic currency import costs, and hence induce firms to raise their domestic producer prices even in the absence of any expansion of aggregate demand. Because exchange rate changes are viewed as a signal of future price movements in many countries, particularly those with a history of high and variable inflation, wages and prices may change even before movements in import costs have worked their way through the cost structure (BIS, 1998).

2.5. Lags in Transmission of Monetary Policy

The first source of monetary policy lags is the delay in pass-through of changes in the overnight cash rate to other interest rates that serve as a key policy instrument of monetary policy. While the response of short-term money market interest rates is rapid and complete, pass-through to other interest rates such as the deposit and lending rates of financial intermediaries appears to be slower (Lowe, 1995). Since intermediaries' interest rates are important determinants of cash-flow, asset prices, and the incentive to postpone expenditure, slow pass-through contributes to the transmission lag from the real cash rate to activity.

The lags in this transmission channel are due to the time it takes for aggregate demand to respond to changes in interest rates, and the time it takes for inflation to respond to the output gap. Consequently, there will be lags in the response of inflation expectations to changes in policy, and the response of inflation to changes in inflation expectations.

There are also lags in the so-called *direct* exchange rate channel due to the time it takes for import prices to respond to exchange rate movements and the time it takes for changes in import prices to flow through into CPI inflation. In addition, there is an *indirect* exchange rate channel that has an influence on inflation. An appreciation of the exchange rate makes domestic goods more expensive relative to foreign goods. This reduces the demand for domestic exports, and shifts some domestic demand to the now-cheaper import goods. In both cases, aggregate demand for domestically-produced goods falls (Yuong Ha, 2000).

Beyond pass-through, an important source of lags arises from the gradual response of investment (both business investment and consumer investment in durables and dwellings) to changes in monetary policy. Adjustment costs associated with changing the level of the relevant capital stock are partly responsible. However, changes in interest rates also affect the incentive to postpone investment when returns are uncertain. The largely irreversible nature of many investments means that there is an option value to waiting to invest in a world of uncertainty (Dixit and Pindyck, 1994). When a firm or individual makes an irreversible investment, this option is exercised, eliminating the possibility of waiting for the arrival of new information that might

have affected the timing or the desirability of the investment. A change in interest rates affects this option value, and will therefore affect the timing of the investment.

Empirical estimates for the US suggest quite long lags in the adjustment of investment to shocks. For example, Jorgenson and Stephenson (1967) report a mean lag of seven quarters between changes in the rental price of capital and investment in US manufacturing, while Shapiro (1986) estimates that, in response to a shock to the required rate of return on capital, more than half the adjustment in the manufacturing capital stock occurs in the first year, but it takes over four years to be complete. (Gruen, Romalis, and Chandra, 1997).

2.6. Empirical Theories

Obtaining direct empirical confirmation of a link between inflation and economic performance is very difficult. Inflation is, after all, an endogenous variable; and so we rarely if ever see variation in inflation that is not associated with some third factor, such as supply shocks or political instability, which would plausibly affect other elements of economic performance as well. As a result, economists' views on the subject have been based largely on prior arguments, intuition and indirect evidence. That conceded, it is nevertheless clear that the professional consensus, which at one time did not ascribe substantial costs to moderate inflation, has over the past few-decades begun to take the costs of inflation more seriously (Bernanke and Mishkin, 1997).

Indeed, a potentially important advantage of inflation targeting is that it provides not only a ceiling for the inflation rate, but also a floor. Inflation targeting thus acts to

reduce the effects of negative, as well as positive, shocks to aggregate demand. An interesting historical example is that of Sweden in the 1930s, which adopted a "norm of price stabilization" after leaving the gold standard in 1931. As a result, Sweden did not undergo the devastating deflation experienced by other countries during the Great Depression (Jonung, 1979).

It has been that inflation is very difficult to predict accurately, particularly at both very short and very long horizons (Cecchetti, 1995). This lack of predictability poses two important problems for the inflation targeting strategy. The first is strictly operational: given the long lags between monetary policy actions and the inflation response, low predictability suggests that accurate targeting of inflation could be extremely difficult. The second issue has to do with the central bank's credibility: if inflation is largely unpredictable, and hence not finely controllable, then it will be difficult to judge whether the central bank has made its best effort to hit the inflation targets. For example, the central bank could always argue that wide misses were the result of bad luck, not bad faith; since central bank forecasts of inflation contain substantial judgmental components, such claims would be difficult to disprove. This possible escape hatch for the central bank weakens the argument that inflation targeting increases accountability of monetary' policy and suggests that building up credibility for its inflation-targeting framework could be a long and arduous process (Bernanke and Mishkin, 1997).

Bernanke and Mishkin, (1997) conclude that it is too early to offer a final judgment on whether inflation targeting will prove to be a fad or a trend. However, their preliminary assessment was that this approach when construed as a framework for

making monetary policy, rather than as a rigid rule-has a number of advantages, including more transparent and coherent policymaking, increased accountability, and greater attention to long-run considerations in day-to-day policy debates and decisions. Similar sentiments are deduced by Svensson (1998) who concludes that any evaluation of inflation targeting performance must be highly preliminary and substantive conclusions will have to wait for several more years of data, including several business cycles, until we can make a very reliable evaluation.

2.7. Conclusions from Literature Review

On the whole, the longer the lag the less effective monetary' policy becomes and as a consequence a monetary policy with a long lag period should be subject to policy instrument modifications or even a complete switch in application of policy instruments. An important facet of the monetary transmission process is the impact of policy-induced changes in short-term interest rates on long-term interest rates and asset prices. In practice, the response of long rates and asset prices to policy induced changes in short rates has been difficult to predict, even in industrialized countries. First, it depends on how the expected future path of short-term interest rates is affected by a policy step. Much depends on how the action alters market expectations of the need for further measures (BIS, 1998). Lowe (1995) also finds that while the response of short-term money market interest rates is rapid and complete, pass-through to other interest rates such as the deposit and lending rates of financial intermediaries appears to be slower in the developed markets. In the Kenyan context, the policy lag in the key policy instrument will render monetary policy ineffective in the long run and as such the central bank may be forced to revert back to multiple

policy instruments and cease to give added weight to inflation targeting through CBR adjustments.

In emerging market economies, uncertainties about the channels of transmission of monetary policy, combined with rapid structural change in these channels, make the interpretation of indicators of monetary' stance especially difficult. Moreover, even if the channels of monetary transmission are stable and well-understood, the greater volatility of financial markets and macroeconomic performance may loosen the linkage between indicators of monetary conditions and future economic outcomes. Also, if inflation expectations are high and volatile, it may be very difficult to identify which part of the interest rate reflects the real interest rate and which part the inflation risk premium (BIS, 1998).

However, a study by Owoye & Onafowora (2007) appears to validate the use of a simple monetary policy rule-such as that of inflation targeting or monetary targeting-which can be effective in emerging market economies like Nigeria if the central bank commits to the rule-prescribed growth targets and minimize the deviations from target levels. On the other hand, Mullei (2005) has reservations for monetary- policies directly mimicking those of industrialized countries such as those of keeping inflation in single digits. In light of this, the study undertakes to asses the extent to which the retail (market) interest rales respond to the key policy rate (the CBR) and by extension deduce the effectiveness of the current policy rate as an instrument of monetary policy.

CHAPTER THREE

Research Methodology

3.1. Research Design

To assess the responsiveness of lending rates to the CBR rate a cross sectional design was used. This made use of already available historical data from the KNBS for the purpose of establishing the responsiveness of the CBR on the benchmark commercial banks' lending rates. The empirical analysis took into account lags in the general interest regime response to changes in CBR. Further, money supply, M2, was applied as a control variable to explain changes in interest rates that could not be explained by adjustments in the CBR rate. In this way, the study also assessed, as to which of the two policy instruments, namely CBR rate or M2, lending rates are more responsive to.

3.2. Population

The population of the study constituted the Central Bank of Kenya and all the 43 commercial banks licensed by the CBK at the time. The commercial banks were selected for this study because they make loans to business and subsequently establish lending rates. The Central Bank constantly monitors interest rates and money supply and as such it is a source of key financial data.

3.3. Sample Design

The particular aspect of interest in this study was to establish the effectiveness of the Central Bank Rate (CBR) on the trends of the lending rates. Consequently, the sample constituted the 9 listed commercial banks, which comprised over 50% of the banking industry loan portfolio and the Central Bank. The commercial banks

constituting the sample were; Barclays Bank of Kenya Ltd., Standard Chartered Bank, Equity Bank, CFC Bank Ltd., Diamond Trust Bank, Kenya Commercial Bank, National Bank of Kenya Ltd., NIC Bank Ltd., and the Co-Operative Bank of Kenya Ltd.

3.4. Data collection

Data was undertaken through bank market surveys, of the 9 listed banks, with regard to their historical lending rates for the period June 2006, when the CBR was introduced, to December 2009. In addition, secondary data from the Central Bank on CBR rates and Money Supply (M2) levels was sourced for the same period. Historical data on the banks' lending rates was sourced from the KNBS.

3.5. Data analysis

In assessing the responsiveness of lending rates to changes in the CBR, the commercial bank lending rate (L) was regressed against a 3-month lagged CBR and a 3-month Lagged Money Supply growth rate (M2), with the commercial lending rate as the dependent variable. The regression model applied was a geometric lag model, which not only took into account the impact of present CBR rates and money growth on lending rates but also the impact of past CBR rates and money growth on present trends in the lending rates following the method recommended by Pindyck, Rubinfeld (1991). The model is stated as follows:

$$Lt = oo + ai\ I\ w"CBR_{(t..n)} + a_2\ £\ WAM2_{(t\_n)} + e_i$$

Where,

Lt = Lending Rate

CBR = Central Bank Rate

AM2 = percentage change in broad Money Supply, M2

aj = regression coefficients

t= is the present time period

n= is the number of months prior to the present time period

w= is the weight, which in this case is presumed to be 0.5; in this model the further the time period *t-n* is away from *t,* the lesser the weight it carries and hence the less the impact of the time variable on the lending rate,

ei = error term

Accordingly, the regression model for the three month lag was stated as follows:

$$L_t = ao + ai \{CBR_t + wCBR_{(t-1)} + w^2CBR_{(t-2)} + \wedge CBRdO)\} + a_2 \{AM2_{(t)} + wAM2_{(t-1)} + W^2AM2_{(t-2)} + w^3AM2_{(t-3)}\}$$

The coefficient (Xi in the equation captured the impact of the lagged values of the CBR rate on the average lending rate (L) whereas the coefficient (X2 captured the impact of lagged changes in money supply (M2) on the average lending rate. In addition to the 3-month lag period the

same model was applied to test for CBR responsiveness assuming a 6-month period so that if the responsiveness was not captured with a 3-month lag it would be visible in the 6-month lag failure to which the monetary' policy tool could be deemed ineffective within a reasonable time frame.

On deriving the regression equation from the respective coefficients ai and (X2 were tested for significance and the appropriate conclusions deduced as to whether the lending rates were responsive to the CBR rate assuming a 3-month lag and a 6-month lag. The significance of the impact of money supply on lending rates was also ascertained.

A t-test was undertaken on the coefficients of the above regression equation to assess whether in general, coefficients (L\ and (L2 were significant and by extension determine whether commercial lending rates were responsive to the CBR within a reasonable time frame.

A correlation analysis between lending rates and the CBR and between lending rates and money supply was also undertaken to further strengthen the regression analysis.

CHAPTER 4

Data Analysis, Results, and Discussion

4.1. Descriptive Statistics

Table 1: Quarterly averages and standard deviations

	Quarter	Quarterly Averages			Quarterly Standard Deviation		
		L (%)	CBR (%)	AM2 (%)	L (%)	CBR (%)	AM2 (%)
2006	Qi	13.27	10.95	12.55	0.07	0.32	1.01
	Q2	13.75	9.93	17.27	0.22	0.15	0.62
	Q3	13.63	9.92	18.45	0.09	0.14	1.15
	Q4	13.89	10.00	17.35	0.14	0.00	0.53
2007	Ql	13.62	10.00	16.44	0.17	0.00	0.59
	Q2	13.27	9.50	14.97	0.12	0.87	0.92
	Q3	13.07	8.67	16.96	0.21	0.14	1.71
	Q4	13.32	8.75	18.02	0.08	0.00	2.06
2008	Ql	13.89	8.75	22.32	0.15	0.00	1.27
	Q2	13.99	8.83	22.38	0.08	0.14	5.00
	Q3	13.74	9.00	16.35	0.14	0.00	1.18
	Q4	14.44	8.83	16.45	0.39	0.29	1.66
2009	Ql	14.77	8.42	11.61	0.10	0.14	0.57
	Q2	14.88	8.17	10.73	0.19	0.14	3.66
	Q3	14.76	7.75	15.17	0.03	0.00	0.20
	Q4	14.83	7.25	16.62	0.05	0.43	0.87

As indicated by the quarterly averages, the lending rate (L) increased gradually over the four year period while the CBR declined marginally over the same period with money supply (AM2) witnessing a more erratic pattern. Accordingly, this heightened volatility in money supply growth is captured in its standard deviation trends ranging

from a quarterly high of 5 to a low of 0.20. The other two variables recorded minimal volatility implying general stability in both the lending rate and the CBR.

4.2. Regression Analysis

Table 2: Statistical Results of the Regression Analysis (Jan. 2006 - June, 2008)

	3-Month Lag		**6-Month Lag**	
	Coefficients	*P-vcilue*	*Coefficients*	*P-value*
Intercept	0.08263	0.0000000014	0.08052	0.0000000134
XCBR	0.19543	0.0000606594	0.17651	0.0001519602
£AM2	0.06680	0.0000003794	0.06388	0.0000005140
R^2	0.6551		0.6961	

Significance at P<0.05

The results for the first two years, in the period leading to both the culmination of the post election violence and the global financial meltdown, indicates that there was a positive and significant relationship between lending rates and the CBR for both the 3-month lag and 6-month lag period. There was, however a positive and insignificant relationship between the lending rates and money supply growth for both the 3-month lag and 6-month lag period.

In addition, the two factors, CBR and money supply growth, accounted for 65.51 and 69.61 of the explained variance in lending rates for the 3-month lag and 6-month lag periods respectively which indicates that they played a significant role in influencing the direction of lending rates.

Table 3: Results of the Regression Analysis (Jan 2006 - Dec 2009)

	3-Month Lag		6-Month Lag	
	Coefficients	*P-value*	*Coefficients*	*P-value*
Intercept	0.18688	0.0000000000	0.18942	0.0000000134
XCBR	-0.24071	0.0000031119	-0.22535	0.0000228185
XAM2	-0.03157	0.0128445547	-0.02969	0.0172467466
R^2	0.4807		0.4834	

Significance at $P<0.05$

When the four years are taken in their totality, the study finds a negative and significant relationship between lending rates and both the CBR and money supply growth for both the 3-month lag and 6-month lag period. In this case, the two factors, CBR and money supply growth, accounted for 48% of the explained variance in lending rates for both the 3-month lag and 6-month lag periods which is indicative of other emerging factors coming into play to reduce the sensitivity of the lending rates to the CBR.

4.3. Implications of Findings

The results indicate that in the period leading to both the culmination of the post election violence and the global financial meltdown, increase in the CBR led to an increase in lending rates while a decrease in CBR led to a decrease in lending rates and as such in this period the CBR was a reasonably effective instrument of monetary policy as it was able to influence the direction of interest rates within a span of 3 to 6 months.

However, it is most probable that in the wake of the 2008 post election skirmishes and the global financial crises a kneejerk reaction by commercial banks led to a resistance to reduce interest rates despite a gradual decline in the CBR. Accordingly, the lending rate was more responsive to the CBR before the political and financial crises took full effect but less responsive after the crises; the banks raised the political risk and counter-party risk premiums despite the gradual decline in the CBR over the 4-vear period to December, 2009

CHAPTER 5

Summary, Conclusions, and Recommendations

5.1. Summary

The findings of this research indicate that the CBR can be used as a tool to guide the level of interest rates charged by the commercial banks. In the periods when the CBK increased the CBR, the commercial banks also followed suit by increasing their base lending rates. In the periods when the CBK reduced the CBR, commercial banks also reduced their base lending rates over a period of between 3 to 6 months.

5.2. Conclusions

As dictated by the findings of the study, the inflation and monetary targeting though having a significant capacity to influence interest rates achieve better results in periods in which financial and political crises are absent or minimal. In the wake of crises, the effectiveness of inflation targeting and monetary policy targeting is reduced as lending rates rise to reflect the rise in political risk and counter-party risk.

5.3. Policy Recommendations

As a matter of policy, both inflation targeting and monetary targeting can attain the desired outcome in an economy whereby there is reduced financial upheaval and political tension is at a minimal. Accordingly, in a stable economic and political environment a lower CBR rate will generally achieve a lower lending rate over a 3 to 6 month period and vice-versa. Accordingly, inflation targeting is effective to the

extent of the stability of the political and economic environment. However, in the event of a crisis, monetary' targeting through an expansionist monetary policy can serve to lower interest rates given the negative relationship between money supply growth and lending rates in turbulent times. But this approach must be undertaken with caution given that in the long run excess money supply raises inflation and as such would this would blunt the effectiveness of inflation targeting even in times of relative stability.

5.4. Limitations

Given that the CBR was only introduced in June 2006, there was a limitation in the amount of data available due to the relatively short period of time since the implementation of the central bank rate as a tool of monetary policy.

The study only applied two independent variables, namely the CBK benchmark rate (CBR) and money supply, for testing against lending rates and thus its findings do not shed light on how other policy factors affect lending rates.

5.5. Recommendations for Further Studies

In light of the relatively short period since the inception of the CBR there is need to carry out the study over a longer period of time in the future to test whether the findings reached in this study hold under stable political and macro-economic environments.

Given the constrained impact of monetary targeting and inflation targeting, under conditions of political and economic upheaval, there is need to look into the impact of

other monetary policy tools on lending rates and their effectiveness during periods of economic and political turmoil.

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~~Appendix 1: Quantity of Money (Figures in millions)~~

		LIQUIDITY (M3 + Non-bank Govt. Paper Holdings)									
		M3 (M2+Non-Foreign Currency Holdings)								Non-bank Govt Paper Holdings	Total
		M2 (M1+NBFIs)						Residents Currency Deposits	Total		
		M1 (M0+ Demand Deposits)			Quasi Monetary Deposits	NBFIs	Total				
		M0	Demand Deposits	Total							
2005	Jan	59,215	150,067	209,282	207,106	12,322	428,710	79,801	508,511	122,002	630,513
	Feb	58,313	144.559	202,872	213,428	12,511	428,811	82,116	510,927	123,542	634,469
	Mar	58,042	148,151	206,193	216,375	12,346	434,914	83,056	517,970	125,620	643,590
	Apr	59,815	151,427	211,242	211,442	12,652	435,336	81,389	516,725	131,251	647,976
	May	58,264	149,736	208,000	217,502	12,045	437,547	81.186	518,733	131,858	650,591
	Jun	59,370	162,558	221,928	208,265	12,209	442,402	81,313	523,715	137,037	660,752
	Jul	59,789	162,484	222,273	210,551	12,380	445,204	85,249	530,453	143,063	673,516
	Aug	59,637	165,818	225,455	215,487	12,027	452,969	86,234	539,203	145,424	684,627
	Sep	59,369	161,479	220,848	220,928	11,995	453,771	84,460	538,231	144,452	682,683
	Oct	60,129	171,360	231,489	220,892	11,537	463,918	84,930	548,848	144,316	693,164
	Nov	63,731	164,805	228,536	230,288	11,485	470,309	83,207	553,516	143,990	697,506
	Dec	66,327	164,795	231,122	231,402	11,966	474,490	83,281	557,771	148,734	706,505
2006	Jan	63,745	174,609	238,354	226,825	12,413	477,592	82,469	560,061	148,215	708,276
	Feb	63,102	175,151	238,253	233,626	12,334	484,213	85,377	569,590	149,169	718,759
	Mar	64,254	178,050	242,304	238,839	11,700	492,843	86,084	578,927	150,954	729,881
	Apr	63,572	205,008	268,580	229,276	11,466	509,322	87,612	596,934	152,273	749,207
	May	62,406	191,140	253,546	246,145	11,521	511,212	84,719	595,931	156,781	752,712
	Jun	67,301	191,125	258,426	251,926	11,604	521,956	83,257	605,213	159,868	765,081
	Jul	67,060	199,764	266,824	254,490	11,046	532,360	86,899	619,259	157,951	777.210
	Aug	68,618	195,055	263,673	256,052	11,473	531,198	89,796	620,994	163,994	784,988
	Sep	68,763	198,456	267,219	258,977	11,475	537,671	92,709	630,380	164,137	794,517
	Oct	69,718	211,894	281,612	253,001	11,161	545,774	94,498	640,272	161,764	802,036
	Nov	72,709	212,538	285,247	257,556	10,627	553,430	93,415	646,845	162,342	809,1 87
	Dec	76,479	215,310	291,789	250,952	11,166	553,907	99,129	653,036	167,323	820,359
2007	Jan	73,245	219,795	293,040	253,252	10,618	556,910	100,352	657,262	169,945	827,207
	Feb	73,500	216,227	289,727	259,830	11,069	560,626	99,322	659,948	165,934	825,882
	Mar	76,630	217,298	293,928	270,903	11,450	576,281	101,068	677,349	173,832	851,181
	Apr	76,216	222,818	299,034	271,383	11,484	581,901	100,267	682,168	175,666	857,834
	May	77,228	248,284	325,512	249,610	11,014	586,136	104,406	690,542	178,897	869,439
	Jun	78,281	260,544	338,825	255,833	10,892	605,550	102,843	708,393	175,082	883,475
	Jul	78,328	261,503	339,831	263,415	9,431	612,677	100,936	713,613	178,863	892,476
	Aug	81,131	271,186	352,317	265,706	11,025	629,048	101,464	730,512	179,444	909,956
	Sep	80,184	269,590	349,774	270,440	10,927	631,141	102,188	733,329	183,117	916,446
	Oct	80,850	269,891	350,741	275,024	11,877	637,642	102,022	739,664	182,633	922,297
	Nov	87,358	273,127	360,485	274,171	11,888	646,544	102,216	748,760	188,798	937,558
	Dec	96,124	277,186	373,310	281,635	11,930	666,875	110,721	777,596	191,888	969,484
2008	Jan	90,671	287,371	378,042	292,739	12,287	683,068	118,990	802,058	194,338	996,396
	Feb	89,186	289,686	378,872	301,568	12,537	692,977	117,844	810,821	196,073	1,006,894
	Mar	85,098	295,043	380,141	305374	12,754	698,269	114,092	812,361	204,011	1,016,372
	Apr	81,205	355,417	436,622	298,628	12,849	748,099	119,613	867,712	201,842	1,069,554
	May	81,694	313,464	395,158	302,642	11,862	709,662	130,176	839,838	200,921	1,040,759
	Jun	83,718	308,105	391,823	313,621	12,604	718,048	124,711	842,759	196,419	1,039,178
	Jul	84,874	297,300	382,174	324,293	12,508	718,975	131,438	850,413	191,308	1,041,721
	Aug	85,510	297,915	383,425	327,698	12,572	723,695	131,257	854,952	190,612	1,045,564
	Sep	85,566	299,438	385,004	338,780	12,541	736,325	123,003	859,328	191,893	1,051,221
	Oct	88,782	309,792	398,574	342,969	12,340	753,883	129,856	883,739	191,681	1,075,420
	Nov	91,486	301,913	393,399	344,996	12,788	751,183	139,049	890,232	192,761	1,082,993
	Dec	93,957	298,899	392,856	360,225	13,390	766,471	134,662	901,133	190,874	1,092,007
2009	Jan	91,178	307,559	398,737	352,402	12.511	763,650	131,748	895,398	193,814	1,089,212
	Feb	89,835	290,662	380,497	374,476	13,217	768,190	131,839	900,029	203,378	1,103,407
	Mar	88,066	320,261	408,327	358,224	13,962	780,513	125,554	906,067	201,885	1,107,952
	Apr	86,689	296,096	382,785	396,162	14,360	793,307	135,517	928,824	206,636	1,135,460
	May	86,557	306,298	392,855	387,498	15,247	795,600	133,003	928,603	210,864	1,139,467
	Jun	87,465	313,189	400,654	395,933	15,469	812,056	138,184	950,240	216,686	1,166,926
	Jul	89,426	338,056	427,482	386,225	14,813	828,520	145,102	973,622	226,336	1,199,958
	Aug	89,136	344,473	433,609	383,530	14,760	831,899	150,955	982,854	229,270	1,212,124
	Sep	87,745	345,609	433,354	400,488	15,368	849,210	137,691	986,901	231,277	1,218,178
	Oct	94,152	353,279	447,431	407,659	16,526	871,616	134,393	1,006,009	237,830	1,243,839
	Nov	93,811	347,142	440,953	422,112	16,458	879,523	142,816	1,022,339	221,184	1,243,523
	Dec	100,869	341,253	442,122	438,798	17,057	897,977	147,557	1,045,534	234,811	1,280,345

Source: Central Bank of Kenya

Appendix 2: Monthly Interest Rates

		91-day T-Bill Rate %	Rediscount Rate (CBR) %	Repurchase (Repo) Rate %	Lending Rate %	Inter-Bank Rate %	Hire Purchase Rate %	Mortgage Rate %
2006	Jan	8.23	11.23	7.81	13.2	7.78	18.5	18.75
	Feb	8.02	11.02	7.78	13.27	7.73	18.5	18.75
	Mar	7.6	10.6	7.5	13.33	7.52	18.5	18.75
	Apr	7.02	10.02	6.78	13.51	6.97	18.5	18.75
	May	7.01	10.01	6.68	13.95	8.11	18.5	18.75
	Jun	6.6	9.75	6.39	13.79	6.41	18.5	18.75
	Jul	5.89	9.75	5.73	13.72	5.74	18.5	18.75
	Aug	5.96	10	5.94	13.64	5.66	17.5	18.75
	Sep	6.45	10	6.16	13.54	6.02	17.5	18.75
	Oct	6.83	10	6.23	14.01	6.08	17.5	16.75
	Nov	6.41	10	6.33	13.93	6.18	17.5	16.75
	Dec	5.73	10	6.34	13.74	6.34	17.5	16.75
2007	Jan	6	10	6.43	13.78	6.43	17.5	16.75
	Feb	6.22	10	6.75	13.64	6.52	17.5	16.75
	Mar	6.32	10	6.7	13.44	6.55	17.5	16.75
	Apr	6.65	10	6.84	13.33	6.81	17.5	16.75
	May	6.77	10	7.03	13.35	7.11	17.5	16.75
	Jun	6.53	8.5	7.07	13.14	6.98	19.5	16.75
	Jul	6.52	8.5	7.19	13.29	7.07	19.5	16.75
	Aug	7.3	8.75	7.49	13.04	7.38	19.5	16.75
	Sep	7.35	8.75	7.81	12.87	7.59	19.5	16.75
	Oct	7.55	8.75	7.44	13.24	7.65	19.5	16.75
	Nov	7.52	8.75	6.42	13.39	6.5	19.5	16.75
	Dec	6.87	8.75	7.13	13.32	7.05	19.5	16.75
2008	Jan	6.95	8.75	7.75	13.78	7.61	19.5	16.75
	Feb	7.28	8.75	6.9	13.84	7.21	19.5	16.75
	Mar	6.89	8.75	6.46	14.06	6.35	19.5	16.75
	Apr	7.35	8.75	6.67	13.91	6.7	19.5	16.75
	May	7.76	8.75	7.48	14.01	7.72	19.5	16.75
	Jun	7.73	9	7.58	14.06	7.772	1.75	16.75
	Jul	8.03	9	7.41	13.91	8.06	19.5	16.75
	Aug	8.02	9	6.35	13.66	6.93	21.75	16.75
	Sep	7.69	9	6.06	13.66	6.7	21.75	16.75
	Oct	7.75	9	6.03	14.12	6.81	21.75	16.75
	Nov	8.39	9	6.27	14.32	6.84	21.75	16.75
	Dec	8.59	8.5	6.36	14.87	6.68	39.3	16.75
2009	Jan	8.46	8.5	5.1	14.78	5.95	25.52	16.75
	Feb	7.55	8.5	5.08	14.67	5.49	25.52	16.75
	Mar	7.31	8.25	4.62	14.87	5.57	25.52	16.75
	Apr	7.34	8.25	4.05	14.71	5.81	25.52	16.75
	May	7.45	8.25	6.18	14.85	5.55	25.52	16.75
	Jun	7.33	8	0	15.09	3.08	39.3	16.75
	Jul	7.24	7.75	0	14.79	2.69	25.52	16.75
	Aug	7.25	7.75	0	14.76	3.68	25.52	16.75
	Sep	7.29	7.75	0	14.74	3.38	25.52	16.75
	Oct	7.26	7.75	0	14.78	2.57	30	16.75
	Nov	7.22	7	0	14.85	3.11	25.52	16.75
	Dec	6.82	7	0	14.87	2.95	25.52	16.75

Source: Central Bank of Kenya

Appendix 4: Results of the 6-Month Lagged Responses,(Jan. 2006-June. 2008)

		L (%)	CBR (%)	AM2 (°o)	3-Month Lag L (%)	3-Month Lag £CBR (%)	3-Month Lag £AM2 (%)
2006	Jan	7.78	8.02	-1.41			
	Feb	7.50	7.60	-5.23			
	Mar	6.78	7.02	-9.37	6.78	12.83	-12.34
	Apr	6.68	7.01	-4.35	6.68	12.42	-10.35
	May	6.39	6.60	-4.96	6.39	11.86	-9.47
	Jun	5.73	5.89	-10.78	5.73	10.94	-14.34
	Jul	5.94	5.96	-4.61	5.94	10.56	-11.23
	Aug	6.16	6.45	-4.34	6.16	10.90	-9.33
	Sep	6.23	6.83	-3.26	6.23	11.55	-6.58
	Oct	6.33	6.41	-7.47	6.33	11.44	-10.18
	Nov	6.34	5.73	-6.69	6.34	10.64	-11.24
	Dec	6.43	6.00	-14.46	6.43	10.47	-19.67
2007	Jan	6.75	6.22	-10.26	6.75	10.65	-19.16
	Feb	6.70	6.32	-2.14	6.70	10.93	-10.88
	Mar	6.84	6.65	0.16	6.84	11.37	-3.48
	Apr	7.03	6.77	-4.40	7.03	11.68	-4.86
	May	7.07	6.53	-6.14	7.07	11.58	-8.30
	Jun	7.19	6.52	-14.62	7.19	11.48	-18.79
	Jul	7.49	7.30	-3.90	7.49	12.19	-12.75
	Aug	7.81	7.35	-4.78	7.81	12.63	-10.38
	Sep	7.44	7.55	6.42	7.44	13.05	3.05
	Oct	6.42	7.52	11.87	6.42	13.13	13.88
	Nov	7.13	6.87	6.84	7.13	12.52	14.38
	Dec	7.75	6.95	15.72	7.75	12.27	22.11
2008	Jan	6.90	7.28	13.26	6.90	12.47	22.83
	Feb	6.46	6.89	11.39	6.46	12.27	21.95
	Mar	6.67	7.35	11.89	6.67	12.62	20.90
	Apr	7.48	7.76	7.70	7.48	13.16	16.49
	May	7.58	7.73	15.72	7.58	13.45	22.54
	Jun	7.41	8.03	32.63	7.41	13.84	42.41

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-0.0051747	0.43110	0.01670

Appendix 4: Results of the 6-Month Lagged Responses ,(Jan. 2006-June. 2008)

		L (%)	CBR (%)	AM2 (%)
2006	Jan	7.78	8.02	-1.41
	Feb	7.50	7.60	-5.23
	Mar	6.78	7.02	-9.37
	April	6.68	7.01	-4.35
	May	6.39	6.60	-4.96
	June	5.73	5.89	-10.78
	July	5.94	5.96	-4.61
	Aug	6.16	6.45	-4.34
	Sept	6.23	6.83	-3.26
	Oct	6.33	6.41	-7.47
	Nov	6.34	5.73	-6.69
	Dec	6.43	6.00	-14.46
2007	Jan	6.75	6.22	-10.26
	Feb	6.70	6.32	-2.14
	Mar	6.84	6.65	0.16
	April	7.03	6.77	-4.40
	May	7.07	6.53	-6.14
	June	7.19	6.52	-14.62
	July	7.49	7.30	-3.90
	Aug	7.81	7.35	-4.78
	Sept	7.44	7.55	6.42
	Oct	6.42	7.52	11.87
	Nov	7.13	6.87	6.84
	Dec	7.75	6.95	15.72
2008	Jan	6.90	7.28	13.26
	Feb	6.46	6.89	11.39
	Mar	6.67	7.35	11.89
	April	7.48	7.76	7.70
	May	7.58	7.73	15.72
	June	7.41	8.03	32.63

6-Month Lag

L (%)	£CBR(%)	£AM2 (%)
5.73	12.55	-15.88
5.94	12.11	-12.53
6.16	12.39	-10.52
6.23	12.91	-8.37
6.33	12.76	-11.59
6.34	12.01	-12.40
6.43	11.91	-20.49
6.75	12.08	-20.43
6.70	12.26	-12.28
6.84	12.67	-5.93
7.03	13.01	-7.25
7.07	12.94	-9.66
7.19	12.90	-19.22
7.49	13.65	-13.36
7.81	14.08	-11.42
7.44	14.48	0.70
6.42	14.66	12.29
7.13	14.10	13.08
7.75	13.90	22.49
6.90	14.11	24.57
6.46	13.83	23.75
6.67	14.15	23.66
7.48	14.72	19.34
7.58	14.98	25.28
7.41	15.41	45.02

a_2	ai	ao
-0.0152939	0.58251	-0.00933

Appendix 5: Results of the 3-Month Lagged Responses, (Jan. 2006-Dec. 2009)

		L(%)	CBR (%)	AM2 (%)
2006	Jan	13.20	11.23	11.40
	Feb	13.27	11.02	12.92
	Mar	13.33	10.60	13.32
	Apr	13.51	10.02	17.00
	May	13.95	10.01	16.84
	Jun	13.79	9.75	17.98
	Jul	13.72	9.75	19.58
	Aug	13.64	10.00	17.27
	Sep	13.54	10.00	18.49
	Oct	14.01	10.00	17.64
	Nov	13.93	10.00	17.67
	Dec	13.74	10.00	16.74
2007	Jan	13.78	10.00	16.61
	Feb	13.64	10.00	15.78
	Mar	13.44	10.00	16.93
	Apr	13.33	10.00	14.25
	May	13.35	10.00	14.66
	Jun	13.14	8.50	16.02
	Jul	13.29	8.50	15.09
	Aug	13.04	8.75	18.42
	Sep	12.87	8.75	17.38
	Oct	13.24	8.75	16.83
	Nov	13.39	8.75	16.83
	Dec	13.32	8.75	20.39
2008	Jan	13.78	8.75	22.51
	Feb	13.84	8.75	23.50
	Mar	14.06	8.75	20.97
	Apr	13.91	8.75	27.94
	May	14.01	8.75	20.97
	Jun	14.06	9.00	18.23
	Jul	13.91	9.00	17.35
	Aug	13.66	9.00	15.05
	Sep	13.66	9.00	16.67
	Oct	14.12	9.00	18.23
	Nov	14.32	9.00	16.18
	Dec	14.87	8.50	14.93
2009	Jan	14.78	8.50	11.93
	Feb	14.67	8.50	10.95
	Mar	14.87	8.25	11.96
	Apr	14.71	8.25	6.56
	May	14.85	8.25	12.20
	Jun	15.09	8.00	13.42
	Jul	14.79	7.75	15.24
	Aug	14.76	7.75	14.95
	Sep	14.74	7.75	15.33
	Oct	14.78	7.75	15.62
	Nov	14.85	7.00	17.09
	Dec	14.87	7.00	17.16

3-Month Lag

L(%)	YCBR (%)	Y AM2 (%)
13.33	18.92	22.63
13.51	18.08	26.88
13.95	17.67	28.66
13.79	17.26	30.65
13.72	17.13	32.78
13.64	17.31	31.55
13.54	17.44	32.02
14.01	17.50	31.21
13.93	17.50	31.12
13.74	17.50	29.99
13.78	17.50	29.39
13.64	17.50	28.27
13.44	17.50	28.97
13.33	17.50	26.66
13.35	17.50	26.01
13.14	16.00	26.91
13.29	15.25	26.76
13.04	15.13	29.97
12.87	15.25	30.37
13.24	15.31	30.13
13.39	15.31	29.59
13.32	15.31	33.02
13.78	15.31	36.91
13.84	15.31	39.85
14.06	15.31	38.34
13.91	15.31	44.30
14.01	15.31	40.19
14.06	15.56	35.71
13.91	15.69	31.71
13.66	15.75	28.28
13.66	15.75	28.53
14.12	15.75	30.32
14.32	15.75	29.47
14.87	15.25	27.58
14.78	15.00	23.44
14.67	14.88	20.65
14.87	14.63	20.42
14.71	14.50	15.28
14.85	14.44	18.47
15.09	14.19	21.16
14.79	13.81	25.00
14.76	13.63	25.93
14.74	13.56	26.62
14.78	13.56	27.02
14 85	12.81	28.73
14.87	12.44	29.60

a_2		ao
0.03157	-0.2407	0.18688

Appendix 4: Results of the 6-Month Lagged Responses ,(Jan. 2006-June. 2008)

		L (%)	CBR (%)	AM2 (%)
2006	Jan	13.20	11.23	11.40
	Feb	13.27	11.02	12.92
	Mar	13.33	10.60	13.32
	Apr	13.51	10.02	17.00
	May	13.95	10.01	16.84
	Jun	13.79	9.75	17.98
	Jul	13.72	9.75	19.58
	Aug	13.64	10.00	17.27
	Sep	13.54	10.00	18.49
	Oct	14.01	10.00	17.64
	Nov	13.93	10.00	17.67
	Dec	13.74	10.00	16.74
2007	Jan	13.78	10.00	16.61
	Feb	13.64	10.00	15.78
	Mar	13.44	10.00	16.93
	Apr	13.33	10.00	14.25
	May	13.35	10.00	14.66
	Jun	13.14	8.50	16.02
	Jul	13.29	8.50	15.09
	Aug	13.04	8.75	18.42
	Sep	12.87	8.75	17.38
	Oct	13.24	8.75	16.83
	Nov	13.39	8.75	16.83
	Dec	13.32	8.75	20.39
2008	Jan	13.78	8.75	22.51
	Feb	13.84	8.75	23.50
	Mar	14.06	8.75	20.97
	Apr	13.91	8.75	27.94
	May	14.01	8.75	20.97
	Jun	14.06	9.00	18.23
	Jul	13.91	9.00	17.35
	Aug	13.66	9.00	15.05
	Sep	13.66	9.00	16.67
	Oct	14.12	9.00	18.23
	Nov	14.32	9.00	16.18
	Dec	14.87	8.50	14.93
2009	Jan	14.78	8.50	11.93
	Feb	14.67	8.50	10.95
	Mar	14.87	8.25	11.96
	Apr	14.71	8.25	6.56
	May	14.85	8.25	12.20
	Jun	15.09	8.00	13.42
	Jul	14.79	7.75	15.24
	Aug	14.76	7.75	14.95
	Sep	14.74	7.75	15.33
	Oct	14.78	7.75	15.62
	Nov	14.85	7.00	17.09
	Dec	14.87	7.00	17.16

6-Month Lag

L (%)	VCBR (%)	y AM2 (%)
13.79	19.62	33.48
13.72	19.39	36.14
13.64	19.52	35.14
13.54	19.60	35.85
14.01	19.64	35.30
13.93	19.66	35.06
13.74	19.68	33.99
13.78	19.69	33.30
13.64	19.69	32.16
13.44	19.69	32.72
13.33	19.69	30.33
13.35	19.69	29.55
13.14	18.19	30.53
13.29	17.44	30.09
13.04	17.31	33.22
12.87	17.25	33.73
13.24	17.22	33.47
13.39	17.20	33.33
13.32	17.22	36.81
13.78	17.23	40.68
13.84	17.23	43.55
14.06	17.23	42.47
13.91	17.23	48.91
14.01	17.23	45.17
14.06	17.48	40.50
13.91	17.60	37.25
13.66	17.66	33.30
13.66	17.70	32.99
14.12	17.71	34.29
14.32	17.72	33.00
14.87	17.22	31.15
14.78	16.97	27.23
14.67	16.84	24.33
14.87	16.53	23.87
14.71	16.38	18.21
14.85	16.30	21.05
15.09	16.02	23.71
14.79	15.63	26.91
14.76	15.43	28.23
14.74	15.34	29.26
14.78	15.29	30.14
14.85	14.52	31.97
14.87	14.13	32.93

a_2		ao
-0.0297	-0.2253	0.1894

Appendix 8: Statistical Results of the 3-Month Lags, (Jan, 2006-Dec, 2009)

Summary Output

Regression Statistics	
Multiple R	0.8094
R Squared	0.6551
Adjusted R Squared	0.6275
Standard Error	0.0020
Observations (Months)	28

ANOVA

	df	*SS*	*MS* .	*F*	*Significance F*
Regression	2	0.0001921744	0.0000960872	23.7380657048	0.0000016665
Residual	25	0.0001011953	0.0000040478		
Total	27	0.0002933696			

	Coefficients	Standard Error	t -Stat	P-value	Lower 95 %	Upper 95%
Intercept	0.08263	0.0088952444	9.2893426174	0.0000000014	0.0643108741	0.1009510713
ICBR	0.19543	0.0406130605	4.8119344860	0.0000606594	0.1117832233	0.2790715496
7AM2	0.0668	0.0097957607	6.8192093801	0.0000003794	0.0466245966	0.0869740898

Appendix 8: Statistical Results of the 3-Month Lags, (Jan, 2006-Dec, 2009)

Summary Output

Regression Statistics	
Multiple R	0.6934
R Squared	0.4807
Adjusted R Squared	0.4566
Standard Error	0.0045
Observations (Months)	46

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	0.0008023365	0.0004011682	19.9052626963	0.0000007599
Residual	43	0.0008666168	0.0000201539		
Total	45	0.0016689533			

	Coefficients	Standard Error	t-Stat	P-value	Lower 95 %	Upper 95 %
Intercept	0.18688	0.0075130203	24.8739187564	0.0000000000	0.1717268069	0.2020297052
£CBR	-0.24071	0.0449255121	-5.3578816115	0.0000031119	-0.3313065036	-0.1501046464
VAM2	-0.03157	0.0121599899	-2.5963058527	0.0128445547	-0.0560940095	-0.0070480965

Appendix 8: Statistical Results of the 3-Month Lags, (Jan, 2006-Dec, 2009)

Summary Output

Regression Statistics	
Multiple R	0.8343
R Squared	0.6961
Adjusted R Squared	0.6685
Standard Error	0.0019
Observations (Months)	25

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	*2*	0.0001900462	0.0000950231	25.1942994003	0.0000020430
Residual	*22*	0.0000829754	0.0000037716		
Total	24	0.0002730216			

	Coefficients	Standard Error	t -Stat	P-value	Lower 95 %	Upper 95 %
Intercept	0.08052	0.0092217669	8.7310772228	0.0000000134	0.0613911849	0.0996407327
£CBR	0.17651	0.0386694388	4.5644896084	0.0001519602	0.0963107442	0.2567017587
VAM2	0.06388	0.0091387470	6.9899822166	0.0000005140	0.0449270780	0.0828322806

Appendix 8: Statistical Results of the 3-Month Lags, (Jan, 2006-Dec, 2009)

Summary Output

Regression Statistics	
Multiple R	0.6953
R Squared	0.4834
Adjusted R Squared	0.4576
Standard Error	0.0045
Observations (Months)	43

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	*2*	0.0007744811	0.0003872406	18.7149739701	0.0000018324
Residual	40	0.0008276593	0.0000206915		
Total	42	0.0016021405			

	Coefficients	Standard Error	t -Stat	P-value	Lower 95 %	Upper 95 %
Intercept	0.18942	0.0082478019	22.9667052591	0.0000000000	0.1727554058	0.2060942644
ICBR	-0.22535	0.0470123631	-4.7933710233	0.0000228185	-0.3203632282	-0.1303321699
VAM2	-0.02969	0.0119468510	-2.4847650385	0.0172467466	-0.0538306041	-0.0055396314