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Two Stage Interest Rate Pass Through In Kenya

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Abstract

Interest rate volatility is a major concern for emerging economies due to its crippling effects on the economy. There is wide ranging disconsensus on the effectiveness and speed of various tools. This paper proposes timely monetary policy mediation to curb interest rate volatility through the determination of the total time taken for the effects of monetary policy instruments to transmit to via the interest rate channel to market rates. A change in the Central Bank Rate (CBR) will trigger a corresponding change in intermediate variables (Treasury bill (T-bill), Repurchase agreement (REPO) and Interbank rates) in the first stage of transmission. The second stage measures the transmission from the intermediate variables to market rates. The study uses an Auto Distributed Lag (ADL) specification parameterized as an Error Correction Model (ECM) with primary data coming from Central Bank of Kenya (CBK). The results indicate it takes 7 days for monetary policy adduced shocks to transmit from CBR to REPO, 3 months from CBR to T-bill and 12 months from CBR to interbank for the 1st stage. At the second stage it takes 3 months for the adduced shocks to transmit from interbank to market rates and 10 months from T-bill to market rates. The paper proposes that CBK considers alternative monetary policy transmission channels as well as adopting a hybrid approach to monetary policy control. The study is the first to measure the complete two stage interest rate pass-through in Kenya and will contribute the scarce but steadily growing pool of literature on the subject in Kenya and Sub-Saharan Africa. The study will aid economists in determining the appropriateness of the interest rate channel based on its speed

Keywords: Interest rate(s), monetary policy, CBR, two stage, market rates, Kenya, transmit.

INTRODUCTION

A substantial body of recent literature has focused on these issues for developed and emerging economies looking at the transmission mechanisms and sectoral effects of monetary policy. Different observers weigh in different ways the various specific channels through which monetary policy works. However, there is still wide ranging disconsensus on the effectiveness of monetary policy and its transmission channels. Taylor (1995) found that there are strong interest rate and exchange rate channels while Obstfeld and Rogogf (1995) stress the relative importance of the exchange rate channel. The exchange rate in Kenya has been volatile from a low of 61.44 in May 2008 to a high of 105.96 in October 2011.

The year 2011 witnessed by far the most significant weakening of the shilling and perhaps the highest inflation rates in recent history. The weakening of the Kenya shilling has been attributed to developments in international currency market, largely influenced by the effect of the Debt Crisis in the Euro zone, pressures from Kenya's balance of payments and partly on account of arbitrage in the money market. The Treasury bill interest rate, which is primarily driven by the Central Bank Rate (CBR), recorded a high of 20.8% in January 2012 and a low of 1.09% in September 2003.

LITERATURE REVIEW

The interest rate channel is the primary mechanism at work in conventional macroeconomic models. The basic idea is straightforward: given some degree of price stickiness, an increase in nominal interest rates, for example, translates into an increase in the real rate of interest and the user cost of capital. These changes in turn lead to a postponement in consumption or a reduction in investment spending. This is precisely the mechanism embodied in conventional specifications of the "(Investment Saving) IS" curve—whether of the "Old Keynesian" variety, or the forward-looking equations at the heart of the "New Keynesian" macro-models (Rotemberg & Woodford, 1997; Clarida et.al, 1999). But as Bernanke and Gertler (1995) have pointed out, the macroeconomic response to policy-induced interest rate changes is considerably larger than that implied by conventional estimates of the interest elasticities of consumption and investment.

The size or degree of pass-through refers to the extent to which changes in the money market rates are passed through to the banking rates in the long run. The speed of the pass-through refers to the length of time required for the adjustment to occur. In explaining this transmission mechanism when a

policy action is effected, Balazs (2007) and Michel and Yan (2010) distinguish two stages of pass-through. The first stage measures how changes in the policy rate are transmitted to short- and long-term market rates. The second stage captures how changes in market rates influence bank deposit and lending rates. The first stage is to a large extent influenced by the stability of the yield curve: if the term structure remains stable over time, the pass-through from policy rates to market rates is said to be proportionate. However, any twist in the yield curve can change the size of the pass-through. The second stage is best described using the cost of funds approach in which case, it is argued that in an economy where there are large concentrations of market power, the degree of monopoly in each industry allows a mark-up over unit prime costs. Under this theory, interest rate on bank loans is seen as a price of the financial goods provided by the banking sector. Interest rates or prices of loans are therefore determined by a mark-up over this cost of funds, which is determined by the degree of monopoly or the profit margin of the bank (Rousseas, 1985). The proxy for the cost of funds in this case is the equivalent of the CBR and the connection to retail banks is through the effect of the policy rate on the money market rates.

Groups of companies or individuals controlling a substantial market share may bind themselves with formal or informal agreements (usually illegal) on prices and quantities. When these formal agreements are aimed primarily at controlling pricing directly or indirectly by limiting output, it is called collusive pricing behaviour. These groups or individuals limit open competition by deceiving, misleading, or defrauding consumers of their legal rights to gain an unfair advantage. Collusion is not a reserve of oligopolistic competition but is prevalent among oligopolies which are characterized by few market players and fierce competition. Assuming that the behavior of the firms acting in oligopolistic markets is profit maximizing, they have an incentive to collude in order to increase their joint level of profit (Stigler, 1964).Collusive pricing behaviour on the part of banks is one of the factors explaining interest rate rigidity.

Banks are reluctant to effect price changes that would lower their profits and that would increase chances of a breakdown of collusive behaviour arrangements. This is because banks face lower profits following an increase in deposit rate or a reduction in lending rates. Collusive pricing behaviour implies rigidity in lifting the deposit rate and reducing the lending rate. At the same time, however, the cost of changing a price by banks may be related to negative reactions from customers. This is the adverse customer reaction hypothesis, in which case, banks may practice downward rigidity in deposit rates and upward rigidity in lending rates so as to maintain customers (Wang and Lee, 2009; Barry, 1996). Conventionally money supply, interest rate, exchange rate, lending (broad credit), asset price and expectations influence monetary policy transmission. Under the conventional Keynesian interest rate channel, an increase in short term interest rates occasioned by the manipulation of policy instruments such as rise in the bank rate increases cost of capital, lowers the demand for credit and depresses spending on assets, including investment. On the other hand, it results in increased saving (Taylor, 1995; Cotarelli and Courelis, 1994; Clarida et. al, 2000).

Most studies cited in this paper have been conducted in the developed countries; few have been conducted on African countries and Kenya in particular. Analysis of interest rates spreads in Kenya and sub-Saharan Africa (SSA) was conducted by (Ndungu & Ngugi, 2000; Ngugi, 2001; 2003;) who analyzed interest rate spreads in Kenya and SSA covering the periods 1991-1999 and 1993-1999 respectively. Misati et al. (2011) investigated the size and speed of monetary policy interest rate transmission to long-term interest rates in Kenya. Their study found incomplete pass-through of policy rates both in the short and the long run. This study aims to quantitatively measure the two stage speed of monetary policy interest rate transmission to long-term interest rates in Kenya from January 2007 to February 2012. During part of this period, CBK failed to use monetary policy tools to intervene in the market choosing the “do nothing” approach which allows market forces of demand and supply to determine equilibrium rates. This period of monetary policy inactivity will be examined in step three of the analysis to determine the implications of this monetary policy passivity.

RESEARCH METHODOLOGY

This study uses an Auto Distributed Lag (ADL) specification parameterized as an Error Correction Model (ECM). The data was obtained from the CBK annual reports. The analysis was done in three steps. The first step entailed a computation of basic statistics to establish the existence (or lack) of a relationship between the variables of interest. This is essential for validation of the model. The second step analyzed transmission from CBR to T-bill, REPO and Interbank, then the combined effect of these variables to lending rates. The third and final step isolates and analyses the period of monetary policy inactivity and high exchange rates. The relationship between the output (y_t) and the inputs ($\acute{\alpha}_0$, $\acute{\alpha}_1$, and x_t) is given by the general equation (1) below.

$$y_t = \acute{\alpha}_0 + \acute{\alpha}_1 x_t + \acute{\varepsilon}_t \quad (1)$$

The second step utilises variations of equation (1) and the LAG formula ($\beta_2 = (\acute{\alpha}_1 + \acute{\alpha}_3)/(1- \acute{\alpha}_2)$) to determine

the two stage pass-through to long-term lending rates. In the third and final part of the analysis the study attempts to delineate and discuss the behaviour of the CBR versus the Kenya Shilling-United States Dollar (USD) exchange rate and lending rates curves for the period associated with the monetary policy passivity. First, the long-term relationship between the administered rate and the market rate is as follows;

$CBR_t = \acute{\alpha}_0 + \acute{\alpha}_1 REPOR_t + \acute{\varepsilon}_t$ (1a)

$CBR_t = \acute{\alpha}_0 + \acute{\alpha}_1 T\text{-}billR_t + \acute{\varepsilon}_t$ (1b)

$CBR_t = \acute{\alpha}_0 + \acute{\alpha}_1 InterbankR_t + \acute{\varepsilon}_t$ (1c)

CBR adduced shocks transmit to REPO, T-bill and Interbank simultaneously but at different speeds. Equations 1a, 1b and 1c are variations of equation (1) that helped us to measure stage 1 transmission; $\acute{\varepsilon}_t$ is the disturbance term; $\acute{\alpha}_0$ and $\acute{\alpha}_1$ are the model parameters. According to Rousseas (1985), $\acute{\alpha}_0$ measures the constant markup and $\acute{\alpha}_1$ measures the degree of pass-through in the long term. The long-run adjustment is complete when $\acute{\alpha}_1$ is equal to one. It is, however, incomplete ($\acute{\alpha}_1$ is less than one) when markets are not fully competitive and when there are high switching, menu costs and/or asymmetric information.

To examine the short-run dynamics of administered rate changes in response to changes in the market rate, we employed an error-correction methodology, used in Heffernan (1997) and Scholnick (1996). Using the error-correction model, testing for differences in the administered rate adjustments when they are above or below their equilibrium level is possible. Finally, the error-correction model also allows us to determine how long it takes for the administered rates to fully adjust to changes in wholesale rates in the market. Equation (1) may be estimated using the Engle-Granger 2 step procedure to obtain the pass-through coefficient. This is because most time series data are non-stationary in nature and the Granger model uses cointegration and error-correction procedures to remove any spurious results. The ADL model is specified as:

$y_t = \acute{\alpha}_0 + \acute{\alpha}_1 x_t + \acute{\varepsilon}_t + \acute{\alpha}_2 x_{t-1} + \acute{\alpha}_3 y_{t-1} + \acute{\varepsilon}_t$ (2)

Where y_t represents the endogenous administered (lending or deposit) rates; x_t denotes the corresponding interbank rate (which is assumed to be exogenous). And Δy_t and Δx_t are changes in the endogenous administered rates and corresponding interbank rates respectively. To examine the long- and short-term dynamics, we transform equation (2) into an ADL specification reparameterized as an ECM (Beng et al., 2006; Keele and De Boef, 2005; Gerrard and Godfrey, 1998). This is the standard procedure used in the empirical literature on pass-through studies (Chionis and Leon, 2006; Marco and Alessandro, 2004; Stefannie and Harald, 2003). Following Hendry (1995), equation (2) reparameterized as an ECM yields:

$\Delta y_t = \acute{\alpha}_1 \Delta x_t + \beta_3(y_{t-1} - \beta_0 - \beta_2 x_{t-1})$ (3)

Where;

$\beta_3 = \acute{\alpha}_2 - 1$, $\beta_2 = (\acute{\alpha}_1 + \acute{\alpha}_3)/(1 - \acute{\alpha}_2)$.

The Mean Auto-distributed Lag (MAL) is a measure of the speed at which retail rates respond to movements in policy rates (Liu et al., 2008; Beng et al., 2006; Hendry, 1995).

$$MAL = \frac{(1 - \acute{\alpha}_1)}{\beta_3}$$

RESULTS

Preliminary analysis (Step 1)

Table 1: Correlation matrix

VARIABLE	CBR	DEPOSIT	INTERBANK	LENDING	REPO	T-BILL
CBR	1.0000	0.8886	0.9406	0.8724	0.8384	0.9253
DEPOSIT	0.8886	1.0000	0.8301	0.9236	0.6898	0.9054
INTERBANK	0.9406	0.8301	1.0000	0.8508	0.9515	0.9571
LENDING	0.8724	0.9236	0.8508	1.0000	0.7171	0.8974
REPO	0.8384	0.6898	0.9515	0.7171	1.0000	0.8927
T-BILL	0.9253	0.9054	0.9571	0.8974	0.8927	1.0000

Source, Analysis of CBK Time Series Data in Appendix 1)

Table 2: Unit root testing

Variable	CBR	Interbank	Repo	T-Bill	Lending	Deposit
Order of Integration	I(2)**	I(0)**	I(0) ***	I(1)*	(1)***	I(1)*

Source: Analysis of CBK Time Series Data in Appendix 1

*Stationary at 10% level of significance, ** at 5% level of significance and *** at 1% level of significance

The results of Table 1 above indicate that all variables are statistically significant. The correlation matrix indicates a very high level of correlation between variables with elements varying between strong positive correlation (.6898) and perfect positive correlation (1). The unit root testing (Table 2) revealed that the data is not normally distributed (skewed). The repo and interbank rates are the only zero order stationary sets at 1% and 5% levels of significance respectively.

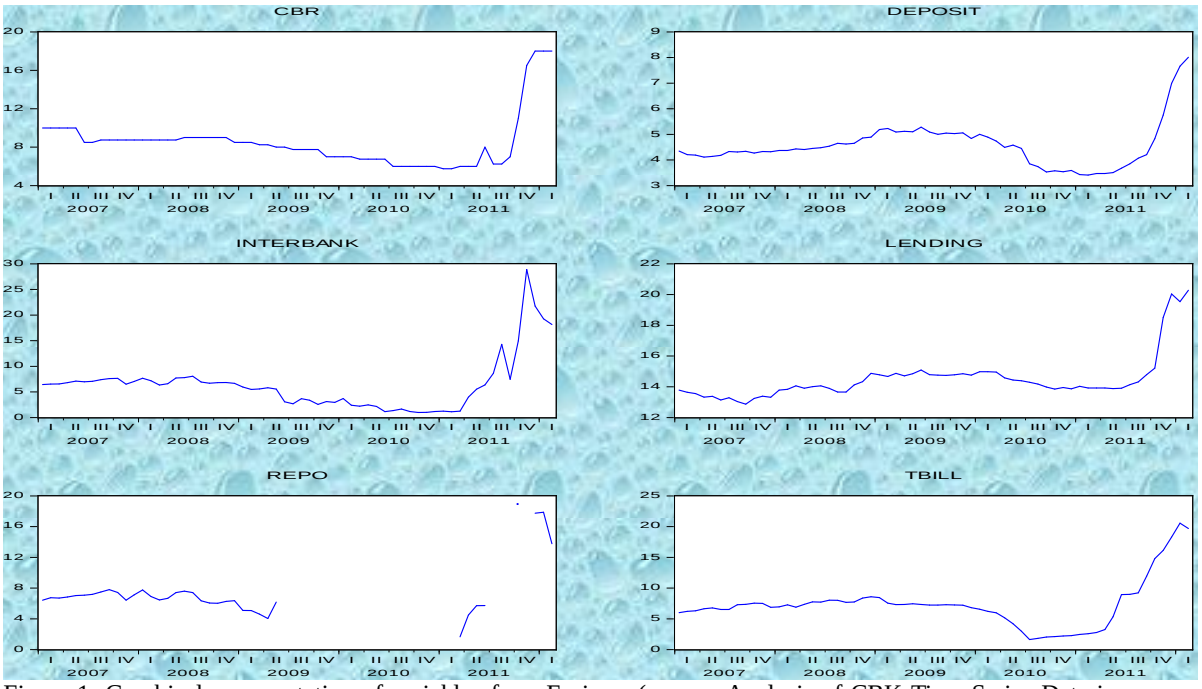

Figure 1: Graphical representation of variables from E-views (source, Analysis of CBK Time Series Data in Appendix 1)

The trends in graph 1 above indicate that the intermediate variables of interest (interbank, REPO and T-bill rates) move in harmony with CBR. The REPO graph has discontinuities because it is a weekly discontinuous rate. Deposit and lending rates also conform with the trend of CBR to intermediate variables, this implies two things. First, our test statistics above which indicate high correlation are accurate. Second, the interest rate channel transmits monetary policy adduced shocks to intermediate and eventually market rates.

Short-Term and Long-Term Pass-Through Rate Computations (Step Two)

Table 3: Pass-through rate workings

STAGE 1-CBR TO T-BILL, REPO, INTERBANK				**STAGE2-T-BILL, REPO, INTERBANK TO**			
CBR TO		**t-value**	**Mal**		**t-value**	**Mal**	**Total**
Interbank	0.084071	3.674427	12 Months	2.021850	6.851975	3 Months	15 Months
	-0.075808	-1.260201		-0.441314	-3.811432		
T-bill	3.247731	4.491698	3 months	0.116948	1.750635	10 months	13 months
	0.693164	6.144382		0.093204	2.754003		
REPO	0.777027	0.422368	7 days	-0.022995	-1.136264	83Months	7 days
	-0.954392	0.132457		0.011763	0.425912		

Source, Analysis of CBK Time Series Data in Appendix 1)

Stage one measured transmission from CBR to REPO, Interbank and T-bill while stage two measured REPO, Interbank and T-bill to lending rates. This makes it possible to obtain more meaningful results for the short term and then the long term. From the results of our data analysis (Table 3), it takes 12 months for CBR to transmit to Interbank rates in the first stage. This slow adjustment may be an indication that the interest rate channel is not very efficient in transmitting monetary policy adduced shocks. In the second stage it takes

only 3 months for Interbank to transmit to lending and in total 15 months.

It takes 3 months for CBR to transmit to T-bill in the first stage and 10 months in the second stage. This is expected considering the 91 day T-bills whose effect should be felt significantly in the short run. Secondly, T-bills (if the return is high like the case in Kenya last year when T-bills attracted a 22% interest), will have an immediate effect of mopping up excess liquidity as investors look for a safe investment option that guarantees immediate return and cushions them against losses associated with a weak currency through high inflation. The behaviour of T-bill rates is very strongly related to movements in CBR (correlation coefficient of 0.9253). This explains why the two have a near equal transmission rate i.e. 13 months for the T-bill adduced shock to transmit to lending rates and 15 months for Interbank in total. It takes 7 days for CBR to transmit to REPO in the short run. This is reasonable considering that repurchase agreements (REPO) are valid for one week. In the long-run it takes 83 months a result we choose to ignore as it may be distorted by other MPC instruments, subsequent pronouncements and a presumed high pass through degree in the short-run.

Graphical analysis of monetary policy passivity (Step three)

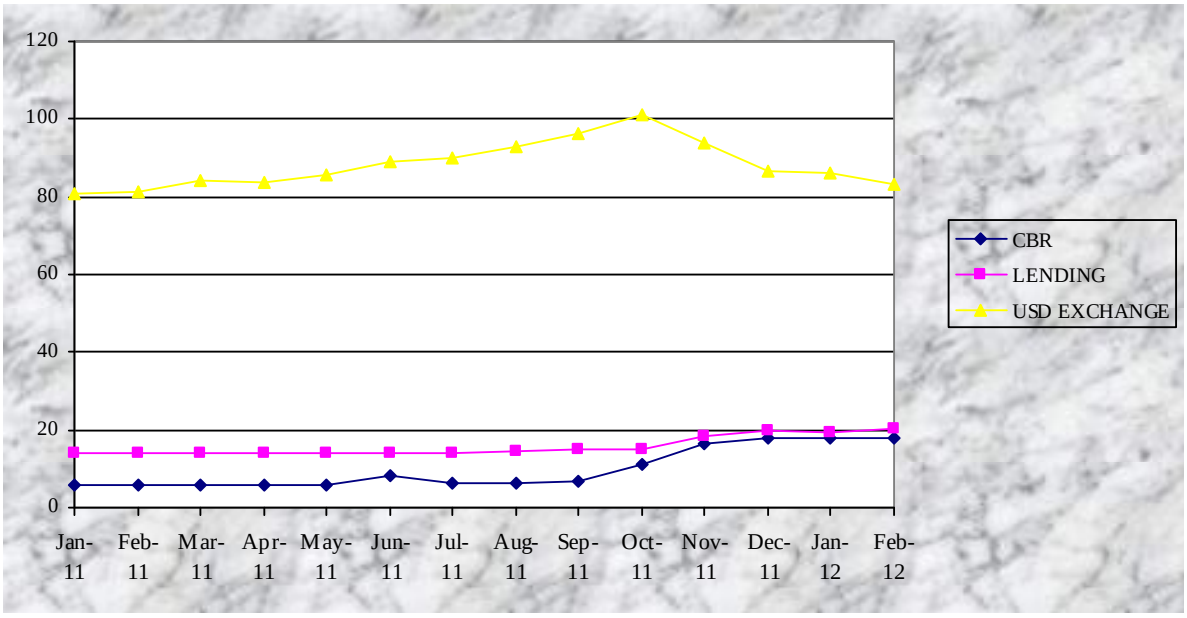

Figure 2: Graph of CBR, lending rates and USD exchange rates from Jan-2011to Feb-2012 (*source, Analysis of CBK Time Series Data in Appendix 1*)

The graph in figure 2 above reveals two important trends; a gap between CBR and lending rates as well as movements in opposite direction between CBR and exchange rates. The gap between the CBR and lending rates curves represents operation costs and profit appetite for commercial banks. Towards November, the two graphs are almost at the same level despite CBR being altered significantly. The flattening of the graph is an indication of a lending rate ceiling (equilibrium point) beyond which the profit equation for commercial banks would reverse. Assuming that commercial bank loans conform to the conventional commodity and service demand curve, a price/interest rate increase beyond this point would adversely affect demand for loans which would result in lower profits.

The trend in exchange rates however is different. Between January and October 2011 the Shilling depreciated considerably against the USD. The graph rises more steeply compared to the CBR within the specified period implying that free market forces act in one direction to raise exchange rates while CBR was rather static. Between October 2011 and February 2012 following the monetary policy tightening, the exchange rate graph deeps sharply. Based on this finding we conclude free market forces have a greater bearing on increasing exchange rates while CBR has a counteracting effect. This finding contradicts the view that market forces of demand and supply will equilibrate automatically.

DISCUSSION AND POLICY IMPLICATION

Based on the analysis above, it takes over a year for the interest rate channel to fully transmit monetary policy shocks to market rates which implies that the channel is not very efficient. This finding is consistent with Misati et al (2011), who found out that it takes between 11-24 months for policy interest rates to be fully transmitted to long-term rates. Misati et al (2011) observed that instead of the lending rates

coming down, they either do not respond, marginally respond or defy all standard Keynesian economic theory and move in the reverse direction in some market segments. This supports our initial observation that the interest rate channel is not efficient.

However, the downward rigidity in lending rates by Kenyan commercial banks could be explained by a near oligopolistic market structure characterised by collusive behaviour, price stickiness and a high profit appetite. There is need for the CBK to explore the use of alternative channels of monetary policy transmission. This is because, other than for the inefficiency, the interest rate channel has far reaching adverse economic repercussions. After the monetary policy tightening by the CBK in November/December 2012, lending rates shot up crippling the mortgage industry. Uptake of loans declined significantly.

According to Ndung'u 2000, doing nothing will allow the exchange rate to equilibrate reserves and determine the optimal flow of short-term capital. The trend in graph 2 shows a period of over 10 months within which the Kenya Shilling weakened significantly against the dollar due to free market forces. The period of Monetary Policy inaction, that seems to have been appraised by "the do nothing policy" popularised by Ndung'u (2000, 1996), was highly critisised by many economists and other professionals. According to the Star Daily (Monday 19/11/2011) "the Shilling remains the 2nd worst performing currency worldwide versus the Dollar this year, after the Uganda Shilling".

It would be plausible to argue in favour of the position that monetary policy stance has great bearing on lending rates subject to a profit equilibrium motivated or appraised by demand for credit against the cost of credit. Secondly, based on empirical evidence exchange rates are driven up more by market forces and counteracted by monetary policy tightening. This finding refutes the "do nothing" approach. The empirical findings by Ndung'u (2000) were based on data for the period between 1973 and 1995 which may have been "seasonally valid". This was a period of relatively stable exchange and inflation rates in Kenya. Secondly, Kenya had not adopted free market exchange regulation and the value of the Shilling against world majors was controlled by the government via CBK. Empirical evidence appears to indicate that a hybrid approach to monetary policy control could be the most effective. We recommend that CBK explores the use alternative monetary policy transmission channels and adopts a hybrid approach to monetary policy control.

LIMITATIONS OF THE STUDY

The study has not considered, in details, the effect of exchange rates of major currencies, other than the USD, on the interest rates offered through options. Kenya adopted a floating exchange rate regime in 1993. A longer study period (starting from 1993) could not be considered, which could provide greater variability.

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APPENDIX

Appendix 1: CBK Interest Rate Time Series Data

Month	Repo	Interbank	T-bill	Lending	CBR
Jan-07	6.43	6.43	6.00	13.78	10.00
Feb-07	6.75	6.52	6.22	13.64	10.00
Mar-07	6.70	6.55	6.32	13.56	10.00
Apr-07	6.84	6.81	6.65	13.33	10.00
May-07	7.03	7.11	6.77	13.38	10.00
Jun-07	7.07	6.98	6.53	13.14	8.50
Jul-07	7.19	7.07	6.52	13.29	8.50
Aug-07	7.49	7.38	7.30	13.04	8.75
Sep-07	7.81	7.59	7.35	12.87	8.75
Oct-07	7.44	7.65	7.55	13.24	8.75
Nov-07	6.42	6.50	7.52	13.39	8.75
Dec-07	7.13	7.05	6.87	13.32	8.75
Jan-08	7.75	7.66	6.95	13.78	8.75
Feb-08	6.90	7.18	7.28	13.84	8.75
Mar-08	6.46	6.35	6.90	14.06	8.75
Apr-08	6.67	6.59	7.35	13.91	8.75
May-08	7.42	7.72	7.76	14.01	8.75
Jun-08	7.61	7.79	7.73	14.06	9.00
Jul-08	7.41	8.07	8.03	13.90	9.00
Aug-08	6.35	6.92	8.02	13.66	9.00
Sep-08	6.06	6.70	7.69	13.66	9.00

Appendix 1: CBK Interest Rate Time Series Data continuation					
Oct-08	6.03	6.81	7.75	14.12	9.00
Nov-08	6.27	6.83	8.39	14.33	9.00
Dec-08	6.36	6.67	8.59	14.87	8.50
Jan-09	5.10	5.95	8.46	14.78	8.50
Feb-09	5.08	5.49	7.55	14.67	8.50
Mar-09	4.62	5.57	7.31	14.87	8.25
Apr-09	4.05	5.81	7.34	14.71	8.25
May-09	6.18	5.55	7.45	14.85	8.00
Jun-09	0.00	3.08	7.33	15.09	8.00
Jul-09	0.00	2.69	7.24	14.79	7.75
Aug-09	0.00	3.68	7.25	14.76	7.75
Sep-09	0.00	3.38	7.29	14.74	7.75
Oct-09	0.00	2.57	7.26	14.78	7.75
Nov-09	0.00	3.11	7.22	14.85	7.00
Dec-09	0.00	2.95	6.82	14.76	7.00
Jan-10	0.00	3.69	6.56	14.98	7.00
Feb-10	0.00	2.39	6.21	14.98	7.00
Mar-10	0.00	2.21	5.98	14.96	6.75
Apr-10	0.00	2.46	5.17	14.58	6.75
May-10	0.00	2.16	4.21	14.44	6.75
Jun-10	0.00	1.15	2.98	14.39	6.75
Jul-10	0.00	1.35	1.63	14.29	6.00
Aug-10	0.00	1.66	1.83	14.18	6.00
Sep-10	0.00	1.18	2.04	13.98	6.00
Oct-10	0.00	0.98	2.12	13.85	6.00
Nov-10	0.00	1.01	2.21	13.95	6.00
Dec-10	0.00	1.18	2.28	13.87	6.00
Jan-11	0.00	1.24	2.46	14.03	5.75
Feb-11	0.00	1.13	2.59	13.92	5.75
Mar-11	1.66	1.24	2.77	13.92	6.00
Apr-11	4.50	3.97	3.26	13.92	6.00
May-11	5.72	5.54	5.35	13.88	6.00
Jun-11	5.73	6.36	8.95	13.91	8.00
Jul-11	0.00	8.61	8.99	14.14	6.25
Aug-11	0.00	14.29	9.23	14.32	6.25
Sep-11	0.00	7.46	11.93	14.79	7.00
Oct-11	18.89	14.95	14.80	15.21	11.00
Nov-11	0.00	28.90	16.14	18.51	16.50
Dec-11	17.75	21.75	18.30	20.04	18.00
Jan-12	17.88	19.27	20.56	19.54	18.00
Feb-12	13.78	18.15	19.70	20.28	18.00