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Abstract
Several African nations, including Kenya, Nigeria and South Africa, have seen dramatic shifts in their monetary policy framework and financial environment during the last two decades. To manage and stabilize the economy, the Central Bank of Kenya (CBK) stopped intervening directly in lending low interest rates at financial institutions and instead turned to indirect and market-based measures to carry out monetary policy. Even though it was predictable that a changing financial environment would have a substantial impact on the efficacy of monetary policies, there has not been sufficient research done to determine how IRPT affects lending rates. The purpose of this article was to analyze the pass-through effects of the central bank rate on lending rates in Kenya. The study adopted a non-experimental research design. Data was collected from the CBK, the Kenya Bureau of National Statistics, and the Nairobi Stock Exchange between 2010 and 2021 quarterly data. The study's theoretical underpinning was the loanable funds theory and cost of capital. The cost-of-funds method is based on the conventional marginal cost pricing model for financial markets and helps explain how market prices are transmitted to consumers. The error correction model was used to measure the short-term effect of bank rate changes on Kenyan lending rates. The findings showed that Kenya has an incomplete IRPT which means that increases in the lending rate would be less than proportional whenever there is a change of a specific percentage in the CBR. According to the study, this may be one of the causes of some banks' foreign ownership, their independence from the central bank's liquidity, and their slow reaction times to signals from the central bank to modify lending rates. The study recommends that since commercial banks are a very important component in the transmission mechanisms, they should follow suit in the adjustment of the lending rates.

Introduction

High borrowing rates are an indicator of the banking industry's inefficiency. Compared to other African nations, Kenya's average loan rates are somewhat higher, suggesting inefficiency in the country's banking sector (Hassan & Khan, 2010). In this view, there has been a lot of focus and interest from academics, consultancies, and non-profits in studying Kenya's bank lending rates (Hafer, 2010). Studies on interest rates, such as (Hassan & Khan 2010), believe that commercial banks' interest rates are abnormally high compared to their cost of funding. With inflation expectations firmly anchored within the Government goal range, enhanced certainty for economic growth prospects, and economic

production below its potential level, the Monetary Policy Committee (MPC) decided to lower the CBR from 10% in September 2016 to 9.50% in March 2018 to boost economic activity. Comparatively, the average commercial bank loan rate was 12.47 per cent in June 2019, whereas, in June 2020, it was 11.89 per cent.

The policy rate is crucial to a country's economy because it sets the benchmark for how much banks charge to borrow money. There is an argument here for the assumption that if monetary policy were tightened, consumers and businesses would have to pay more in interest and principal on their variable-rate loans. The lending rate refers to the interest rate financial institutions charge borrowers (Maina, 2015). Either BFIs or NBFIs may be the institutions. Kithinji and Waweru (2007) suggest that the loan charges might be viewed as "Rent for money," which is a tiny deviation. Lending rates consider market data on the erratic nature of the value of the dollar and the chance that inflation will fluctuate in the future (Ngugi, 2001).

According to Were and Wambua (2014), this is predicated on the idea that borrowers—some of whom may be money lovers—are more likely to take out loans when interest rates are low, which could lead to inflation, while borrowers facing higher interest rates might be forced to forgo borrowing, which could result in deflation.

The commercial banks' interest rate that the central bank establishes is called the prime lending rate, and any changes made to it will substantially influence the cost of borrowing money in the short future (CBK, 2019). After sending signals that it is prepared to be more flexible with monetary policy, the Central Bank may opt to cut its interest rate if market interest rates continue to fall due to the signal (Mwega, 2014). When interest rates are lowered, the economy grows. The CBK keeps an eye on the Over The Counter (OTC) money market but has no direct impact (Muchiri, 2012). Rates set by Central Banks have an indirect effect on market interest rates.

Commercial banks vary the interest rates they charge their retail customers in reaction to changes in the central bank's short-term policy interest rate. This is known as the rate of interest channel of monetary transmission policy. This theory maintains that interest rates are the vehicle via which central banks convey their monetary policies to the economy. Consequently, the immediate policy rate of interest is recognised as an effective operational monetary policy instrument, especially among countries that want to contain inflation. In the European Union, this is especially true. The idea that short-term interest rates matter much in achieving price stability is central to the new mainstream of macroeconomics, which provides the theoretical foundation for this argument. Changes to the interest rate at which commercial banks in Kenya borrow money from the Kenyan Commercial Banks have the potential to have substantial repercussions for the country's economy.

The cost of borrowing money goes up as a side effect of high-interest rates on deposits at the Central Bank (Ng'etich & Wanjau, 2011). As a result, less money is being put into the economy, and less money is being spent, both of which slow the growth of the national economy. Lending rates should be kept very low to provide the financial services outlined in Kenya's Vision 2030 project. From 1998 to 2012, Kenya's CBR affected short-term interbank rates but did not impact the lending rate at which commercial banks lent money. It's not clear whether the loan interest rate increased or not. As literature suggests, monetary policy may not have had as much of an impact on private investor financing and economic growth as was previously believed. (No clear pattern emerged in actual GDP growth rates in response to alterations in interest rates from the central bank throughout the studied period.)

Thus, the (CBR) is a crucial tool valued more in effecting changes in the monetary system. A modification in the CBR by the CBK is expected to be reflected in adjustments to interbank, deposit, and lending rates. Yet, there has recently been criticism in Kenya by researchers on central banks' monetary policy stance. For example, Mwega (2014), that interest rates on loans, particularly associated charges, do not move fully and as quickly as the rates for monetary policy. As a result, the banking system has come to be viewed as a barrier to realising the goals of Vision 2030 since it makes it challenging to finance crucial economic activity and effectively implement monetary policy. Because of doubts about the efficacy of Kenya's monetary policy, the CBR was established to provide more certain signals about the bank's monetary stance than the monetary targeting framework. The deregulation of interest rates in Kenya occurred in July 1991, and currency rates were liberalised in October 1994, both congruent with the introduction of CBR in the country (Mwega, 2003). Implementing the changes has been hampered by the quick uptake of cutting-edge financial products, information and communication technology (ICT), and globalization. Central banks' Interest Rate Pass-Through (IRPT) effect may be understood most effectively by situating it within the context of the Monetary Policy Transmission Mechanism (MPTM). To better comprehend Interest Rate Pass-Through (IRPT), it is required to look at how MPTM occurs and affects other macroeconomic variables (Jibrilla & Balami, 2022).

A monetary regulator, often a central bank, will announce a policy move to the public to affect interest rates as the first step in the MPTM policy for the economy. An efficient MPTM interest charges transmission channel allows commercial banks to advise borrowers of interest rate changes in the banking system via retail bank interest charges. A complete (of one) IRPT indicates an efficient and competitive financial system. Developing nations like Kenya are likely to have a lot of incomplete IRPTs (Maravalle & Pandiella, 2022). This suggests that their financial system is not entirely developed and, therefore, not competitive and inefficient.

Since IRPT is essential to the success of monetary policy, economists and policymakers are increasingly interested in the time lapse between policy interest rate changes and increases at commercial banks. Loans to business customers like merchants and wholesalers are a necessary aspect of a commercial bank's mission to foster the growth of economic activity (Greenberg, 2011). The Kenya Vision 2030 program comprises activities that must be undertaken and target the banking system to raise savings rates from 17% of GDP to at least 30% of GDP. The adoption of these measures is planned to bring about these expansions. This would need lowering borrowing costs and raising bank deposits from 44% to almost 80%.

Central Bank Rate has been found to affect most sectors of the economy, including the financial market, commodity market and international trade market. Changes in Central Bank Rate have a negative relationship with economic variables whereby an increase in bank rates results in a decline in growth of the economy due to the contraction of money supply in the economy, which ultimately slows down economic activities, hence affecting economic growth by a more significant margin. The loanable funds theory and cost of capital provided the study's theoretical underpinning for the study. The cost-of-funds method was based on the conventional marginal cost pricing model for financial markets and may help explain how market prices are transmitted to consumers.

In case of the absence of co-integration techniques and taking the likelihood of structural breaks into account, the ARDL model of central bank rate IRPT on lending rate can be described as follows:

$$\Delta LR_t = \beta_0 + \sum_{i=1}^{q} \alpha_{1i} \Delta LR_{t-i} + \sum_{i=1}^{q} \alpha_{2i} \Delta CBR_{t-i} + \sum_{i=1}^{q} \alpha_{3i} \Delta EER_{t-i} + \sum_{i=1}^{q} \alpha_{4i} \Delta MR_{t-i} + \sum_{i=1}^{q} \alpha_{5i} Dum + \sum_{i=1}^{q} \alpha_{6i} Dum\_CBR_{t-i} + \sum_{i=1}^{q} \alpha_{7i} Dum\_EER_{t-i} + \sum_{i=1}^{q} \alpha_{8i} Dum\_MR_{t-i} + u_t$$

Where, LR stands for retail bank rates, CBR for central bank policy rates, MR for wide money, EER for estimated exchange rate, and q represents for the best lag numbers found by means of the AIC criterion by providing for four optimum number of lags. Dum is a dummy variable that handles structural breaks (Sander & Kleimeier, 2006).

Results

The study's goal was prompted by the importance of the central bank rate IRPT impacts and the manner in which lending rates have stayed sticky or shifted in various directions when the central bank adjusts its policy. Because of this, it is possible that the impact that was intended to be attained by monetary policy was not. Analysis using an autoregressive distribution lag regression framework was carried out as part of the study so that it could accomplish this goal.

Table 1 provides the descriptive data that includes variables such as broad money, central bank rate, exchange rate, stock market capitalization, real GDP growth and lending rate.

Table 1: Descriptive Statistics Results

Variable	Mean	Standard Deviation	Minimum	Maximum
Broad Money	2065.05	686.95	959.13	3250
Central Bank Rate	9.46	2.84	5.9	18
Exchange Rate	94.85	9.16	80.68	109.49
Stock Market Capitalization	1975.96	322.88	1441	2817
Real GDP growth	5.45	2.76	-5.7	11.6
Lending Rate	9.84	4.87	1.11	22.07

Source: Computations based on Central Bank of Kenya for years 2010-2021

The findings established as seen in Table2 that bank lending rate ranged from 1.11 percent to 22.07 percent. The highest lending rate occurred in the fourth quarter of 2011.

This is the period when commercial banks were allowed to fix the rates. Such action was seen to lock out some businesses especially in the informal sector thus leading to an interest rate capping law. The law which came into force in 2016 required commercial banks to charge an interest rate of not more than 4 percent of the central bank's rate. This led to reduced interest rate as observed at the later years in the study. The stationarity tests such as ADF, PP, and Z-A were applied to investigate for the chances of occurrence of a unit root. The results were as presented in Table3.

Table 2: Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) Unit Root Tests

		Augmented Dickey-Fuller			Phillips-Peron		
		Statistic	Critical value (5%)	Order of Integration	Statistic	Critical value (5 %)	Integration Order
Lending Rate	Level 1st difference	-2.640 -5.121	-2.950 -2.952	I (1)	-2.795 -5.032	-2.950 -2.952	I (1)
Broad Money	Level 1st difference	-0.850 -6.793	-2.950 -2.952	I (1)	-3.692 -6.879	-2.950 -2.952	I (1)
Central Bank Rate	Level 1st Difference	-2.385 -5.288	-2.950 -2.952	I (1)	-2.686 -5.252	-2.950 -2.952	I (1)
Stock Market Capitalization	Level 1st difference	-1.850 -7.710	-2.950 -2.952	I (1)	-1.620 -8.104	-2.950 -2.952	I (1)
Exchange Rate	Level 1st difference	-1.690 -6.620	-2.950 -2.952	I (1)	-1.594 -6.804	-2.950 -2.952	I (1)
Real domestic product	Level 1st difference	-2.983 -8.895	-2.952 -2.952	I (1)	-2.989 -9.691	-2.950 -2.952	I (1)

The findings showed that broad money was integrated at order one under the ADF and order zero under the PP test, whereas interest rates, stock market capitalization, and exchange rates were all integrated at order one.

In the event of a structural break, the results of these two-unit root tests incorrectly reflect the presence or absence of unit roots in the data. Therefore, the variables were put through a Zivot-Andrews (Z-A) unit root test, which, according to Lumsdaine and Papell (1997), is an improved version of the ADF and PP in terms of determining the proper integration sequence. When a series contains structural breaks, the PP and ADF tests become biased. This supports the application of the Z-A test, which permits a single structural break.

Z-A analyzes whether an endogenous break exists by determining whether the break dates is related to the data (Hansen, 2001). The findings from the Z-A test used to integrate the variables of order 1 provided credence to the ADF and PP tests with regard to the general structure of the research variables, but not in the case of a variables-on-variables analysis. The results were presented in Table 3.

Table 3: Zivot-Andrews Unit Root Test Results

Trend and Intercept					
Variables	Structural break period	Level of Testing	t-statistic	5 percent critical value	Order of Integration
Lending Rate	2017q1 2012q2	Level 1st Difference	-4.080 -5.519	-4.80 -4.80	I (1)
Broad Money	2013q2 2015q3	Level 1st difference	-1.513 -6.735	-4.80 -4.80	I (1)
Central Bank Rate	2015q2 2012q3	Level 1st Difference	-4.059 -5.462	-4.80 -4.80	I (1)
Stock Market Capitalization	2018q3 2018q2	Level 1st difference	-4.684 -8.146	-4.80 -4.80	I (1)
Exchange Rate	2015q2	Level 1st di	-4.618 -7.465	-4.80 -4.80	I (1)
Real Gross domestic product	2015q2 2019q2	Level 1st difference	-4.212 -6.810	-4.80 -4.80	I (1)

Source: Author's Computations based on Central Bank of Kenya data

The findings established that the recognisable endogenous political shocks in 2012 and 2017 coexist with the structural breaks for lending rates identified by the Z-A test in Table 3. The structural break in the other years coincided with periods of adverse weather and a locust invasion from Somalia, an external shock, in Kenya. Then, a substantial amount of government funds was redirected to combat the locusts, hurting government development spending in critical sectors of the economy. The locust invasion in the financial year 2020/2021 had a negative impact on real GDP. This forced the CBK to lower its discount rate to boost the economy. A fundamental breach was seen in interest rates on loans in 2012. This has led to an economic upswing in Kenya, even though rising oil prices have dampened the country's terms of trade, delayed growth, and pushed up inflation. An external shock occurred here. In 2013 and 2015, two significant drops in exchange rates were given by a p-value of less than 0.05 (0.000). The first gap in 2013 was related to the uncertainties brought on by the 2013 general election and the likelihood of regime changes.

The study revealed that sharp increases in inflation expectations were seen in the first half of 2015 due to currency devaluation, market pressures, and persistent volatility in international currency markets. After two years of maintaining inflation at 8.5 per cent, the CBK raised its policy rate by 150 basis points in June 2015 to stem rising prices. To lock in the benefits of the tightening policy bias, the CBR was raised to 11.5% in July 2015, an increase of 150 basis points from its previous level.

Interest rate spreads and lending/deposit rates were impacted by fluctuations in the interbank interest market and the TB market, which occurred simultaneously with the increase. Interest rates spiked in the fourth quarter of 2015 as a direct consequence of new policies introduced that year, then began to decline in the first quarter of 2016 (CBK, 2020).

A sufficient lag length was found by applying the five lag length selection criteria to the analysis. FPE, HQIC, LR, AIC, and SBIC were the taken into consideration. The outcome of the test on lending rate was displayed as shown in Tables 4.

Table 4: Lag Selection for Lending Rate Model

Lag	LL	LR	Df	P	FPE	AIC	HQIC	SBIC
0	-101.50				11.45	5.28	5.34	5.44
1	-97.36	8.298	1	0.004	9.79	5.12	5.19	5.33
2	-93.19	8.34*	1	0.004	8.36*	4.96*	5.05*	5.21*
3	-92.998	0.38401	1	0.535	8.72	4.99	5.11	5.30
4	-92.995	0.00655	1	0.936	9.18	5.05	5.17	5.39

Source: Author's Computations based on data from KNBS

From the lag selection results, the findings revealed that all the lag length criteria suggested two lags. As SBIC's proposed test is more stringent, the research followed its recommendation and used a lending rate function with two delays. According to the lag length selection results of the study, the study settled on lag one as recommended by SBIC. The findings from an ARDL bounds test (co-integration) suggested that interest rates charged by the central bank were correlated with lending rates over the long term. Because the F-test's findings were more significant than the 1(1) limit critical values, the findings inferred a long-term link between the two variables (Pesaran & Shin, 1999). In the near run, estimates were made using preliminary data for the ARDL and the error correction model.

Table 5: Pass through Effect of Central Bank Rate Changes on Lending Rate

Dependent Variable: Lending Rate				
	Coefficient	Standard Error	T	P>t
Error Correction Term (ECT)	-0.6028	0.1713	-3.52	0.002
Central Bank Rate	1.299	0.287	4.53	0.000
Natural log of Broad Money	6.343	5.501	1.15	0.259
Exchange rate	-0.111	0.3162	-0.35	0.727
Dummy variable	-133.97	102.65	-1.31	0.203
Interaction between dummy variable and Central Bank Rate	-0.0836	1.216	-0.07	0.946
Interaction between dummy variable and Natural log of Broad Money	18.29	14.31	1.28	0.212
Interaction between dummy variable and Exchange Rate	-0.0796	0.4282	-0.19	0.854
Lag one of Lending Rate	0.2713	0.1724	1.57	0.128
Lag one of Central Bank Rate	0.9666	0.3306	2.93	0.007
Lag two of Central Bank Rate	-0.1502	0.3516	-0.43	0.673
Lag one of Natural log of Broad Money	-5.707	19.23	-0.30	0.769
Lag two of Natural log of Broad Money	3.954	16.14	0.24	0.808
Lag one of Exchange Rate	0.3796	0.1813	2.09	0.046
Lag two of Exchange Rate	0.06396	0.1752	0.36	0.718
Constant	-24.57	23.095	-1.06	0.297
Jarque Bera Test	0.3128			
Observations	44			
R-squared	0.871			

Discussion

The impact of the central bank Rate on Loan Rates was analysed using the ARDL regression methodology, and the outcome is displayed as presented in Table 5. CBK policy changes and their effect on lending rates from Q1 2010 to Q4 2020 are shown in Table 5. The selected models' goodness-of-fit statistics were also summarised in Table 2. Zivot-Andrews's analysis of the unit root revealed the existence of discontinuities. However, the existence of a long-run link was shown not to be affected by structural fractures.

An adjusted R-squared of 0.871 was discovered, showing that changes in lending rates were driven by central bank rates 87.1 per cent of the time and by other factors 12.5 per cent of the time, which was not measured in this research. Recursive residuals from the ARDL regression were obtained to test for model stability. The CUSUM, or cumulative sum of squares, was established. Figure A.2 in the appendix shows the graphical plot of these CUSUM. The CUSUM should be within a 5% significance threshold to assure model stability. Since the CUSUM was found to be inside the 5 per cent border, the model specified was stable.

The co-integration results are consistent, showing a long-term link between the central bank's rate and lending rate. A substantial negative ECT estimate at the 5% level is required for a sustainable relationship. According to the results, if the CBR in Kenya is changed, equilibrium would be restored in around (0.6028*3 months), or 54 days. The long-term lending rate IRPT for the Central Bank of Kenya was found to be 1.29, implying it takes longer for commercial banks to respond to changes in the central bank rate due to the adverse selection challenges, while short-term lending rate IRPT was found to be 0.9666. These results are consistent with a low short-term IRPT impact from Kenya's central bank rate to lending rate and a larger long-term IRPT effect. According to the findings of this study, Kenya has an incomplete CBR pass-through effect, which means that changes in the lending rate would be less than proportional whenever there is a change of a specific percentage in the CBR. This is one of the reasons that some banks are foreign-owned, do not depend on the CBK for liquidity and may not immediately respond to signals by the CBK to adjust their lending rates.

In general, substantial loan rate rises might contribute to the moral hazard problem. When the anticipated value of a loan is low, borrowers are more likely to choose risky ventures and take out the loan. Aziakpono et al. (2007) and De Angelis et al. (2009), for example, both discovered the same thing when they investigated the impact of interest rates on IRPT. (2009). They found an IRPT between policy and lending rates of 0.93% to 1.040% over the long run. According to the data, consumers may feel an effect from the central bank's short-term borrowing rates ranging from 0.40 percentage points to 0.92 percentage points.

According to the results of Dube and Zhou (2014), commercial banks in Kenya may be incentivised to avoid considerably raising lending rates as borrowers who accept higher rates are more likely to default on their loans. In general, substantial loan rate rises might contribute to the moral hazard problem. When the anticipated value of a loan is low, borrowers are more likely to choose risky ventures and take out the loan.

Aziakpono et al. (2007) and De Angelis et al. (2009), for example, both discovered the same thing when they investigated the impact of interest rates on IRPT (2009). They found an IRPT between policy and lending rates of 0.93% to 1.040% over the long run. Consumers may feel an effect from the central bank's short-term borrowing rates ranging from 0.40 percentage points to 0.92 percentage points.

The results from table 5 demonstrate that at the 1% level, the lag one estimate of the predicted exchange rate was statistically significant, suggesting that prior fluctuations in the projected exchange rate significantly affected present-day loan rates provided by commercial banks. It was calculated that a 1% rise in the exchange rate would lead to a 0.38 % increase in the loan rate without any other changes in the economic environment.

Conclusion

According to the findings, the study concluded that Kenya has an incomplete CBR pass-through effect. This means that changes in the lending rate would be less than proportional whenever a specific percentage changes in the CBR. The CBR changes meant to affect lending rates, economic growth, and even investments in the stock market capitalisation must consider several considerations. The study also concluded that structural breaks do not alter the short- and long-term empirical evidence of IRPT effects of CBR adjustments. In areas where the CBR has been altered, re-establishing stability typically takes about 54 days.

The findings pointed to an imperfect transmission of the CBR's pass-through on the lending rate. Moreover, commercial banks do not adjust their lending in the same proportion with changes in the lending rates, especially when it comes to raising the lending rates, because borrowers could easily shy away from borrowing or they could face off with riskier borrowers. The study recommends that since commercial banks are a very important component in the transmission mechanisms, they should follow suit in adjusting the lending rates.

The implications of these findings for monetary policymaking and framework choice are substantial. If interest rate IRPT is poor, an inflation-targeting monetary framework may not be the best option. This might occur if a nation has a weak financial system or a low-income economy which needs more time to create and enhance transmission channels. A system using monetary aggregates, the exchange rate, or another nominal anchor as an intermediate objective may be more appropriate for this kind of nation.

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