The Relationship between Share Prices and Interest Rates: Evidence from Kenya

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Abstract

The changes in interest rates do have a diverse effect across the economic spectrum in any country. The effects of interest rates may be reflected in the stock prices. Policy makers, scholars, and the general Kenyan public are interested in understanding relationship of stock prices and interest rates. The objective of this research is to examine how changes in interest rates (represented by the weighted average lending rate by commercial banks in Kenya) and stock prices (proxied by the NSE 20 share index) are related to each other for Kenya over the period October 2002- September 2012. The research used Toda Yamamoto method [1] to determine the relationship between stock prices and interest rates. This method is applicable "whether the Vector Auto Regression (VAR) may be stationary (around a deterministic trend), integrated of an arbitrary order, or cointegrated of an arbitrary order" [1] The results indicated that there is no significant causal relationship between interest rate and share price. As regards the sign of causality, negative causality exists in both directions.

1 Introduction

1.1 The problem

The issue of whether stock prices and interest rate are related or not, is an important one especially with increased international trade and the integration of the global financial markets. If stock prices and interest rates are related and the causation runs from interest rates to stock prices then crisis in the stock markets can be prevented by controlling the interest rates. Moreover, developing countries can exploit such a link to attract foreign

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portfolio investment in their own countries. Similarly, if the causation runs from stock prices to interest rates then authorities can focus on domestic economic policies to stabilize the stock market.

The volatility of interest rates may have a diverse effect across the economic spectrum in any country. For instance, interest rates will impact the cost of doing business. The effects of interest rates may ultimately be reflected in the stock prices. On the converse, performance of companies and businesses in Kenya may impact on economic growth. The economic growth may eventually affect levels of interest rates. Policy makers, scholars, economists, business owners, regulators and the general Kenyan public are grappling with figuring out the relationship of stock prices and interest rates.

The objective of this research is to examine how changes in interest rates (represented by the weighted average lending rate by commercial banks in Kenya) and stock prices (proxied by the Nairobi Securities Exchange 20 share index) are related to each other for Kenya over the period October 2002- September 2012.

1.2 Research Question

The research question is: Is there a relationship between stock prices and interest rates?
Null hypothesis
▪ There is no significant causality relationship between stock prices and interest rates
Alternative hypothesis
▪ There is a significant causality relationship between stock prices and interest rates

1.3 Theoretical Framework

It is argued that expected inflation is negatively correlated with anticipated real activity, which in turn is positively related to returns on the stock market. [2] Therefore, stock market returns should be negatively correlated with expected inflation, which is often proxied by the short-term interest rate.

In theory, the interest rates and the stock price have a negative correlation. [3] This is because a rise in the interest rate reduces the present value of future dividend's income, which should depress stock prices. Conversely, low interest rates result in a lower opportunity cost of borrowing. Lower interest rates stimulate investments and economic activities, which would cause prices to rise.

1.4 Empirical Evidence from Literature

Hamrita examined the relationship between the interest rate, exchange rate and stock price using a wavelet transform in US over the period from January 1990 to December 2008. [3]The exchange rate returns and stock index returns were found to have a bidirectional relationship in this period at longer horizons.

Gazi sought to find evidence supporting the existence of share market efficiency based on the monthly data from January 1988 to March 2003 and also shows empirical relationship between stock index and interest rate for fifteen developed and developing countries. [4] For all of the countries it is found that interest rate has significant negative relationship with share price and for six countries it is found that changes of interest rate has significant negative relationship with changes of share price.

Hsing adopted a structural VAR model that allows for the simultaneous determination of

several endogenous variables such as, output, real interest rate, exchange rate, the stock market index and found that there is an inverse relationship between stock prices and interest rate. [5]

Lee used three-year rolling regressions to analyze the relationship between the stock market and the short-term interest rate. [6] He found that the relationship is not stable over time. It gradually changes from a significantly negative to no relationship, or even a positive, although insignificant relationship.

Another study examined the relationship between stock return, interest rate and exchange rates in Pakistani economy over the period of 1998-2009. [7]A multiple regression model was applied to test the significance of change in interest rate and exchange on stock returns. The results indicated that both the change in interest rate and change in exchange rate have a significant impact on stock returns over the sample period.

Hashemdah found bi-directional relationship causality present in regression models between money supply and stock return. However, with respect to interest rates the result was inconclusive. [8]

Gupta studied the relationship between exchange rate, interest rate and stock prices in Indonesia. [11] The study was conducted for five year period from 1993 to 1997 which was divided into three sub periods. The overall evidence, however, failed to establish any consistent causality relationships between any of the macro economic variables under study.

1.5 Research Gap

From the literature and empirical evidence review there is mixed findings. There are studies done by Hsing [5], Arango [10], Gazi [4] in different countries that have found a negative relationship between interest rates and share prices. However, Lee found the relationship changing gradually from a significantly negative to no relationship, or even a positive although insignificant relationship. [6] Gupta failed to establish any consistent causality relationships between interest rates and share prices. [9] Therefore, there is still no unanimity in the study of the relationship between interest rate and share prices.

2   Research Method

2.1 Research Design

The study used an empirical design in which the secondary data is analyzed and the research hypothesis tested. This design will help to build on what is already known in the subject area. The research is designed to perform causality test. The Toda and Yamamoto method is employed to test the relationship between stock prices and interest rates in Kenya. [1] In summary, in order to apply Toda and Yamamoto method, firstly, the VAR order, k, and the maximum order of integration of the variables, Q, should be determined in the VAR model. To employ causality test, modified Wald test (MWALD), is applied to the first k VAR coefficients to investigate causality.

2.2 Population and Sample

The two variables used in the research are interest rates stated as the monthly weighted average lending rate by commercial banks in Kenya and the NSE share index. The NSE share index used in the study is NSE 20 share index. This index tracks the performance of the shares of twenty companies as selected by the management of NSE from time to time. The sample data is based on the NSE stock index values for the time periods between October 2002 and September 2012. The prevailing interest rates for the same time period of between October 2002 and September 2012 are selected for use in the research. The 10 year period provides 120 data points which are considered adequate.

2.3 Data Analysis

Traditionally to test for the causal relationship between two variables, the standard Granger test has been employed. [11] This test states that, if historical values of a variable Y significantly contribute to project the value of another variable Xt+1 then Y is said to Granger cause X and vice versa. To analyze Granger causality between the two variables of interest, the research will use Toda and Yamamoto procedure, as explained below:
The Model
The integrated properties of the stock price series and interest rates series are not important in Toda and Yamamoto method, provided that the risk of misspecification of the order of integration of the series is minimized. Thus, the causality relationship between series which are integrated different orders can be investigated. The VAR order, k, and the maximum order of integration of the variables, Q, are determined in the VAR model. The sum of k and Q is taken into consideration as the total order of VAR, that is (k + Q) th order of VAR is estimated. Then, in order to employ causality test, modified Wald test (MWALD), proposed by Toda and Yamamoto is applied to the first k VAR coefficients to investigate causality. [12]This test has an asymptotic chi square ($\chi2$) distribution when a VAR (k + Q) is estimated. There is evidence that the MWALD test has a comparable performance to the likelihood ratio and WALD tests. [13]

To analyse *Granger* causality between interest rates and stock market price by using Toda and Yamamoto procedure, the following VAR system should be estimated.

$$int_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i}\, eintx_{t-i} + \sum_{j=k+1}^{dmax} \alpha_{2i}\, int_{t-i} + \sum_{i=1}^{k} \lambda_{2j}\, stp_{t-j} + \sum_{j=k+1}^{dmax} \lambda_{2j}\, stp_{t-j} + \mu_{1t} \quad (1)$$

$$stp_t = \beta_0 + \sum_{i=1}^{k} \beta_{1i}\, stp_{t-i} + \sum_{j=k+1}^{dmax} \beta_{2i}\, stp_{t-i} + \sum_{i=1}^{k} \emptyset_{2j}\, int_{t-j} + \sum_{j=k+1}^{dmax} \emptyset_{2j}\, int_{t-j} + \mu_{2t} \quad (2)$$

Where int_t is the interest rate and stp_t is the NSE 20 share index.

3   Main Results

We obtained the data for the stock prices and corresponding interest rates for the period between October 2002 and September 2012. The data for share prices and interest rates were obtained from Nairobi Securities Exchange (NSE) and the Central Bank of Kenya (CBK) respectively. Based on the monthly data obtained we generated the two series one for interest rates and the other for share prices. The two series trend in opposite directions.

For example, between 2002 and 2005 the share prices trended upwards while the interest rates were trending downwards. However, for the period 2007/2008 the share prices plummeted sharply while the interest rates increased marginal. The correlation coefficient is negative 0.356. This indicates weak negative correlation. We therefore perform causality test in order to empirically establish the interest rates and share prices nexus.

Toda Yamamoto method for causality test

Firstly, we perform unit root tests on the time series to investigate whether they are stationary or not. The Augmented Dickey-Fuller (ADF) unit root test is used for this purpose. The tests are based on the null hypothesis (H0): interest rate is not I (0) and share price is not I (0). If the calculated ADF statistics are less than their critical values from Fuller's table, then the null hypothesis (H0) is accepted and the series are non-stationary or not integrated of order zero. The test is repeated until we obtain the level in which the series become stationary. We then determine Q as the maximum order of integration. The results of the unit root tests are summarised below:

Table 1: Outcome of the Augmented Dickey-Fuller unit root test in levels

Variables	Test Critical Value (1%)	Test Statistic	P values
Interest rate	-3.486551	-1.195912	0.6747
Share price	-3.486551	-2.465983	0.1264

The results in table 1 above suggest that none of the variables are stationary, that is, integrated of order 0 since the variables are not statistically significant at 1%.

However, the results in table 2 below suggest that both variables are stationary, that is, integrated of order 1 since the variables are statistically significant at 1% in their first difference. Therefore maximum order of integration (Q) is 1.

Table 2: Outcome of the Augmented Dickey-Fuller unit root test in first difference

Variables	Test Critical Value (1%)	Test Statistic	P values
Interest rate	-3.486551	-8.173242	0.0000
Share price	-3.486551	-9.966756	0.0000

Having determined Q as 1, we then proceed in estimating the lag structure of a system of VAR in levels and our results indicate that the optimal lag length (VAR order k) using AIC optimal lag technique to be 6. We then estimate a system of VAR in levels with a total of (Q+k) lags. Therefore the lag length is determined to be 7 (6+1).

The MWALD test statistic is then computed using the systems of VAR computed above. The MWALD statistic will be asymptotically distributed as a Chi Square, irrespective of whether the series are I (0), I (1) or I (2), non-cointegrated or cointegrated of an arbitrary order. The result of the Toda-Yamamoto causality test is shown below:

Table 3: Outcome of the Toda-Yamamoto Causality Test

Null Hypothesis	Q and Var(k)	MWALD statistic	P values
Stock price does not *cause* interest rates	(1,7)	9.801052	0.7766*
Interest rates does not *cause* stock price	(1,7)	9.801052	0.8655**

*Significant at 5%

Based on the results of the MWALD test statistic as well as its p-values we fail to reject the two null hypotheses at 5% significance level respectively. The results showed in the table 3 indicate that there may be no significant causal relationship between interest rate and share price in both directions. As regards the sign of causality, negative relationship albeit insignificant exists in both directions.

The findings are similar to those of Gupta. [9] They did not find any consistent causal relationship between interest rates and share prices in Indonesia. However, this research finds negative relationship albeit weak similar to other studies carried in different countries.

4   Discussions

4.1 Implications of Findings

The study has established insignificant negative relationship between share price and interest rates. When interest rates increase the share prices decline which attests to the expected relationship as proposed by Fama. [2] The findings have implications for investors, investment managers, regulators, listed companies, financial institutions and other market players.

The regulators such as Central Banks being the custodians of monetary policy have a reason to be concerned with volatility in interest rates and the resulting impact on the stock market. The findings in this research will assist Central banks in understanding the relationship between interest rates and share prices. This may help them deploy the monetary policy tools at their disposal to control the interest rates and consequently preventing a negative effect on the stock market. Based on the finding of this research, the consistent sharp increase in interest rates may erode the value of shares. The Central Banks may move in to stabilize the interest rates and stem the crisis.

The forces of demand and supply in the market determine the market price of shares. This market price is useful in valuation of companies, evaluating portfolio performance, facilitating transfer or disposal of securities among others. High volatility in the interest rates and by extension the stock market will have an adverse effect on pricing efficiency thus distorting the price discovery process.

Portfolio managers are expected to create value for their clients. The volatility in share prices as a result of changes in interest rates may affect portfolio managers. This may encourage them to offload some of the positions in their portfolios. This may result to a dip in the stock market. On the contrary, when the interest rates decline the portfolio of equity securities may appreciate in value. Therefore, the portfolio managers need an in depth understanding of the relationship between interest rates and share prices. Based, on the results of this study, portfolio managers are more likely to protect the value of their portfolio by offloading shares in their portfolio if they predict increased interest rates. The portfolio managers should increase their positions in equity shares when they forecast a decrease in interest rates.

4.2 Areas for further Research

This research considered only two variables; interest rates and share prices. Another study may be done using additional variables. We, also suggest that the significance of our

results could possibly be improved upon by applying daily or weekly data. The use of more frequent observations may better capture the dynamics of stock prices and interest rates interrelationships.

5   Conclusion

The objective of this research was to examine how changes in interest rates (represented by the weighted average lending rate by commercial banks in Kenya) and stock prices (proxied by the NSE 20 share index) are related to each other for Kenya over the period October 2002- September 2012. The research used Toda Yamamoto method. The results indicated that there is no significant causal relationship between interest rate and share price. As regards the sign of causality, negative causality exists in both directions.

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