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# Share Prices – Exchange Rates Nexus: Evidence from Kenya

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**Abstract**
Kenya adopted a floating exchange rate regime in 1993. In the years that followed the exchange rates are market driven. Undoubtedly, the changes in exchange rates do have a diverse effect across the economic spectrum in any country. The sectoral and economy wide effects of exchange rates may ultimately be reflected in the share prices.
The objective of this research was to study share price and exchange rate nexus. The context of the study is Kenya for the period November 1993- April 2011. The findings have implications for investors, investment managers, regulators, listed companies, financial institutions and other market players. The economic theory points to the relationship between stock price and exchange rates but does not properly define the direction of the relationship.
The research used the procedure proposed by Toda and Yamamoto to determine the share price and exchange rates nexus. The outcome of the research suggests that there is bi-directional causal relationship between share price and exchange rates. Besides, the sign of causality is negative and causality exists in both directions.
**Keywords:** Share prices, Exchange rates, Modified WALD test

## 1. Introduction

### *1.1 The Problem*

Kenya adopted a floating exchange rate regime in 1993. In the years that followed the exchange rates are market driven. Undoubtedly, the changes in exchange rates do have a diverse effect across the economic spectrum in any country. For instance, exchange rates will impact the cost of imports and value of exports in Kenya. If the cost of importing fuel is adversely affected by changes in exchange rates, the aftermath may be dire. Fuel costs determine the cost of production which may affect many sectors in the Kenyan economy. The sectoral and economy wide effects of exchange rates may ultimately be reflected in the stock prices. On the converse, performance of companies and businesses in Kenya may have a bearing on economic growth. The economic growth could eventually affect levels of exchange rates.
Policy makers, scholars, economists, business owners, regulators and the general Kenyan public are grappling with figuring out the relationship of stock prices and exchange rates. Nyamute (1998) carried out a study on the relationship between share prices and selected financial variables such as inflation rates and exchange rates in Kenya. The findings were that, a positive correlation between share prices and exchange rates exists. Sifunjo and Mwasaru (2012) investigated the causality of exchange rates and share prices in Kenya. The empirical results obtained over the period November 1993 to May 1999 indicated that exchange rates cause stock prices and not the other way round.
This aim of the research was to study how exchange rates (represented by the Kenya shilling price of one U.S. dollar) and stock prices (proxied by the Nairobi Securities Exchange 20 share index) are related to each other for Kenya over the period November 1993- April 2011.
This research differs from that of Sifunjo and Mwasaru (2012) in two ways: Firstly, there is an extension of the research period to April 2011 from the previous research (Sifunjo & Mwasaru, 2012) which was between November 1993 and May 1999. Secondly, this research employs the Toda and Yamamoto (1995) procedure to determine the stock prices and exchange rates nexus. This method is applicable irrespective of whether the VAR is stationary, integrated or cointegrated. This is an improvement to the traditional granger causality method used by Sifunjo and Mwasaru (2012).

### *1.2 Research question and hypothesis*

The research question is: Is there a relationship between stock prices and exchange rates?
*Null hypothesis*

- Stock price does not granger *cause* exchange rates
- Exchange rates does not granger *cause* stock price

*Alternative hypothesis*

- Stock price granger *cause* exchange rates
- Exchange rates granger *cause* stock price

### *1.3 Theoretical framework*

There are two theories that link exchange rates and stock prices. The first is the traditional approach. It is argued that currency depreciation will result in higher exports and therefore corporate profits resulting in higher stock

 

prices in the short run. This relationship is attributed to Solnick (1987). He argued that a real currency appreciation will reduce a company's competitive ability to export, while a real depreciation enhances its ability to export in the short run.

The second is the portfolio adjustment theory (Dornbusch & Fischer, 1980). The theory posits that portfolio adjustments arise whenever there is a change in the stock prices. If stock prices are on the increase, they will attract more foreign capital. However, a decline in the stock prices will result in deterioration of shareholders wealth leading to the reduction in the country's wealth. This may lead to a fall in the demand for money and monetary authorities reduce the interest rates to mitigate this situation. A low interest rate regime may encourage capital flight where investors take advantage of higher interest rates in other part of the world resulting in currency depreciation. Therefore, according to this theory, lower stock prices may lead to currency depreciation.

*1.3 Empirical Evidence from literature*

Nyamute (1998) carried out a study on the relationship between share prices and selected financial variables such as inflation rates and exchange rates in Kenya. The findings were that, a positive correlation between share prices and exchange rates exists. However, his research performed data analysis on non-stationary series which may adversely affect the validity of the results.

Sifunjo and Mwasaru (2012) investigated the causality of exchange rates and share prices in Kenya. The empirical results obtained over the period November 1993 to May 1999 indicated that exchange rates cause stock prices and not the other way round. Therefore, the movements in exchange rates exert significant influence on stock price determination in Kenya. They tested for stationarity, cointergration and finally causality.

Abdalla and Murinde (1997) examined the relationship between stock prices and exchange rates in four Asian countries. They found out that exchange rates granger cause stock prices in India, Korea and Pakistan. Empirical evidence also indicated that in Philippines, stock prices cause exchange rates. Doong et al. (2005) studied the interrelation of stocks and exchange rates. The period of study was between 1989 and 2003. The findings showed causality in both directions in four of the six countries studied.

Muhammad and Rasheed (2002) examined the link between exchange rates and stock price for four countries for the period between 1994 and 2000. The empirical results showed a long-run causality in both directions for Bangladesh and Sri Lanka. No significant relationship was established for Pakistan and India.

Aydemir and Demirhan (2009) investigated the relationship between stock prices and exchange rates in Turkey. The study period was between 23 February 2001 and 11 January 2008. The results of empirical study indicated that there is bidirectional causal relationship between exchange rate and all stock market indices. While the negative causality exists from national 100, services, financials and industrials indices to exchange rate, there is a positive causal relationship from technology indices to exchange rate. On the other hand, negative causal relationship from exchange rate to all stock market indices was determined.

*1.4 Research gap*

From the literature and empirical evidence review it is still not clear on the direction of the relationship between exchange rates and stock prices. In some studies such as in the G7 countries (Nieh & Lee, 2001) no significant relationship was found. The studies done in Sweden (Hatemi-J & Irandoust, 2002) and Cyprus (Tsoukalas, 2003) revealed one way relationship from stock prices to exchange rates. The one way relationship was also established Kenya, USA and Japan but it was from exchange rate to stock prices. Finally, the studies done in Turkey and other six Asian countries indicated a bidirectional relationship. Therefore, there is still no unanimity in the study of the exchange rate and share prices nexus. This research will contribute to the growing literature by employing the Toda and Yamamoto (1995) method in the Kenyan scene since the previous research in Kenya used other methods namely traditional Granger (1969) causality test and Error Correction Model.

## 2. 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 (1995) method is employed to test the stock prices and exchange rates nexus in Kenya. In summary, in order to apply Toda and Yamamoto method, firstly, the VAR order, k, and the maximum order of integration of the variables, dmax, 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 exchange rates stated as the number of Kenya shillings that one US dollar can buy (1 US$ = XX Kenya shillings) and the Nairobi Securities (NSE) share index. The NSE share index used in the study is NSE 20 share index. This index is made up 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 November 1993 and April 2011. The prevailing exchange rates for the same time period of between November 1993 and April 2011 are selected for use in the research. This average monthly

 

data for each of the variable from November 1993 to April 2011 is used. The choice of the start date is based on the date when Kenya adopted an floating exchange rate regime.

*2.3 Data analysis*

Traditionally to test for the causal relationship between two variables, the standard Granger (1969) test has been employed. This test states that, if historical values of a variable M significantly contribute to project the value of another variable Nt+1 then M is said to Granger cause N and vice versa. To analyze Granger causality between the two variables of interest, the research will use Toda and Yamamoto (1995) procedure, as explained below:

The Model

The integrated properties of the stock price series and exchange 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 (Aydemir & Demirhan, 2009). 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, dmax, are determined in the VAR model. The sum of k and dmax, is taken into consideration as the total order of VAR, that is (k+dmax) th order of VAR is estimated. Then, in order to employ causality test, modified Wald test (MWALD), proposed by Toda and Yamamoto (1995), is applied to the first k VAR coefficients to investigate causality (Aydemir & Demirhan, 2009).This test has an asymptotic chi square ($\chi 2$) distribution when a VAR (k + dmax) is estimated. Zapata and Rambaldi (1997) provided evidence that the MWALD test has a comparable performance to the likelihood ratio and WALD tests. They asserted that the procedure does not require the knowledge of cointegration properties of the system. Moreover, according to Toda and Yamamoto, the MWald statistic is valid regardless whether a series is integrated in the order of 1 or 2, non-cointegrated or cointegrated of an arbitrary order.

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

$$ex_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i}\, ex_{t-i} + \sum_{j=k+1}^{dmax} \alpha_{2i}\, ex_{t-i} + \sum_{i=1}^{k} \lambda_{2j}\, stp_{t-j} + \sum_{j=k+1}^{dmax} \lambda_{2j}\, stp_{t-j} + \mu_{1t} \qquad (1)$$

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

Where $ex_t$ is the nominal exchange rate between US dollar and Kenya shilling and $stp_t$ is the NSE 20 share index.

**3. Results**

We obtained the data for the two variables if interest for the period between November 1993 and April 2011. The data for share prices and exchange rates were obtained from NSE and the Central Bank of Kenya (CBK) respectively. Based on the monthly data obtained we generated the two series one for exchange rates and the other for share prices and plotted on separate graphs.

By observing the trends on the two graphs in figures one and two below, one for exchange rates and the other share prices we note an important relationship. The two series trend in opposite directions. For example, between 1994 and 2002 the share prices declined while the exchange rates was trending upwards (implying depreciating Kenya shillings). For the period between 2003 and 2007 the share prices increased steadily while the exchange rates declined though minimally.

The following figures one and two depict the graphical analysis of the share prices and exchange rates series:

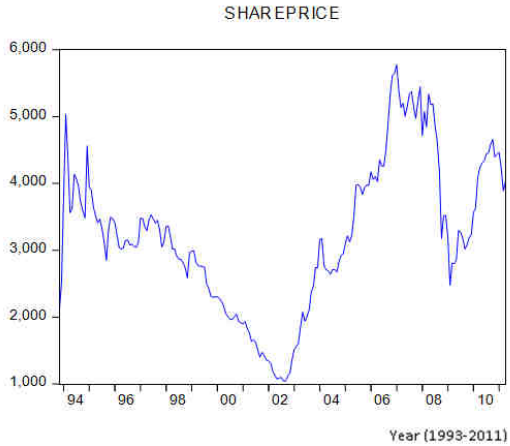


**Figure 1: Graphical analysis of share prices series**

 

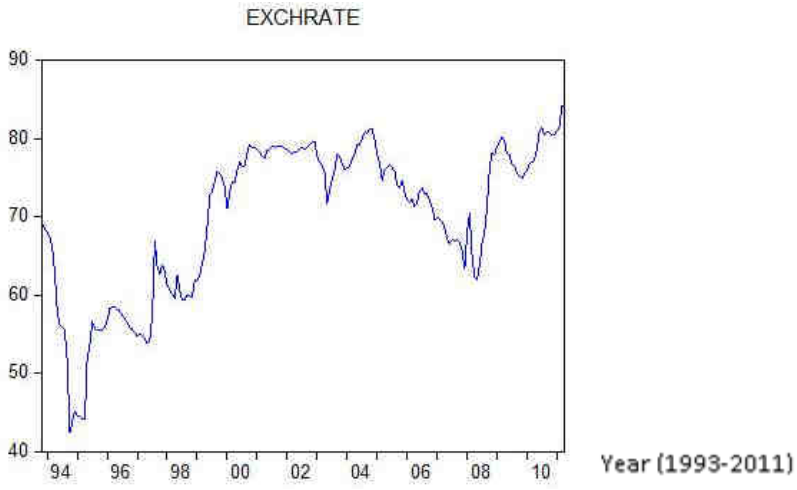


**Figure 2: Graphical analysis of exchange rates series**

We therefore perform causality test in order to empirically establish the exchange 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): exchange 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 *dmax* as the maximum order of integration. The outcome 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 |
|---|---|---|---|
| Exchange rate | -3.461783 | -1.400984 | 0.5813 |
| Share price | -3.461783 | -1.755215 | 0.4020 |

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 (dmax) 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 |
|---|---|---|---|
| Exchange rate | -3.461783 | -11.05731 | 0.0000 |
| Share price | -3.461783 | -12.57780 | 0.0000 |

Having determined that *dmax* as 1, the next step was estimating the lag structure of a system of VAR in levels and the outcome indicate that the optimal lag length (VAR order k) using AIC optimal lag technique to be 18. A system of VAR integrated in the order of zero with a total of (*dmax*+k) lags is then estimated. Therefore the lag length is determined to be 19 (18+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 integrated in the order of 0, 1 or 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 | $d_{max}$ and Var(k) | MWALD statistic | P values | *The Sign of the Sum of Lagged Coefficients* |
|---|---|---|---|---|
| Stock price does not *cause* exchange rates | (1,18) | 33.04564 | 0.0165* | (-) |
| Exchange rates does not *cause* stock price | (1,18) | 41.37849 | 0.0013** | (-) |

*Significant at 5%

**Significant at 1%

 

Based on the results of the MWALD test statistic as well as its p-values we reject the two null hypotheses at 5% and 1% significance level respectively. The results showed in the table 3 indicate that there is bi-directional causal relationship between exchange rate and share price. As regards the sign of causality, negative causality exists in both directions.

The findings are similar to those of Aydemir and Demirhan (2009) who found out a relationship between exchange rates and share price in both directions in Turkey. Doong et al. (2005) also found a two directional relationship in five of the six Asian countries that they investigated. The finding in this research is a different from earlier study done in Kenya. Sifunjo and Mwasaru (2012) had established a unidirectional relationship from exchange rates to share price in Kenya.

## 4. Discussion

### *4.1 Implications of findings*

The study has established a bi-directional negative relationship between share price and exchange rates. The exchange rate is stated as the Kenya shillings price of one US dollar (1US dollar = 'XX' Kenya shillings). Therefore when the exchange rate "increases" it implies depreciation of the Kenya shilling or appreciation of the foreign currency. This means that when the foreign currencies appreciate or Kenya shilling depreciates, the stock prices fall. Also, when the stock prices rise, the foreign currencies depreciate or Kenya shilling appreciates. The findings have implications for investors, investment managers, regulators, listed companies, financial institutions and other market players.

Portfolio managers are mandated to maximize the wealth for their clients by optimizing portfolio values. The sharp fluctuations in share prices as a result of oscillations in foreign exchange rates cause panic among portfolio managers. This may predispose them to liquidate some of the holdings in their portfolios. This may result to a slump in the stock market. On the contrary, when the foreign currency depreciates the portfolio of equity securities may appreciate in value. Therefore, the portfolio managers need a thorough understanding of the relationship between exchange rates and share prices. Based, on the results of this study, portfolio managers are better off when they dispose shares in their portfolio if they predict an appreciation of the foreign currency. On the flip side, the portfolio managers may increase their positions in equity shares when they forecast a depreciation of the foreign currency.

The regulators such as CBK who are in charge of monetary policy have a reason to be concerned with volatility in exchange rates and the resulting impact on the stock market. The findings in this research will assist CBK in mastering the relationship between exchange rates and share prices. This may help them employ the monetary policy tools at their disposal to control the exchange rates and consequently averting adverse effect on the stock market. In accordance with the findings of this research, the free fall of the Kenya shilling may erode the value of shares. The CBK may intervene to stabilize the exchange rates by among other things increasing the interest rates.

The stock market is an important institution for price discovery. 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 currency market and by extension the stock market will have an adverse effect on pricing efficiency. If volatility persists for a long time there will be a disruption in the price discovery process in the market. This disruption in price discovery process renders the stock market inefficient.

The linkage between exchange rates and share prices is important to managers of listed companies in Kenya. The managers of these companies have to plan in advance ways of mitigating the risk of adverse effects of exchange rates movement on the performance of their companies. The managers also need to position themselves in order to benefit from favourable movements in the exchange rates as has been established in this research. In addition, the performance of managers of such companies is evaluated based on the profitability of the company. The managers are rewarded with company shares for their good performance through executive share option plans. Therefore, it is in their best interest to grasp the relationship between exchange rates and share prices.

The findings in this research have also contributed to the body of knowledge. Previous study done in Kenya (Sifunjo & Mwasaru, 2012) had established a one direction relationship from exchange rates to share price in Kenya. This research having used Toda Yamamoto (1995) method, an improved version of the traditional granger causality test that was used by Sifunjo and Mwasaru (2012), has found out a bi-directional negative relationship between exchange rates and share prices. Therefore, the stock prices cause exchange rates and also exchange rates cause share price.

### *4.2 Areas for further research*

This research considered only two variables; exchange rates and share prices. In addition, the study considered only the exchange rates between Kenya shilling and the US dollar. Another study may be done using additional variables. Also, future research should not be restricted to the exchange rates between Kenya shilling and the US dollar, but can consider other major exchange rates. 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 and currency market interrelationships. Another possible extension is to employ the firm level data for these countries and examining the above relationship for those firms that are engaged in international trade (e.g., multinational firms) and for those firms that are not directly affected by exchange rates.

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