

# ESTIMATING THE EFFECTS OF EXCHANGE AND INTEREST RATES ON STOCK MARKET IN NIGERIA

**Okoli, Margaret Nnenna**  
School of Management Technology,  
Federal University of Technology Owerri,  
Imo State, Nigeria

## **Abstract**

The study examined the effects of exchange rate and interest rate on the Nigerian Stock Market using the All-share index as a proxy for the market. The monthly closing returns of All-share index, exchange rates and interest rates were utilized for a period of thirty years beginning from January, 2009 to December, 2011. Ordinary least square models were used to establish this relationship. The need to empirically determine the predictive power of exchange rate and interest rate on stock market returns formed the central problem and objective of the study. Result revealed a significant relationship with the exchange rate but a negative one. Implication of this is that an increase in exchange rate reduces stock market returns thereby dampening the market activity. The interest rate also showed a negative relationship but insignificant at the chosen 5% level of significance. This study recommended that policy makers should put in place measures that will ensure a stable macroeconomic environment since an unstable macroeconomic environment can deter investors and make them lose confidence in the system. A stable exchange and interest rates system is a prerequisite for attracting investments especially foreign direct investment.

**Key words:** Exchange rate, interest rate, All-share index, multiple regression models.

## **Introduction**

Common stock value is affected by two important economic and financial risk factors namely interest rate and exchange rate. Interest rate which reflects the price of money also affects other variables in the financial market. Valuation of stock prices is indirectly affected by interest rates while directly its volatility causes a shift between financial markets instruments. Volatility in interest affects the valuation of stocks through the basic values of the firm like interest margin, sales etc. In theory, it is a known fact that an increase in interest rates negatively affects the value of assets by increasing the required rate of return. It can also make investors to change the structure of their investment from capital market to fixed income securities market. Contrary, a decline in interest rate leads to an increase in the present value of future dividends (Hashemzadeh & Taylor 1988). Confirming, Modigliani & Chon (1979) posit that interest rate is one of the most important determinants of prices.

For foreign exchange rate, the variable is one of the major sources of macroeconomic uncertainty that affects the firm. Theory explains that a change in exchange rates would affect a firm's foreign operation and overall profits which in turn affects its stock prices. Foreign exchange volatility affects the value of the firm. This is because the

future cash flows of the firm changes with the fluctuations in the foreign exchange rates. According to Luehrman (1991), when a currency of a country depreciates, the competitiveness of the firms engaged in international competition is affected. How? There will be an increase in the demand for its export foods.

The Nigeria financial system has experienced major changes as a result of financial liberalization and deregulation. Also with the adoption of a floating exchange rate, the economy has become vulnerable to many economic and financial risks. There is the need therefore to investigate whether these two basic financial risks ó interest rate and foreign exchange rate have any significant predictive power on stock market and their volatilities. Investment in stock index has of recent gained remarkable attention. Investors have acknowledged many of the advantages with holding index fund rather than having only individual stocks in their portfolio of investments. One of the advantages is risk diversity and a fall in trading costs. It will be insightful to know how the different factors may affect stock returns and volatility. The Nigerian Stock Exchange (NSE) indices are especially important to examine. A broad-based index is composed of companies from all sectors of the economy, so it provides an easy way to gauge the performance of the entire market, as well as, by proxy, the economy as a whole. A well-functioning stock market is important for achievement of the country's key policy objectives of higher rates of savings, investment and economic growth. The central roles of a stock market are indeed to enhance mobilization of savings, and the provision of equity capital to the corporate sector. Furthermore, it promotes efficient investment choices through continuous market monitoring of share prices and the implied possibility of merger and takeover. Therefore indices act as indicators of business conditions since stock markets are believed to be sensitive to business conditions. This paper contributes to literature in that it analyses the effects of interest and exchange rates on the stock market return and volatility. Furthermore, a cursory examination of foreign exchange rate history in Nigeria shows considerable level of volatility. Therefore it would be interesting to explore the effect of exchange and interest rates volatility on her stock market. Also studies examining both variables jointly are scanty in Nigeria.

The plan of the work is specified as follows: section one is the introduction while section two reviews the literature. Section three describes the data and methodology, while section four discusses the results. Section five is for summary and conclusion.

As a central objective, this study seeks to investigate the predictive power of interest rate and exchange rate in Nigerian Stock Market using the All-share index as a proxy for stock market. These two variables are directly associated with stock market volatility. Moreover, economic, social and political risks in the country may influence the sector indices differently.

### **Hypothesis:**

The analysis is done on the null hypothesis that the selected variables namely exchange rate and interest rate do not significantly predict stock market prices.

Ho: Exchange rate and interest rate do not predict stock market returns.

## **Literature Review**

There is no shortage of research on the impact of financial and macroeconomic variables on stock prices in different economies. For instance, Maysami and Koh (2000) and Choi et al (1992) investigated the impact of interest rate and exchange rate on the stock returns and showed that both are determinants in the stock prices. Similarly, Ehrhardt (1991) recorded a strong effect of the interest rates on stock returns. Studying different countries, Campbell (1987), Shanken (1990), Apergis and Eleftherion (2002) confirmed the same. Yang (2000) studied the correlation between exchange rates and stock prices and found a significant positive correlation between the two. Tabak (2006) analyzed the dynamic relationship between stock prices and exchange rate in the Brazilian economy and revealed that there is no long-term relationship between these variables. Cifles and Ozun (2007) examined the impact of changes in interest rates on stock returns using wavelet analysis with Granger Causality. Using daily closing values of the Istanbul Stock Exchange 100 index and compounded interest rates, they reported that interest rates on stock returns increase with higher time scales. The argument then follows that bond market has significant long-term effect on stock market. Bren et al (1989) examining economic significance of predictable variations in stock returns showed that one-month interest rate is useful in forecasting the sign as well as the variance of the excess return on stocks. Erdem et al (2005) analyzed the effects of macroeconomic variables on the Istanbul Stock Exchange indexes using the Exponential Generalized Autoregressive (GARCH) model to test unvaried volatility spillover for macroeconomic variables. They discovered the existence of unidirectional strong volatility spillover from inflation, interest rate to all stock price indices. In the same vein, Aloui (2006) explored the nature of the mean, volatility and causality transmission mechanism between stock and foreign markets for the United States and some European markets. Adopting the extended Multivariate EGARCH model, the results support the asymmetric and long-range persistence volatility spillover effect and showed strong evidence of causality in the mean and variance between foreign exchange rate and stock price.

The sector index returns are also used in many studies to measure the impact of interest and exchange rates on them. For example, Malik and Hassan (2004) testing with five major sectors for the events that alter the volatility pattern of financial assets and how unanticipated shocks determine the persistence of volatility over time, detected that accounting for volatility shifts in the standard GARCH model considerably reduces the estimated volatility persistence. They also detected time periods of sudden changes in volatility by using the iterated cumulated sums of squares (ICSS). Jayasinghe and Tsui (2007) researched the exchange rate exposure of sector returns and volatilities in Japanese industries. With the use of a bivariate GJR ó GARCH model on a sample of fourteen sectors, they proved a significant presence of exposed returns and its asymmetric conditional volatility of exchange rate exposure. In addition returns in many sectors are correlated with those of exchange rate changes. Hyde (2007) examines the response of industry stock returns to exchange rate and interest rate risks in four major European economies namely France, German, Italy and the United Kingdom. Results revealed that in addition to exposure to the market, significant levels of exposure to both exchange rate risk in the four countries, and interest rate risk in France and Germany are proved.

### **Data and Methodology**

The monthly closing returns on All-share index, exchange rates and interest rates are used for the period beginning from January, 2009 to December, 2011. Data were obtained for the sector index from NSE *FACTBOOK* while data for the exchange and interest rates were sourced from the Central Bank of Nigeria Statistical Bulletin. These variables are used to show the impact of exchange and interest rate changes on the underlying index volatility. All-share index (NSEASI) is employed as a proxy for the stock market in the analysis. The foreign exchanges are stated in United States dollars per local currency and interest rate is measured as the Treasury Bill rate. The impact of interest and exchange rates changes on All-share index is estimated using the multiple regression analysis. Estimating, we say that stock market is a function of exchange rate and interest rate and stated thus:

All-share index = f (exchange rate, interest rate)

That is,

$$ASI = b_0 + ASI(-1) + b_1 \text{exch} + b_2 \text{int} + u$$

Where ASI stands for All-Share Index

$b_s$  are constants

exch is for exchange rate and

int is for interest rate.

The resulting estimated model is:

$$ASI = 6.155094927 + 0.916835369 ASI(-1) - 0.01053382262 \text{exc} - 0.004464052577 \text{int}$$

### **Empirical Analysis**

The paper examines the predictive power of exchange rate and interest rate on the Nigeria stock market using the multiple regression models. Stock market was proxied with the Nigeria All Share Index. Looking at the overall performance as represented by  $R^2$  statistics, it indicates that the independent variables explain about 80% of the variation in the All-share index price. Also the model incorporates a lagged value of approximately 0.92 percent of the ASI (-1) with a t-statistic of 8.272 calculated and a t-tabulated of 1.960. Since the t-calculated is greater than the t-tabulated, we reject the null hypothesis and accept the alternative and conclude that ASI (-1) is statistically significant which has a significant positive influence on current All-share price. A 1 percent increase in the All-share index in the previous one year leads to an increase in the share price by approximately 0.92 percent in the current year. The equation also contains a positively signed and statistically significant constant term with a value of approximately 6.16 and an associated t-statistic of 2.35. Result also indicates that the coefficient of the exchange rate is negative and statistically significant; indicating that changes in the exchange rate dampens stock market activity. This means that an increase in exchange rate will lead to a fall in stock market return. Likewise, the interest rate has a negative coefficient with a t-calculated of 1.903716 which is less than the t-tabulated. We therefore accept the null hypothesis and reject the alternative hypothesis that interest rate is statistically significant at 5% level of significance. A 1 percent increase in interest rate leads to a decrease of 0.004 percent in the All-share

index return. This means that higher volatility in interest rate dampens stock market activities especially for a stock exchange dominated by local firms. Under this condition of unattractive interest rates, analysts believe that investors may shift their funds from stocks into treasury bills that may affect stock market activities and vice versa.

### **Conclusion**

The study was undertaken to determine the effect of exchange rate and interest rate on stock market in Nigeria. The ordinary least square model was utilized to examine the causal relationship between the variables. Results show that the relationship between stock market and macroeconomic variables was statistically significant. Implication observed between exchange rate and stock returns is that an increase in exchange rate reduces stock market returns thereby dampening the market activity. The same goes for the interest rate. It implies that investors may utilize macroeconomic data to forecast market volatility.

### **Recommendation**

The study recommends thus: Policy makers should put in place measures that will ensure stable macroeconomic environment. This is necessary because any disturbance in the macroeconomic environment may affect the stock market's activities. So to attract investments, especially foreign direct investment, a stable exchange rate system becomes a prerequisite. Furthermore, a volatile exchange rate may create uncertainty in investors whether to invest or not. To therefore boost investors' confidence, it becomes imperative for policy makers to intervene in times of abnormal volatility.

### **References**

- Aloui, Chaker, 2007, "Price and Volatility spillovers between exchange rates and stock indexes for the pre- and post- euro period", *Quantitative Finance* 7, No:6
- Apergis, N. and Eleftheriou, S., 2002. Interest rate, inflation, and stock prices: the case of Athens Stock Exchange. *Journal of Policy Modeling* 24, pp.231-236.
- Bren, W. Glosten, R.I. and Jagannathan, R., 1989, "Economic Significance of Predictable Variations in Stock Index Returns." *The Journal of Finance* 44, No: 5. pp.1177-1189.
- Cifter, Atilla and Ozun A., 2007, "Estimating the Effects of Interest on Share Prices Using Multi-scale Causality Test in Emerging Markets : Evidence from Turkey", MPRA Paper No. 2485.
- Ehrhardt, O. and Nowak, E. 2001 "Private benefits and minority shareholder expropriation : Empirical evidence from IPOs of German family-owned firms", CFS Working Paper 10.
- Erdem Cumhuri, Arslan C.K. and Erdem, M.S. 2005 "Effects of Macroeconomic Variables on Istanbul Stock Exchange Indexes", *Applied Financial Economics* 15, pp. 987-994

- Hyde, S., 2007, "The response of industry stock returns to market, exchange rate and interest rate risks", Manchester Business School Working Paper.
- Hashemzadeh, N. and Taylor, P., 1988 "Stock prices, money Supply, interest rate: the question of causality", *Applied Economics* 20, pp. 1603 ó 1611.
- Malik, Farooq and Hassan S.A. 2004, "Modeling Volatility in Sector Index Returns with Garch model using an Iterated Algorithm". *Journal of Economics and Finance* 28:2, pp.211-225.
- Maysami, R.C. AND Koh, T.S. 2000. A Vector Error Correction Model of the Market. *International Journal of Economics and Finance* 9:1, pp.79-96.
- Modigliani, F. and Cohn, R.A, 1978. "Inflation Rational Valuation, and the Market". *Financial Analysis Journal* 38, pp. 24-44 firm.
- Shanken .Jay, 1990. "Intertemporal Asset Pricing". *Journal of Econometrics* 45, pp.99-120.
- Tabak, Benjamin, M. 2006. "The Dynamic Relationship between Stocks Price and Exchange Rates: Evidence for Brazil". Central Bank of Brazil Working Paper 124.