

Pricing of Foreign Exchange Risk And Stock Returns At Nairobi Securities Exchange, Kenya

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Abstract - *The exits of purchasing power parity stipulates that different countries differ in prices for goods when a common digit is applied and therefore, random changes in exchange rate has often been implicated to be the key cause of fluctuations in prices leading to more risk in the assets pricing models. This implies that Exchange rate is a crucial variable that affect both the international competitiveness of both multinationals and investor's wealth as they participate in international stock markets. It then follows that investors and other players who participate by investing in stocks at the Nairobi Securities Exchange are not exceptional and therefore, this study seeks to empirically ascertain effects of the pricing of foreign exchange risk on stock returns on listed securities trading at Nairobi Securities Exchange, Kenya. The study covered a period of ten years starting from January 2003 to December 2012, with specific interest being to determine the degree at which inflation rate differential affected stock returns at Nairobi Securities Exchange and to examine the magnitude at which interest rate differential affected stock returns at Nairobi Securities Exchange. This study employed monthly time series data while adopting the use of Unconditional two factor international arbitrage pricing model which formed the backbone on which the empirical model was based on. Moreover, by employing inclusion - exclusion criteria for survivorship biasness, on the sixty one firms listed at Nairobi Securities Exchange, only those securities that were in trade for the entire period formed a sample of thirty six (36) securities summing up to (59.02%) of the entire population. Empirically this study made use of Generalized Method of Moments estimation technique to empirically analyze the data corresponding to the entire period under the study. This was supported with inbuilt E-Views computer software for data analysis while the data was presented in form of figures and tables. This study further adopted the use of F and t- Statistics, to test the Null hypothesis at 5% confidence levels. The result in this study revealed that foreign exchange risk was weakly priced and there existed a long run relationship between the interest rate differential and abnormal return and between Interest rate differential and inflation rate differentials respectively.*

Key Words: *Foreign exchange risk, stock returns, pricing forex, interest rate differential, inflation rate differential.*

I. INTRODUCTION

1.1 Background of the Study

Foreign exchange risk is an institutional exposure to the prospective impact of movements in foreign exchange rates. The risk is caused by unfavorable movements in exchange rates that may amount in loss of value of a country's currency terms to its institutions. Foreign

exchange rates results from different foreign exchange rate regimes: fixed exchange rate regime, intermediate exchange rate regime and floating exchange rate regime which may be evaluated and compared in terms of efficiency specification monies, meaning the money of each country may be used to transact in its commodity market and its currency denominated bonds - with clear predictions only when all equilibrium allocations are pareto efficient. Foreign exchange risk is created by currency mismatch in an institutional assets and liabilities both on and off the balance sheet as well as currency cash flow mismatch (Bank of Jamaica, 1996). Incorporating the standard de jure classification approach, fixed exchange rate regimes are allied with changes in international reserves aimed at plummeting the instability in nominal exchange rate, flexible exchange rate regimes which are considered with significant volatility in nominal rate with fairly stable reserves and finally the intermediate exchange rate regimes (conventional pegs that includes; one - sided peg regime and cooperative peg regime) as the exchange rate stabilizing authority breaks even over a period of time (Helpman, 2013). In equilibrium allocation, exchange rate regimes are described according to the behavior of the classified variables. The variables may include the variation in nominal exchange rate, the instability of those changes and the volatility of international reserves. Therefore the process of pricing foreign exchange risk has been the most long - lived anomalies in open macroeconomic and international finance brainteaser that has triggered diverse scholarly arguments on whether or not currency risk is priced on equities listed on stock markets worldwide (Tai, 2010). Major studies that have been carried out on American stock markets converge at a common point that under deviations from purchasing power parity (PPP), currency risk ought to be priced see; solnik (1974), Adler and Dumas (1983), Himmel (2002), Carrieri, Errunza and Majerbi (2006) respectively.

More so, other studies that were carried out in American market, Canada, Japan and some parts of Europe, argued that exchange-rate movements affected corporate expected cash flows, and hence stock returns. This was due to fluctuations in the home currency value in respect to foreign currency denominated revenues and the terms of competition for multinationals firms with international activities. In a circumstance where purchasing power parity

is violated, it may lead to exchange rate exposure that is not limited to firms with direct foreign trade activities. Therefore this necessitates the growing emphasis on exchange risk management which entails the extensive use of foreign currency derivatives and other hedging instruments by corporations to circumvent the effects of foreign exchange risk and hence implying that the market value of firms are sensitive to exchange rate uncertainty. Moreover, empirical evidence from past studies has produced mixed results; Choi and Prasad (1995) study posited a significant exchange rate exposure that contradicted with (Jorion, 1990).

1.1.1 The Currency risk and Kenyan Securities markets

Kenyan security market is a relatively small and speculative market that begun during colonialism in 1954 as it acted as an overseas stock exchange operating under London stock exchange. However, since then, Kenyan stock market has undergone several phases of exchange regimes as follows; in 1974, Kenyan shilling was pegged to the US dollar which was later reviewed to Special Drawing Right (SDR), before changing to crawling peg in 1982 up to 1990. It further moved to dual exchange rate regime that lasted till 1992. Thereafter, Kenya shilling was devalued leading to the end of fixed exchange rate regime so was the instigation of floating exchange rate. This led to a policy that ensured shilling remained competitive and these efforts eventually were able to tame inflation rate and therefore ensured strict monetary standpoint and upholding of real interest rate at a positive digit (Kodongo, 2011). Lately, NSE operates as the fourth- largest sub – Sahara's exchange market with market Capitalization of approximately Ksh.1.90 trillion by the end of 2013 (Economic Survey, 2014). In 1995, Nairobi securities market was opened to foreign investors with maximum limit of 20% shareholding for institutions and 2.5% for individuals. Nairobi Securities market deals in equities exchange trades, Kenyan government bonds, corporate bonds, Treasury bills, commercial papers and the central depository system leading to which has seen it automate all its operations, with an aim of speeding up clearing and settlement.

The effect of the pricing of foreign exchange risk on stock returns can be felt on any security market worldwide. This because domestic firms are affected by unexpected exchange-rate change or by alteration on aggregate demand hence, leading to current account deficits. Study by Bartov and Bodnar (1994) indicated that failure of past studies to control firms' associations to international conditions might have been the reason why they could not document a significant relation between exchange rate variations and stock returns. Moreover, literature on the effect of the pricing of foreign exchange risk on stock returns could not be captured on Kenyan security market or

African securities markets well due to limited information available on the same. It then followed that, since this problem was persistent and needed to be addressed, any relevant materials both locally and internally were incorporated to build both the background and the research gap. In line with the above, the study by Jorion, (1991) indicated that correlation between stock returns and the value of dollar varied steadily a cross industries. The study also observed that active hedging policies could not affect the cost of capital and therefore the need for hedging could not be explained. The result further revealed the presents of unconditional small premium of 0.2 percent which were associated to foreign currency risk, as this was in line with early study of (Jorion, 1990). These results were relatively small and insignificant for the study. It then followed that on such circumstance, investors were not willing to pay premiums on firms with active hedging policies. This implied that currency risk was not diversified and therefore more stable earning could neither alter the cost of capital nor the firm's capitalization value. This creates a limbo on whether currency risk is well priced or which effect currency risk has on stock returns.

Choi and Prasad (1995) study examined exchange risk sensitivity of 409 firms on U.S multinationals from the year 1978 to 1989. The study revealed that the pricing of currency risk was significant at sixty percent of the firms registered gains in respect to depreciation of US dollar hence exchange rate variations did not affect firm's value due to depreciation of the dollar since there existed a positive correlation between the slopes of exposures as measured in foreign sales. This results were in contradiction with the findings of the study done by Dumas and Solnik (1995). Their study established the existence of foreign exchange risk with variation in the realized premiums. This implied that foreign exchange risk was priced since different countries were faced with different prices of goods hence risk premiums were based on covariance of assets exchange rates employed in the model. The study findings further indicated a significant variation of between negative (-0.48) coefficient and positive (0.51) coefficient values. These significant variations clearly indicated that the level of pricing of currency risk differed from one security market to another. This therefore leaves one wondering on the effect of the pricing of the currency risk to stock returns on any given security market. Following the negative and positive coefficients realized above, it is clear that the effects are never the same when two markets are compared at the same time. It hence leaves the researcher with the duty to ascertain the position taken at NSE decisively. Brennan (2006) study argued that the relationship between foreign exchange risk premium, exchange rate volatility, and the volatilities of the pricing kernels for the underlying currencies, were derived under the assumption of

integrated capital markets, and that foreign exchange risk premium were significantly related to both the estimated volatility of the pricing kernels and the volatility of exchange rates. It then followed that the risk premium notion in the foreign exchange markets varied with the general level of risk premium in the corresponding bond markets as expected in integrated capital markets. Therefore the results in the study supported the notion of forward premium puzzle. Similarly, this findings were consistent with Dumas and Solnik (1995) study findings. However, since the variations in the pricing of currency risk brings about disparity in returns hence the speed of wealth accumulation varies from security to security, from one portfolio to the other and from one security market to another hence validating the need for this study on NSE.

In addition to the above, study by Carrieri and Majerbi (2006) argued that by violating exchange rate caused a change in the value of multinational firms in foreign markets. This led to profit (pricing of currency risk) or loss (unpriced currency risk), and eventually a change in stock prices when other factors were kept constant. The results showed that the betas in respect to world market varied from -0.04 for India to 0.89 for Mexico, the exchange rate betas were larger than world market beta's as they ranged from 0.46 for Zimbabwe to 3.18 for Argentina. The estimated world market premium was 0.11 percent against monthly risk factor premium of 0.73 percent; this was a significant premium to reckon against insignificant market premium. The presents of significant variations in the world market beta, exchange rate beta and world market premium against monthly risk premium results, presented ambiguity that needed to be addressed since investors would be left wondering which market is well priced and which effects do the pricing has on stock returns. Although these studies posited significant results on currency risk, the degree of significance also varied steadily, hence the need to remove ambiguity by ascertaining the levels at which currency risk was priced in other markets particularly the NSE was critical. Moreover, (Kodongo, 2011), carried a study on seven African stock markets (Botswana, Egypt, Ghana, Kenya, Morocco, Nigeria and South Africa), the study realized that foreign exchange risk was not priced unconditionally when returns were measured in US dollar, were weakly priced when returns were measured in Euros and were priced with time varying risk premium in conditional sense. The study also argued that African stock markets were partially integrated with the world markets. The study posited mixed result since the findings were unable to come to a definite conclusion. The confusion brought about by the findings can easily lead to investor's indecision on which currency to use when investing since each currency has different effect on the pricing of foreign exchange risk when stock returns are used. The mixed results further creates dilemma on which

security market should one invest on and which currency should be used. Therefore in such circumstance, further research on the same topic is important for conclusive result.

Subsequently, a study by (Kodongo and Kalu, 2012) on examining currency risk and market integration in equity market of Nigeria and South Africa, using GMM with multi - beta asset pricing model and firms - level data, indicated that currency price was partly unconditionally priced in South Africa's stock market and largely incorporated with the world equity market. However this finding contradicted with the results on Nigerian stock market as the currency risk was neither priced nor integrated with world equity market since no evidence was staged. This was because portfolio beta varied from 0.5652 to 0.0560 on low market capitalization of South Africa and Nigeria respectively. More so, the estimated unconditional monthly risk premium for currency risk factors posited a statistically insignificant value to world market equity portfolio of 0.017 and unpriced unconditionally premium of -0.0165 in Nigeria's equity market. It then follows that the cross sectional result on South African and Nigerian stock markets posited contradicting findings on situations in the two markets. This contradicting result brings much confusion to investors, as one wonders on the state of the pricing of foreign exchange risk and the effect it has on individual stock returns. This necessitates the need to arrive to a precise result in future. In a nutshell, the performance of many emerging markets currencies are driven by the behaviours of major currencies in developed markets and so do Kenyan currency. It is from these findings that foreign investments on African stock markets are restricted by factors such as foreign exchange risk, political risk, low liquidity, information asymmetry and institutional barriers. Keeping other factors constant, the paradox of the pricing of foreign exchange risk in Kenyan security market posits a prominent argument since the need to examine stock prices and establish its relationship with currency exchange rates exposure has been the researcher's headache as they try to establish the effect of the pricing of currency risk on stock returns on NSE, Kenyan.

1.1.2 The Pricing of Foreign exchange risk

The paradox of foreign exchange rate risk has to be unmasked to help investors understand the importance of this study in the foreign exchange markets. As many researchers tries to find whether currency risk is priced in many different foreign markets, The most outstanding research gap has been the failure of the past studies to reach to a common conclusion on whether or not foreign exchange risk is being priced, the level at which it is priced and the effects of the study on both small, medium and multinational firms worldwide. Bekaer, Robert and Hodrick (1992) acknowledged that excess returns in regard

to diversity of assets could be predictable due to the methods of evaluation (dividend yield, short term interest rate, structural interest rate yield and default spread) as outlined in foreign exchange markets. However, the predictability of returns is evaluated through forward premiums as indicators of currency risk. It is from this observation in line to foreign exchange risk that Asset pricing model helps predict the expected return on asset that moves proportionately with different beta, in respect to the underlying factors.

Following the theoretical sides taken on the debate in which the international assets pricing model corresponding to Solnik (1974) and the optimizing portfolio positions as contained in forwards contract on equal foreign currency denominated hedging bills, (Jorion, 1990) and (Jorion, 1991) studied on the pricing of exchange rate risk by incorporating both two factor model, (on the market and exchange rates) and multi – factor arbitrage pricing model made up of the value- weighted stock market return, industrial production growth, change in expected inflation, unexpected inflation, risk premium and term structure. On adopting a two factor Arbitrage pricing model that incorporated the stock market return orthogonal composition and innovation in a trade weighted exchange rate, the study propounded that the correlation between the dollar value and stock returns varied steadily across industries without a clear indication that foreign exchange rate risk was priced in stock markets as the unconditional premium attached to foreign exchange exposure appeared considerably small. Although the study concluded that active hedging policies adopted by managers were neutral to the cost of capital and that hedging were motivated by other factors due to little evidence implying that foreign exchange risk was being priced. The study presumed that in the above case, the excess market return was an indicator of priced foreign exchange risk.

Himmel, (2002) carried a study on the pricing of exchange risk using the two international asset pricing model (IAPM), where a single currency index alongside world market factor (CI – IAPM) was employed on one side and the three exchange risk variable were adopted to check the triad region by the (Triad – IAPM) on the other side. The study posited a mixed result with time variation for both sub periods and the moving window periods. More so contrary to CI – IAPM, the Triad – IAPM provided systematic exchange risk evidence in more recent time with a more differentiated picture on the pricing of exchange risk since IAPM uses a single currency index. The study showed evidence of mixed results hence necessitated the need to carrying a similar study elsewhere.

Yang and Shuh (2004) explored nature of volatility transmission mechanism between stock and foreign exchange markets on the G – 7 countries while adopting

the weekly (Friday) closing exchange rate and market indices of Toronto 300 composite, Paris CAC 40, Frankfurt DAX, Millan stock index, Mikkei 225, FT – 100 and S & P 500 of DataStream international. By applying the Vector autoregressive (VAR) model, where the conditional variance of volatility spill over takes a version of Nelson's, (1991) exponential GARCH (EGARCH) model, in volatility transmission mechanism. The study posited empirical evidence that asymmetric volatility spill over affected stock price movement in near future, a very crucial evidence for international portfolio manager when adopting hedging and diversification technique for portfolios. Following the study done by Carrieri and Majerbi (2006), the study reckons the earlier studies done by Carrieri, Errunza, and Majerbi (2003), Blanchard, Filipa and Giavazzi (2005) as well as Phylaktis and Ravazzolo (2005) while studying nine foreign stock markets which included; Argentina, Brazil, Chile, Mexico, Greece, India, Korea, Thailand and Zimbabwe. The study found that by employing the unconditional capital asset pricing model (ICAPM), exchange rate was globally priced and commanded a significant unconditional risk premium in emerging stock markets. It also acknowledged that there was a controversy between its findings and those studies that were done earlier in major developed markets as the hypothesis of zero exchange rate risk was not rejected in a fully integrated model. It is from researcher's perspective that this study posited a valid finding since; the model adapted only incorporated one factor whose effect was implicated in the findings. In the assumption that the study complied with *Ceteris Paribus*, other factors held constant, then the study was valid. However, in the interest of common knowledge, foreign markets are affected by other volatile factors that may adversely affect the outcome of such a study should they be incorporated. Therefore it becomes necessary to carry a similar study on other domestic markets when adopting a multi-factor Asset pricing model which incorporates more factors to enhance the complexity and the reliability of the model.

Moreover, Tai (2010) studied on currency risk on Japanese stock Markets and reckons that the debates on the linkage between exchange rate fluctuations and pricing of foreign exchange risk in domestic markets is prone to continue since the study acknowledges the existence of past diverging results from different market environment. This is after the result of the study showing that currency risk was not priced in Japanese stock market. (Kodongo, 2011) studied on seven major African stock markets including; Botswana, Egypt, Ghana, Kenya, Morocco, Nigeria and South Africa from the year 1997 to 2009. Using asset pricing model, the study noted that foreign exchange risk was not priced unconditionally when returns were measured in US dollar, was weakly priced when returns were measured in Euros and was priced with time

varying risk premium in conditional sense and hence concluding that African stock markets were partially integrated with the rest of the world. In the researcher's opinion, this may be attributed by the fact that weak currency markets tends to be influenced by strong currency market behaviours and so is the currency risk they experience. Despite that, due to the presence of arbitrage, the excess returns were wiped away in long run hence implying that the mean ought to be zero in long runs too. It is obvious the study gives mixed results and fails to give a conclusive finding on whether or not, and the degree to which the foreign exchange risk was priced, a gap that the study seeks to fill. According to (Kisaka & Mwasaru, 2012) study, the data comprised of monthly NSE stock price index and the nominal Kenyan shilling per US dollar. The result stipulated that both foreign exchange rate and stock prices were nonstationary in both first differences and second level of integration as well as cointegration. It is clear that further studies should be conducted to establish if the integration results indicated the pricing of the currency risk. (Du, 2012) recognises international capital asset pricing model of Sonilk (1974) and Sercu (1980) by reiterating that the covariance of stock return with foreign exchange change should be priced when purchasing power parity is violated. (Kodongo & Kalu, 2012) posited conflicting results on the study of South Africa stock markets and Nigerian stock market. The study propounded that currency risk was priced in South African stock market and that the market was integrated to the rest of the world. Contrary to the fact that currency risk was neither priced at Nigerian stock market nor was the market integrated to the rest of the world.

1.1.3 Inflation rate differential and Purchasing Power Parity Theory

Long run determination of exchange rate may be made possible by using the law of one price when cost is ignored. The law of one price stipulates that identical goods should sell at same price regardless of where they are sold, as pardoned by the logic of purchasing power parity. Since Purchasing power parity explains the correlation between a country's foreign exchange rate and its national price level of fluctuation relative to that of a foreign country, absolute Purchasing power parity (PPP) stipulates that the purchasing power of a unit of home currency should exactly be equivalent to that of foreign economy once it is converted into foreign currency at absolute purchasing power exchange rate (Coakley, Flood, Fuertes, and Taylor, 2005). This means that if the price changes in one country and not in another, the exchange rate adjust to reflect the change. Hence it can be observed that in long run, shifts in exchange rate would be due to the difference in inflation rate (Cecchetti, 2011).

In line with the above, Devereux and Engel (2002) explored the condition to which local- currency price induces a higher level of exchange rate volatility by impeding the linkages of prices of goods a cross countries as well as local currency leading to deviation from purchasing power parity, in a bid to explain the high exchange rate volatility after insight of Krugman. It was noted that if international financial market allows for a full cross boarder risk sharing then the exchange rate would be determined by a risk sharing requirement even if local currency price are autonomous of exchange rate. It is obvious that the linkage of assets prices through bonds markets imposes a tight limit on the degree of exchange rate movement leading to lack of international trade, hence, the local currency pricing do not guarantee high exchange rate volatility due to wealth effect of exchange rate that changes firms profit limits and the degree to which exchange rate fluctuates.

1.1.4 Interest rate differential and Interest Rate Parity Theory

Pandey (2010) argued that the parity between interest rate and exchange rate is the interest rate parity. Interest rate parity stipulates that the relationship between interest rate and exchange rate of given two countries, is affected by interest rate differential. It therefore implies that a currency of a higher interest rate country would be subjected to forward discount relative to the currency of a lower interest rate country. It is then clear that the exchange rate -spot and forward- differentials should be equal to interest rate differential between two countries. In an event that interest rate parity fails to hold, it then triggers arbitrage opportunities responsible for exchange rate variability leading to currency risk, this implicates the significance of interest rate differential as a core variable in this study.

Recognizing 'post' Keynesian views, the future spot rate cannot predict forward exchange rate. Sharpe (2003) carried a research on imperfect asset substitutability, speculations of fixed exchange rate and the impact of that speculation in forward exchange market - in the view that uncovered interest parity holds - the study recognised that the differential in interest rate and the differential between forward and spot rate, using graphs to demonstrate how current spot rate could be influenced by the interest rate differentials. It then followed that some kind of currency premium would be required in circumstance where interest rate of one currency was different from that of another currency only when premiums depends on the accumulated net foreign debt. It is believed that, real exchange rate is in the principle of monetary variable and hence prone to policy manipulation of an incredible fixed exchange rate regime, and hence interest rate discrepancies should not occur. The study then concludes that in circumstances that monetary policies are manipulated and that if free floating

exchange rate regime is adopted by the government, then interest rate discrepancies would be registered hence, leading to exchange rate fluctuation.

Theoretical evidence has shown that investors are willing to pay or encounter extra cost (premiums) for firms which engages in active hedging policies only when foreign exchange risk can't be diversified a way. In Arbitrage pricing model forwarded by Ross in 1996, it is argued that should the economy be described by a small number of all-encompassing factors, then the factors should be priced since the investor is ready and willing to circumvent the risks imposed by those factors by paying a premium and in circumstances where home currency is anticipated to appreciate and domestic nominal interest rate exceed foreign interest rate leading to a well documented market empirical finding, then the slope coefficient from a linear projection would be a shift in the foreign exchange rate and on interest rate differential between home and foreign countries and hence, negatively significant.

1.1.5 Summary of Literature

Market segmentation is a significant area of the study as much as international asset pricing is concerned. Diversifying risks are investor's avenues since conglomerate investments drawn from different boundaries with their heterogeneous portfolios affect the position of assets pricing relations. It is argued that while investors depends on imported goods in current market settings, inflationary exchange risk is an essential determinant of real equity price, since inflationary exchange rate affects the investors real purchasing power of current money, where the value of the firms is likely to be affected. It then should be noted that foreign exchange rate is influenced by the level of speculation and integration of risk management (Aabo, Hansen, & Pantzalis, 2012). Therefore the impact of unexpected change in exchange rate exposure on firm's stock return can produce a significant impact on stock return of large firms than in medium and small firms (El-Masry and Abdel-Salam, 2007). Therefore the above literature can be summarised by acknowledging Tai (2010) that the linkage between exchange rate fluctuations and pricing of foreign exchange risk in domestic markets is subject to greater debates in future studies. In addition, a study by (Kodongo, 2011) produced mixed results while the study conducted on South Africa and Nigeria stock markets by (Kodongo & Kalu, 2012) posited conflicting results. This research therefore, seeks to fill the gap in the study done by (Carrieri and Majerbi, 2006) which posited results with varying level at which currency risk was priced from one equity market to another since, It is important for a study to give precise direction on the degree at which currency risk is priced as well as the trend taken and so, this is also applicable is in the Kenyan Nairobi Securities Market context.

1.2 Statement of the Problem

The problem of the pricing of currency risk in stock markets has continuously become a contentious issue to financial analysts as argued in the past studies since the magnitude at which stronger currency affects weaker currency in respect to the pricing of foreign exchange risk differ from currency to currency with integral part being constituted by time variations. Therefore, the need to evaluate the effect of the pricing of foreign exchange risk on stock returns at Nairobi Securities Exchange was triggered by the fact that most of the past studies had reported mixed findings since currency risk were either non priced when returns were measured in US dollar, were weakly priced when returns were measured in Euros or were priced with time (Kodongo, 2011). It then follows that the failure of the past studies to give conclusive results substantiated the statement of the problem as the need to disclose the ambiguity in stock market environment was pledged on the fact that no such study had neither been conducted on Kenyan securities market nor had conclusively unlock the ambiguity experienced on the same and therefore the need to empirically evaluate how the pricing of foreign exchange risk affected returns on equity at Nairobi securities exchange was inevitable.

1.3 Purpose of the Study

The general objective of this study was to find out the effect of the pricing of foreign exchange risk on stock returns at the Nairobi Securities Exchange, with specific intention to; (a) determine the effect of inflation rate differential on stock returns at NSE and (b) Examine the effect of interest rate differential on stock return at NSE which further generates the hull hypothesis for the study.

1.4 Assumptions of the Study

To justify how the independent variables forming the proxies of the study enabled the study to attain the general objective in respect to the pricing of foreign exchange risk affected stock returns on equities at Nairobi securities exchange, several assumptions were made; the expected excess returns on asset i , is a linear function of the foreign exchange risk premium factors F_i where F_i is the exchange rate movements caused by independent variables (Inflation rate differential and Interest rate differential). With other factors held constant, this assumption was substantiated by the volatility of the two factors above. The study also assumed that Nairobi securities market does not operate as a closed market and therefore foreign investors all over the world participates in the investment activities at NSE. This followed that their returns were susceptible to the impacts of exchange rate fluctuation i.e. since earning are denominated in foreign currency (translation exposure). The study further assumed that some of the players were multinational companies operating in more than one

country and therefore exchange rate is a major source of their uncertainty as argued by (Jorion,1990). Moreover the study assumed that all listed firms at NSE either imported inputs of production or used locally available inputs whose prices were determined in the international markets marking the effects of firms' shareholding composition irrelevant since all the firms were susceptible to the effects of currency risk. Finally the study assumed that all investors had a short term investment plan and therefore the effect of dividend payout on returns was irrelevant in this study, meaning that investors were driven by capital gains rather than dividend payout.

II. STUDY DESIGN AND METHODOLOGY

2.1 Research Design

This study employed a descriptive, non – experimental research design and employed a cross- sectional time series data where secondary data formed the basis of the data that was used in the study. According to Kothari (2004) a study is non – experimental, if the independent variables in the study are free from manipulations and therefore, non – experimental research design is concerned with testing hypothesis of fundamental relationship between variables while reducing biasness and increases reliability, as it consent to depiction of conclusion about causality.

2.2 Empirical Research Model

This study adopted APT theoretical model which forms the backbone on which the empirical model was found. Moreover, by borrowing from Ross (1986), Jorion (1991), Choi (1998) and Himmel (2002), the study assumed a two factor model, in which the exchange rates proxy components in the model was *orthogonal* to the abnormal return generating process on the market which is a linear function of the *orthogonalised* exchange rate proxy components on risk factors (F) as below;

$$R_t = \beta_0 + \beta_{F1,A} R_{F1,t} + \beta_{F2,A} R_{F2,t} + \epsilon_{A,t} \tag{1}$$

In which coefficient $\beta_{F1,A}$ is an *orthogonalised* inflation rate differential and coefficient $\beta_{F2,A}$ is the *orthogonalised* interest rate differential. R_t - is the market abnormal return at period t as measured in Kenyan shillings when the factor premiums is under consideration; R_{F1} and R_{F2} are the estimated market returns in respect to factors; F_1 and F_2 respectively and $\epsilon_{A,t}$ are the zero – mean residual terms of the assets. This is in line (Elton and Cruber, 1991) study which refers to *Orthogonalized* exchange risk factor as the difference between the actual percentage changes in exchange rate risk factor proxy and the estimated values. In that sense, the model must conform to the condition that the mean value to the *Orthogonalized* inflation rate differential and interest rate differential are zero conditional to the market factor.

2.2.1 Constructing Stock returns and or Market Abnormal returns

This study employed the monthly closing prices for the entire period after which, the monthly excess stock return

$$(R) \text{ was computed as follows; } R = \left(\frac{P_t - P_{t-1}}{P_{t-1}} \right) X 100$$

Where P_t - is the average current month's (t) rate, P_{t-1} is the average rate of the previous month and R is the excess stock return. In finance, market returns assumes that the mean of the stock performance is expected to be the same as that of the mean of the market performance, and therefore the study adopted the percentage change in NSE - 20 indexes as a measure in this circumstance. Hence normal market returns would be

$$R_{nse} = \left(\frac{Nse_t - Nse_{t-1}}{Nse_{t-1}} \right) X 100$$

It then followed that the supernormal return (capital gain\ loss) for asset A was computed as:

$$R_{At} = \left\{ \left(\frac{P_t - P_{t-1}}{P_{t-1}} \right) X 100 \right\} - \left\{ \left(\frac{Nse_t - Nse_{t-1}}{Nse_{t-1}} \right) X 100 \right\}$$

Where R_{At} is supernormal returns (capital gain/ loss) on asset A relative to market normal return as dictated by NSE – 20 index, R_{nse} is market gains above the previous NSE – 20 index at time t , P_t is the current month's (t) closing rate, P_{t-1} is the closing rate of the previous month, Nse_t is the current month's (t 's) NSE – 20 index, Nse_{t-1} is the previous NSE – 20 index time $t - 1$.

To generate the average market abnormal return R_{it} the total accumulative supernormal average returns for entire sample of thirty six assets (firms) was computed as below;

$$R_t = \left(\frac{R_{A,1} + R_{A,2} + R_{A,3} + \dots + R_{A,n}}{N} \right) \text{ Where } R_t \text{ is}$$

the accumulative average abnormal market return, $R_{A,1}, R_{A,2}, R_{A,3}, R_{A,n}$ is the Supernormal return on assets; $A_1, A_2, A_3, \dots, A_n$. where 'n' is all the thirty sixth firm on NSE forming the sample under the study.

2.2.2 Constructing the Explanatory Variables

This study concentrated on Kenyan shillings against American dollar. It is from this point that this study made a comparison between Kenyan ninety one days (91 days) Treasury bill rates ($KEN_{int,t}$), Kenyan 12 – month overall inflation rates ($KEN_{inf,t}$), against ninety one days (91 day) American Treasury bill rates ($USR_{int,t}$) and American monthly inflation rate ($USR_{inf,t}$) respectively. In order to generate an interest rate differential, the study generated

the difference between Kenyan monthly interest rate and American monthly interest rate, while to generate inflation rate differential, the study also computed for the difference between Kenyan monthly inflation rate and American monthly inflation rates. Therefore, the formulae for deriving the inflation rate differential and interest rate differentials were;

$R_{F1,t} = KEN_{inf,t} - USR_{inf,t}$; for inflation rate differential and

$R_{F2,t} = KEN_{int,t} - USR_{int,t}$; for interest rate differential respectively.

In line with the above, this study incorporated the use of the Generalised Method of Moment (GMM) in analysing the data. Smith and Wickens (as cited in Kodongo, 2011) posited that the parametric estimation of the study suits the use of GMM, due to its robustness to heteroscedasticity. Going by Hall (1993), it is argued that GMM model excuses a study from making explicit specification of the data generating process in the study, and hence, the parameters estimation under GMM are computationally not involving and more efficient unlike probability density function (PDF) and maximum likelihood procedure (ML). This makes GMM a consistent, asymptotically normal and efficient estimator while maximising the objective function of the model hence, it exhibit relatively small biasness even with as small sample sizes as sixty.

2.3 Target Population

Target population can be defined as a process that researchers employs to generate the results of the study Mugenda and Mugenda (2003). The population for this study was all the sixty one listed firms on Nairobi Securities exchange as at December 2012. This was in respect to a definition by Ogula (2005), that a population is any group of people, objects or institutions that share at least one character in common. Firms that were not in trade either because of being delisted, suspended or dormant for the entire period of ten years were excluded from the study. To ensure representativeness and utilisation of the research findings and by using inclusion exclusion criteria, firms that were studied included; Kakuzi, Rea Vipingo Plantations, Sasin, Car and General (K) Ltd, Kenya Airways, National Media Group, TPS Eastern Africa (Serena) Ltd, Barclays Bank, CFC Stanbic Holdings, Diamond Trust Bank Kenya Ltd, Housing Finance Co. Ltd, Centum Investment Company ltd, Jubilee Holdings Ltd, Kenya Commercial Bank Ltd, National Bank of Kenya, NIC Bank Ltd, Pan African Insurance holdings Ltd, Standard Chartered Bank Ltd, Athi River Mining, Bamburi Cement Ltd, British American Tobacco Kenya Ltd, Crown Berger Ltd, Olympia Capital holdings Ltd, E.A. Cables Ltd, E.A Portland Cement Ltd, East African Breweries Ltd, Sameer Africa Ltd, Kenya Oil Co Ltd, Mumias Sugar

Co. Ltd, Kenya Power & Lighting Ltd, Total Kenya Ltd, Unga Group Ltd, City Trust Ltd, Express Ltd, Williamson Tea Kenya Ltd and Standard Group Ltd. These firms formed a sample for the study that represented fifty nine point zero two percent (59.02%) of the total population.

2.4 Sampling Design and Sample Size

Frankel and Klallan (2000) defined a sample as a group from which information is obtained and hence sampling is the process of choosing a number of individuals from a population. Furthermore, Reddy (2007) argues that a sample should be chosen in a manner that represents the entire population under the study. This entire population consisted of sixty one (61) firms listed on Kenyan Nairobi securities exchange for the entire period of ten years extending from January 2003 to December 2012. The study applied census of thirty six (36) listed firms from the entire population for the entire period under the study. The sample was made up of only those firms who were in trade for the entire period of ten years without being delisted, suspended or dormant on NSE. The number of firms under the study amounted to fifty nine points zero two percent (59.02%) of the total population as per December 2012, a sufficient number for ascertaining the insight of this study.

2.5 Data collection Procedure, Analysis and presentations

The study employed the use of secondary data by the help of the inclusion exclusion criteria to select firms which provided the data for the past ten years, between; January 2003 to December 2012. The data was retrieved from the following websites; Nairobi securities Exchange (NSE), the Federal Reserve Bank for American 91 day treasury bills rates and inflation rates and from Central bank of Kenya both website and archives (CBK) for 91 days treasury bills and inflation rates respectively. The process of employing statistical or logical techniques systematically to describe and illustrate, condense and summarize, as well as evaluate data is basically referred to as data analysis. Smeenton and Goda (2003), state that various analytic methods provide a way of drawing inductive inferences from data and differentiating the phenomenon of interest (the signal) from the statistical fluctuations (noise) present in the data. This is a very important ingredient for ensuring data integrity and accuracy in the analysis of the research findings.

This study is in a form of time series data since the data and observation were compiled over a period of time (Kothari, 2004). The collected data were entered in the inbuilt computer E – Views software to help in analysing and interpreting the data. The model of the study borrows from International Asset Pricing Model (IAPM), with the help of Iterated Generalized Method of Moments (GMM) of Ferson and Foerster (1994) since, the use of iterated

GMM estimates is critical as, it produces better finite sample properties and uses constant and simultaneous values of respective factors which posits a greater significance in GMM regressions over OLS. It then follows that this study was no under pressure to comply with all the properties and assumptions of OLS. Therefore in this study, all the underlying hypothesis were tested by use of F – statistics since the data was made up of 480 usable observations and three parameters to estimate in the GMM regression. F – Statistical values and p – Values were used to test the confidence of the hypothesis at 5% level. The findings of this study were displayed and interpreted using a collection of tables and figures.

III. RESULTS FINDINGS AND DISCUSSION

3.1 Empirical results for Unconditional Multi – factor Asset Pricing Model

The pre - analysis test for Ordinary least square methods, posits the violation of one or more of its assumptions. According to (Brooks, 2008), if a model encounters a mixture of one or more violation of OLS assumptions, then

the latter can be treated either by correcting to make sure that the assumptions are not violated or by ignoring the detected OLS problems and adopt an alternative techniques which should still be valid. In this case, this study adopted the use of GMM model in analysing its data. Going by Smith and Wickens (as cited in Kodongo, 2011), the parametric estimations of this study suits the use of GMM, due to its robustness to heteroscedasticity. Moreover, according to Hall (1993), GMM model excuses a researcher from making explicit specification of the data generating process in the study, and hence, the parametric estimations under GMM are never computationally involving and are more efficient hence makes GMM to be consistent, asymptotically normal and an efficient estimator although, it exhibits relatively small biasness even with small sample sizes as sixty.

3.2. Test Results for the two factors Model at Nairobi Securities Exchange

The Multi – factor asset pricing model in 3.2 was estimated as relatively unrelated regression model using GMM procedure and the result were as in table 4.1 below:

Table 3.1: GMM Regression Results for Three factor Asset Pricing model on NSE.

Dependent Variable: ABNORMAL__RETURNS

Method: Generalized Method of Moments

Sample: 2003 2122

Instrument specification: ABNORMAL__RETURNS CAD IFRD ITRD C

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IFRD	0.066291	0.089992	0.736626	0.4628
ITRD	-0.079378	0.097748	-0.812066	0.4184
C	0.150655	0.982144	0.153394	0.8784
R-squared	0.012097	Mean dependent var		0.805677
Adjusted R-squared	-0.013452	S.D. dependent var		9.193502
S.E. of regression	9.255131	Sum squared resid		9936.265
Durbin-Watson stat	2.668074	J-statistic		1.478719
Instrument rank	5	Prob(J-statistic)		0.223975

GMM (INSTWGT=WHITE, GMMITER=1, COV =WHITE) ABNORMAL_RETURNS CIFRD ITRD @

ABNORMAL_RETURNS C IFRD ITRD

ABNORMAL_RETURNS = C (1) + C (2)*IFRD + C (3)*ITRD

$$ABNORMAL_RETURNS (R_{it}) = \beta_{0,A} + \beta_{F1,A}R_{F1,t} + \beta_{F2,A}R_{F2,t} + \epsilon_{A,t},$$

Substituted Coefficients:

$$Abnormal_Returns=0.150655060667+0.0662907828596*IFRD-0.0793776043177*ITRD$$

According to the regression equation in the table above, the coefficients obtained in the GMM model holding all other factors into account (inflation rate differential and interest rate differential) constant at zero, abnormal returns on stocks at NSE-20 index was 0.150655060667,

approximately (0.151) 3decimal place. The results further indicated that by holding all other independent variables (interest rate differential) constant at zero, a unit increase in inflation rates differential led to 0.0662907828596 (0.066) 3d.p increase in abnormal returns and lastly, by keeping all

other factors constant at zero (inflation rate differential), there was a unit decrease in abnormal returns of -0.0793776043177 approximately (-0.079) 3d.p in respect to interest rates differential respectively.

Since the study incorporated Hansen (1982) of GMM which is preferred under weak statistical assumptions in order to test the over identification restrictions in both the model and data. It then followed that J – statistical result of (1.478719) failed to reject the validity of variables used in the model at all levels. It further displayed right tailed P - value of (0.223975) for the significance levels hence, the study failed to reject a non significance hypothesis. This was contributed by the fact that the unconditional estimated monthly beta coefficient for foreign exchange rate proxy factors; IFRD registered 0.066 with P – value 0.4628 for IFRD and bet - 0.079 with P – value 0.4184 for ITRD respectively, signalled lack of statistical significant to the risk premium. Furthermore, the inverse relationship exhibited between the abnormal returns and the independent variable (ITRD, -0.079) simply implied that any increase in abnormal return would result to a decrease in the independent variable ITRD too. The results above further seemed to have improved the model specifications in that by incorporating all the two variables, the J – statistic revealed a relatively long tail of 1.478719 (1.479) 3d.p and a p – value of 0.223975 (0.224) 3d.p. This indicated that the hypothetical notion that, all the two factors does not have a significant impact on the return generating process failed to be rejected.

This study results from the GMM model above partly agreed with the following studies; (Tai, 2010) which observed that currency risk did not appear to be priced in unconditional two factor model, (Kodongo, 2011) study which realized that currency risk was not priced unconditionally when returns were measured in US dollar, (Kodongo and Kalu, 2012) study which partly posited a similar results that currency risk was neither priced nor integrated to the world market in Nigerian stock exchange and finally it is fully in tandem with Choi *et al.*, (1998) study which stated that by employing the unconditional multi – factor asset pricing model, in general currency risk was not priced in Japanese and in U.S stock markets. However this results goes contra to studies done by Choi and Prasad (1995) that posited a significant exchange rate exposure, Dumas and Solnik (1995) study results that under conditional International asset pricing model, currency risk priced in major world stock and currency markets and Carrieri and Majerbi (2006) study which ruled that exchange rate risk was globally priced and commanded a significant unconditional risk premium in emerging stock markets worldwide. These findings can be attributed to unfavourable political uncertainties, poor policy implementations, institutional inadequacies,

information unevenness and poor investments patterns of international investors.

3.2 Hypothesis Testing

This study was led by two hypotheses as below:-

$H_{0,1}$ Inflation rate differential has no significant effect on stock returns at NSE.

$H_{0,2}$ Interest rate differential has no significant effect on stock returns at NSE.

Table 3.2: T and F Test statistics for hypothesis testing

	Test Statistic	Value	Df	Probability (p)
ABNORMAL_RE	t-statistic	0.736626	116	0.4628
TURNS C IFRD	F-statistic	0.542618	(1, 116)	0.4628
ABNORMAL_RE	t-statistic	-0.812066	116	0.4184
TURNS C ITRD	F-statistic	0.659451	(1, 116)	0.4184

The t tests were carried out at 5% level of significance. All the two parameters were not significant as t – statistic and F – statistics posited a p value of (IFRD p=0.463 and ITRD p=0.418) respectively. The study results therefore failed to reject all the two null-hypotheses. This results contradicted the GMM results for beta coefficients where IFRD and ITRD affected stock returns at NSE both negatively (ITRD = -0.079) and positively (IFRD =0.066) at different levels. However the levels at which exchange rate proxy variables affected the abnormal returns were insignificant as the GMM results identified a p value of 0.224. The significant test level for independence relationships between variables were determined by the use of the chi- square as; IFRD p=0.462 and ITRD p=0.418. It meant that both IFRD and ITRD were related to abnormal return at 46.2% and 41.8% respectively.

IV. CONCLUSIONS AND RECOMMENDATIONS

To establish the conditions at which foreign exchange risk is related to stock returns or the level at which currency risk is priced on stock returns at NSE, are two closely inter-related issues that are crucial to both investors and corporate risk managers, therefore this raises the needs to be addressed amicably. However past studies have addressed the two issues separately hence their findings have failed to resolve the arguments being raised conclusively. This has escalated to further greater debates on the same. Empirical evidence presented from the findings of this study established that foreign exchange risk was weakly priced. However there was no evidence of bidirectional causality among the rest of the variables. The findings of this study correspond to (Tai, 2010) study, which discovered that foreign exchange risk did not appear to be priced in unconditional two factor model, it also partly posited a similar results to (Kodongo and Kalu, 2012) study which displayed that foreign exchange risk

was not priced in Nigerian stock exchange and that, Nigerian stocks markets was not integrated to the world market. Moreover, going by the coefficient results found from running the GMM model, this study partly agree with (Kodongo, 2011), that foreign exchange risk was weakly price with time as the study registered weak beta values of 0.066 for inflation rate differential and -0.079 for interest rate differential in (3.d.p) respectively. This implied that, though the beta coefficient for the foreign exchange risk factors portrayed the presents of a weak priced model, the effect of the pricing were insignificant hence prompted the study to reject all the two null hypothesis. This study experienced several limitations where the Kenya Beural of statistics, the Central Bank of Kenya and the Nairobi Securities Exchange were neither consistence in compilation and archiving of information nor had impressed digitalization to document relevant information relating to all the proxy variables (current account deficit, inflation rate differential, interest rate differential, and terms of trade, public debt, political stability and economic performance) fully.

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