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**EFFECT OF EXCHANGE RATE VOLATILITY ON FOREIGN DIRECT INVESTMENT:
THE CASE OF KENYA**

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
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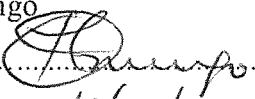
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Abstract

The purpose of this research study was to examine the effect of exchange rate volatility on foreign direct investment (FDI) in a developing nation with the focus being Kenya. Time series data ranging from 1993-2013 were used with ARCH and GARCH models being utilized to determine the volatility of the exchange rate. The study showed that the volatility of the exchange rate has a negative impact on FDI and that the liberalization of the economy has not really contributed to greater FDI inflows to the country. Also revealed in the study was that stock FDI and political stability are likely to draw in more funds from foreign investors and that contrary to commonly held thought, per capita GDP does not really feature as a determinant in a foreign investor's decision process when deciding whether or not to invest in the Kenyan market.

Keywords: exchange rates, volatility, foreign direct investment

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List of Abbreviations

ARCH	Auto-Regressive Conditional Heteroscedasticity
CPI	Consumer Price Index
FDI	Foreign Direct Investment
GARCH	Generalized ARCH
KES	Kenya Shillings
MNC	Multinational Corporation
OLI	Ownership, Location and Internalization
USD	United States Dollars

CHAPTER ONE

Introduction

1.1. Background to the Study

Foreign direct investment involves a long-term relationship between a foreign investor and an affiliate enterprise or foreign affiliate. In this relationship, the investor has a sizeable degree of influence on the management of the enterprise resident in the foreign economy (Kyereboah-Coleman & Agyire-Tettey, 2008).

The increasing interest on the impact of the exchange rate and consequently its volatility on international capital flows such as foreign direct investment by policy makers has been as a result of an increase in the number of countries adopting the floating exchange rate. The rationale used by economies for giving incentives to attract FDIs is derived from the belief that foreign investment has positive outcomes in the form of technological transfers and spillovers on growth. These positive outcomes are important as it is usually assumed that there exist wide 'idea gaps' between developed and developing economies, and it is presupposed that foreign direct investment can ease the transfer of business and technological know-how to developing economies. These transfers may have what is considered to be a 'spillover' effect for the entire economy this is because FDI transfers not only financial resources but also technology and managerial know-how from home countries to host countries. The financial resources are mostly utilized to expand productive capacity by increasing the level of fixed investment in the host country while the transfer of technology and managerial know-how improves productive capability (Kiyota & Urata, 2004). Therefore, foreign direct investment may boost the productivity of all firms and not just the receiving firms. In a study by Tsikata et al. (2000) they also propose an argument that FDI can be understood as a package of resources that complement other financial flows and make distinctive contributions to the development process of a country (Tsikata, Asante, & Gyasi, 2000).

There is no question as to the fact that FDI plays a massive role in the recent globalization movement. In a report by the World Bank in 2010, FDI has increased

from a total global figure of \$13.3 billion in 1970 to \$1.9 trillion in 2007 which is about an increase of 150 times. This however was slowed down by the economic crisis, which slashed FDI flows by about 40% in 2009 thus affecting all economies, sectors and for of investments (Investment Climate Advisory Services and World Bank Group, 2010).

In any FDI undertaken, there exist several inherent risks, among which exchange rate volatility is present, which encompasses transaction exposure, economic exposure and translation exposure (Madura, 2012). Transaction risk relates to the risk of an exchange rate change between the transaction date and the subsequent settlement date, economic exposure could arise either directly or indirectly with the former referring to a situation where a firm's home currency strengthens and their foreign competitors are able to gain sales at their expense while the latter refers to a situation where even though an organization's home currency does not move vis-à-vis their customer's currency, they stand a chance to lose their competitive position as a result of a foreign competitor's currency weakening relative to the customer's currency, and finally translation exposure refers to the risk brought about as MNCs translate the financial statements of their foreign subsidiaries to their home currency.

Exchange rate volatility is the most basic measure of risk that faces international investors and it is used to refer to short-term deviations of the exchange rate around its long-term trend (Kyereboah-Coleman & Agyire-Tettey, 2008). Deviations, whether positive or negative have tendency of increasing risk and uncertainty in international transactions. Methods currently used to hedge against the various foreign exchange rate risks include; invoicing in an organization's home currency (the foreign exchange rate risk is passed on to the consumer), leading and lagging; where an importer/exporter attempts to delay/seek immediate payment if it expects that the currency it is due to pay/receive will appreciate/depreciate before settlement, matching; where an organization matches assets with liabilities in the foreign currency and other financial techniques such as money market hedges (Kaplan Financial, 2012); however, these methods are necessary but not sufficient. Financial derivatives such as forward, future, option and/or swap contracts can also

be used to hedge against exchange rate volatility unfortunately, the derivatives markets is almost non-existent in the Sub-Saharan area in general and Kenya in particular (efforts are however in place to set up a futures market in Kenya), thus reducing the possibility of hedging against the volatility inherent in exchange rates.

1.2. Problem Statement

Given the increasing amount of international capital flows into the country, it is necessary to explore some of the aspects that affect the attractiveness of the country to such flows. One of these aspects is exchange rate volatility.

Goldberg and Kolstad (1995), Cushman (1985 and 1988), and Alba ET. Al. (2005) find a positive impact of exchange rate volatility on FDI (for example, if higher volatility discourages exports, serving the market via FDI could become more attractive, thus the positive relationship) while Bénassy-Quéré, Fontagné and Lahrière-Révil (2001) and Urata and Kawai (2000) find the impact negative. Therefore, findings from previous studies on the effect of exchange rate volatility are mixed.

There exist, at least two possible explanations to explain the mixed results. Studies such as that of Froot and Stein (1991) and Sazanami, Yoshimura and Kiyota (2003) suggest that there exist different impacts of exchange rate on FDI among the various industries; therefore, the analysis of national-level data may lead to ambiguous results as such an analysis masks the impacts of exchange rate volatility among industries by possibly offsetting the impacts across industries (Kiyota & Urata, 2004). Secondly, there is an apparent inadequate treatment of exchange rate volatility. Some studies such as that by Engel and Rogers (1996) found that movements of real exchange rate can be attributed to the failure of establishing the law of one price. They found that both the distance between different economies and the border played significant roles in the failure; therefore, the studies suggested the need to integrate the distance the border effects in the analysis of exchange rate volatility (Engel & Rogers, 1996).

Consequently, there is a need to determine precisely how exchange rate volatility affects FDI.

1.3. Research Objectives

1. To determine the relationship between exchange rate volatility and FDI.
2. To analyze the effect of exchange rate volatility on FDI.

1.4. Research Questions

This study aimed at answering the following questions:

1. What is the relationship between exchange rate volatility and FDI?
2. Given the relationship, what is the effect (positive or negative) of exchange rate volatility on FDI?

1.5. Significance of the study

The study is important as it can aid in the formulation of policy that directly or indirectly influence the movements of the Kenya Shilling. In light of the ever increasing importance of FDI inflows to the development of the local economy, it would be important for the policy settled upon to further foreign investment into the country by choosing those that reduce the level of volatility of the exchange rate.

A lower volatility of the exchange rate will have spillover effects by improving the business environment as a result of a more predictable macroeconomic environment.

CHAPTER TWO

Literature Review

2.1. Introduction

This section of the study analyses the various literature on FDI and exchange rate volatility in line with the research objectives previously stated, it also comments on the conceptual framework and the gap the study attempts to fill.

2.2. Exchange rate – FDI linkages

Theories concerning exchange rate-FDI linkages emerged in the 1970s and 1980s with the likes of Kohlhagen and Cushman being among the first to develop theories on the subject in 1977 and 1985 respectively. Amongst the various theories currently present, two have been highly influential; Blonigen (1997) and Froot and Stein (1991).

Froot and Stein utilized an imperfect market approach to argue that exchange rates operate on wealth to affect FDI, they further on suggested that due to imperfect capital markets, external source of financing is more expensive than a firm's internal cost of capital. Consequently, they argued that host currency depreciation is expected to have a positive impact on inbound FDI as it automatically increases the wealth of foreigners thus allowing them to make higher bids for local assets (Phillips & Ahmadi-Esfahani, 2008).

Blonigen (1997) on the other hand focused on acquisitions FDI; this provides a special case for FDI in that the acquisition of the foreign target market firm can provide firm specific assets. The theory advanced by Blonigen assumes goods market segmentation, and postulates that domestic and foreign firms have the same opportunity to buy, but different opportunities to generate returns on assets in foreign markets. The profitability of multinational branches may be increased after the acquisition of a foreign firm; therefore, the currency may affect relative asset valuations, and a depreciation of the host's currency increases IFDI.

In a sense, historically, one can hardly find a theory which is able to explain all aspects of FDI to a satisfactory level as scholars for a near four decades have

developed a number of theoretical foundations that are complementary to one another rather than substitutes (Root & Ahmed, 1979). Coleman and Agyire-Tettey (2008) proposed that FDI is theoretically a 'rational intersection' of three distinct theories:

- a) International capital markets
- b) International trade
- c) The international firm

However to Jun and Singh (1995) suggested three issues surrounding FDI;

- a) Expansion of national firms to multinational organizations.
- b) Firms opening production facilities in foreign countries rather than licensing and exporting.
- c) Factors determining geographical patterns of FDI flows.

Dunning (1988) in his internalization theory argues that organizations expand abroad in order to 'internalize' activities in the presence of market imperfections which are represented by transaction costs. This theory suggests that there are both natural and artificial reasons for market imperfections. Dunning expanded this theory by asking why multinational firms exist rather than having production take place at 'arm's length', harmonized only by contracts with foreign licenses or perhaps just exported to foreign markets. Among the most appealing features of this framework is its ability to explain patterns of the location of FDI in the world. It also covers the all types of foreign involvement in an enterprise. It suggests that an organization will engage in FDI when:

- The organization possesses ownership advantages
- There are market imperfections such that it is more profitable for the firm that possesses the ownership advantages to utilize them itself rather than sell or lease to foreign organizations
- It is profitable for the organization to utilize its advantages in conjunction with some factor inputs outside its home country

Albeit this wide approach has been criticized for being taxonomic in character, static in nature and not paying particular attention to social and political elements, it can at least be viewed as providing a good start towards a commonplace theory of FDI (P. Agarwal, 1980). It is also agreed that government policies have a role on influencing FDIs, issues considered when evaluating the suitability of FDI include:

- The pervasiveness of weak monetary policies that affect the stability of price and the cost of capital
- Tax policies
- Exchange rate policies that affect the value of transferred profits, acquired assets and exports

The continuous elimination of restrictions on capital flows makes the expansion of direct investment possible.

In the oligopoly theory advanced by Caves in 1971 it is proposed that organizations move abroad to exploit the monopoly power they control through factors such as unique products, control of technology, marketing expertise, managerial skills and/or access to capital. Organizations may move abroad as part of their competitive strategy, to gain a permanent advantage over their competitors or to hinder a competitor's move that may provide them with a survival-threatening advantage. The oligopoly framework is consistent with the OLI/eclectic model and adds to it the concept that the timing of entry into definitive markets may depend upon the timing of entry of a given organization's competitors. Markusen (1998), progressing the political economy theory, states that MNCs (which are the main drivers of FDI) are more likely to be attracted by countries having a well-flourishing democracy where governments do not use oppressive means to manage its citizens and opposition. In other words, foreign investors tend to be cautious about the commitment of governments to the rule of law in the scenario of political instability (Markusen & Venables, 1997).

Vernon (1971) argues in the context of the product cycle theory and maintains that every technology product evolves through three phases in its life:

- 1) The innovative phase where production is located in the domestic country with comparative advantage in technology and innovative capabilities, and products produced for domestic consumption
- 2) The process-development or maturing phase, which consists of a favorable blend of innovation and production advantages offered by the domestic country, manufacturing processes improve and production expands to other advanced countries most similar to the home country in terms of demand patterns and supply capabilities
- 3) The mature/standard phase where the standardization of manufacturing processes increases the attractiveness of situating production activities in a foreign location especially as labor increasingly becomes an important part of production costs.

In a tariff-jumping hypothesis advanced by Horst in 1971, in the face of higher tariffs imposed by host countries, *ceteris paribus*, MNCs will decrease their exports and instead increase their production abroad by setting up subsidiaries. This framework has been used to elaborate the increased willingness of some countries to invest in others, since it may provide improved access to all members of a certain regional integration. It therefore implies a positive relationship between FDI and import duty, as well as being consistent with the OLI model.

Lastly, it is affirmed that changes in technology and organizational sophistication creates comparative advantage and the prospect of the expansion of FDI between industrialized economies, which normally export skill-intensive items, and less developing economies, which export unskilled-labor intensive items. The advancement and specialization of communication technology, cheaper and more efficient transport networks and innovative techniques of organization and management make it possible the kind of centralization and integration between industrial and developing economies that is necessary for resource allocation and economic growth in economies participating in external trade.

2.3. Exchange rate volatility and FDI flows

Existing literature exploring the real effects of exchange rate volatility on FDI are relatively scant and inconclusive. While there are a number of studies probing the relationship between exchange rate volatility and investment, the theoretical predictions are somewhat ambiguous and the empirical evidence is sparse (Kyereboah-Coleman & Agyire-Tettey, 2008). Generally, however, the existing literature indicates that foreign investment is negatively related to the appreciation of the domestic currency and to measures of the volatility of the exchange rate. It is important to note that firm- and industry-specific factors are important determinants of foreign investment as well.

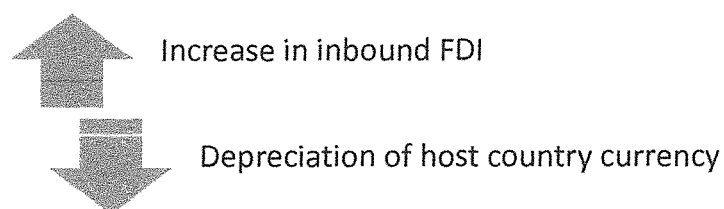
In the year 2000, Liargovas and Kosteletou claim that in theory, there exists no clear-cut distinction on the direction of the relationship between real exchange rate and FDI. They further suggested that there exist at least six competing models that attempt to explain the relationship. These models can be categorized under trade-integrated models and models of financial behavior. The former distinguishes between traded and non-traded goods models while the latter distinguishes between the monetary approach to balance of payments determination, the strategic behavior of international firms, the imperfect capital market theory and the relative labor cost theory. The first model suggests that for a developing economy which is a price-taker, an exogenous inflow of capital would lead to exchange rate appreciation or depreciation depending on whether foreign exchange is used to finance capital accumulation or domestic spending in the traded and non-traded sectors (Branson, 1997). It is important to note that according to the portfolio model, capital and financial liberalization in economies often results in increased inflows and outflows. Therefore, the models contained in the first category suggest that the causality starts from FDI to the real exchange rate while those in the second category show that the causality starts from the real exchange rate to FDI. In this study, a lot of the focus shall be placed on the second category, in accordance with Baek and Okawa (2001) and Liargovas and Kosteletou (2000).

It is argued that when uncertainty exists in macroeconomic variables, the social, political and institutional systems may also be of major concern for foreign investors and consequently have an effect on FDI. In developing economies, the political and institutional factors are the main drivers of foreign investors' confidence, which is also curbed by market failure, which results in price and exchange rate uncertainties.

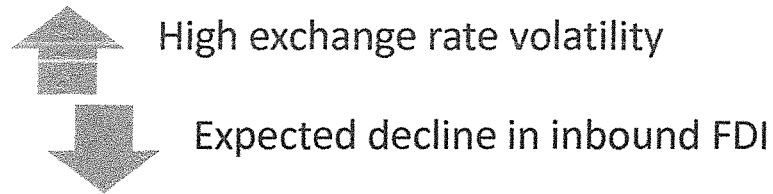
Theoretical accounts on the relationship between exchange rate volatility and FDI have been inconclusive due to different assumptions underlying the different models. Some of the assumptions are about the source of volatility and the investors' risk preferences. In a theory advanced by Cushman in 1985, it was noted that in response to exchange rate risk, MNCs reduce exports to the foreign countries but offset this by increasing foreign production and capital input.

2.4. Conceptual framework

Under the framework proposed by this study, depreciation of the host country's currency is likely to attract FDI inflows, possibly for the following reasons; firstly, the depreciation lowers the value of assets in the host country with regards to other currencies, including that of the source country and secondly, currency depreciation in the host country lowers production costs. Therefore, the cost of undertaking FDI declines in terms of the foreign currency, making FDI in the country with a depreciating currency more attractive.



On the other hand, high volatility in the exchange rate has the effect of discouraging FDI because it increases uncertainty in the business environment of the host country.



2.5. Research gap

Despite the presence of similar studies outside Kenya such as that by Kyereboah-Coleman and Agyire-Tettey (2008), domestically, there appears to be inadequate treatment of the impact of exchange rate volatility on inbound FDI.

Existing domestic studies such as that by Saddimbah (2014) focus on other features of FDI such as its effect on economic growth, exports and balance of payments with findings suggesting a positive effect on the country's economic growth and the country's balance of payments whilst finding a negative relationship between FDI and exports (Saddimbah, 2014). Whilst other studies such as that by Njoroge and Okech (2011) focused broadly on factors influencing FDI inflows in Kenya's horticultural industry. The study found broadly that poor infrastructure, erratic weather conditions, and unfair investment policy requirements for international investors were among the reasons for the relatively low amount of FDI inflows to the sector (Njoroge & Dr. Okech, 2011).

As illustrated above, there appears to be an apparent neglect as to the relationship between the volatility of the exchange rate and inbound FDI. This study, therefore, attempts to fill this gap.

CHAPTER THREE

Methodology

3.1. Introduction

This section outlines the research design, how data needed for the study was gathered, analyzed, applied to a model and used to satisfy the research objectives.

3.2. Research design

This study took on a descriptive approach as it sought to describe the state of affairs as they exist at present with regard to exchange rate volatility and FDI. Also the researcher had no control of the variables and therefore could only report what has happened (*ex post facto*) or what is happening (Kothari C., 2004).

The study also took on a quantitative approach as it sought to numerically establish the effect of exchange rate volatility on FDI. Further it took on an inferential approach as it sought to form a database from which to infer relationships of the population. Therefore, a sample of the population was studied and based on its characteristics; the same was inferred about the population.

3.3. Population

The population consisted of monthly exchange rates of the USD/KES from January 1993 to April 2015 with the USD being the unit currency and the KES being the quote currency while the population of the FDI inflows came from annual inflow figures (in USD) given by The United Nations Conference on Trade and Development from 1970 to 2013.

3.4. Sampling

The sample analyzed was; the annual exchange rates of the USD/KES which was obtained as an average of the monthly values of the USD/KES exchange rate from January 1993 to December 2013. This period was chosen due to the fact that it encompassed five election periods in the country therefore encompassing regime changes. A similar period was used for FDI so as to match the duration for exchange

rates. Therefore, convenience sampling was used based on availability of information to the researcher.

3.5. Data collection

The study utilized data from published secondary sources. The United Nations Conference on Trade and Development provided a spread sheet for annual FDI inflows and outflows to different countries in the world while the Central Bank of Kenya provided monthly values of the exchange rate between the KES and various hard and soft world currencies.

3.6. Data analysis

The study focused on a benchmark regression model stated below;

$$FDI_t = \phi + \alpha REXR_t + \delta EXVL_t + \omega OPN_t + \varphi GDPpC_t + \lambda FDI_{t-1} + \chi PLSIT_t + \varepsilon_t,$$

Where FDI_t is the foreign direct investment at time t , $REXR_t$ is the real exchange rate at time t , $EXVL_t$ is the real exchange rate at time t , OPN_t is the openness of the economy at time t , $GDPpC_t$ is GDP per capita used as a proxy for the mean wage of labor, FDI_{t-1} is the stock of foreign direct investment, $PLSIT_t$ is the political situation (instability) in the country at time t with a dummy variable of 1 assigned in the presence of non-democratic elections/political instability and 0 otherwise, and ε_t being the error term.

The dependent variable, real FDI into Kenya, was measured in 2009 constant prices. Nominal FDI data was obtained from the United Nations Conference on Trade and Development, foreign direct investment online database. In the analysis, real FDI was obtained by deflating the nominal FDI value by the GDP deflator. The data on nominal exchange rates and GDP deflators were obtained from the Central Bank of Kenya database.

The independent variables are real exchange rate of the Kenyan Shilling (REXR), the volatility of the real exchange rate (EXVL), openness of the economy (OPN) indicated by the ratio of imports plus exports all over GDP, GDP per capita (GDPpC).

Real exchange rate (REXR) was defined as:

$$REXR = \frac{(S/P)}{1/P^*} = \frac{SP^*}{P}$$

Where S is the nominal exchange rate of Kenya's currency against the US Dollar (with the US Dollar as the unit currency) and P is the consumer price index (CPI) of the world represented by that of the USA while P* is the domestic consumer price index.

However, instead of running the benchmark regression model using the raw data collected, the study utilized natural logarithms to reduce the fluctuations of the data & to provide easily translatable results. This enabled the researcher to interpret the results in such a way that given an increase in a given independent variable say by 1%, the FDI inflow to the country in that period would increase by a percentage equal to that independent variable's coefficient (beta). However, since the political stability variable is not in a logarithm format, an increase in the variable of say 1% would lead to an increase in FDI of 100% times the coefficient (beta). Therefore, with all variables exhibiting stationarity, the model to be regressed would have been;

$$\ln FDI_t = \phi + \alpha \ln REXR_t + \delta \ln EXVL_t + \omega \ln OPN_t + \varphi \ln GDPpC_t + \lambda \ln FDI_{t-1} + \chi PLSIT_t + \varepsilon_t$$

But before the above regression formula was run, a unit root test was conducted on each one of the stated variables to ascertain the stationarity or otherwise of the data. The study desires stationary data as they exhibit a constant mean and variance over time.

3.6.1. Estimation of real exchange rate

The real exchange rate indices of the Kenyan shilling with the US dollar were calculated taking the price differential of Kenya with the USA in order to get a single measure of the exchange rate index. The real exchange rate was obtained using the Purchasing Power Parity approach and therefore, the real

exchange rate was defined as the nominal exchange rate (NER) of the shilling/dollar multiplied by the ratio of the price level in the Kenya to price levels in the USA. The NER index was defined as the amount of domestic currency that can purchase a unit US dollar. Consequently, a rise in this index indicates a nominal depreciation of the local currency and vice versa. While calculating the RER, the NER was adjusted for the price differential by keeping the US prices (P) in the denominator and the local prices (P^d) in the numerator. The US price level was represented by the consumer price index (CPI) of the USA, while the consumer price index was used as a proxy for the domestic prices. The REXR is further defined as:

$$REXR_t = NER_t * \frac{P^d}{P}$$

3.6.2. Volatility Measure

The ARCH and GARCH models introduced by Engel (1982) were used as exchange rates have been known to follow a GARCH process (McKenzie, 1999). Volatility was therefore measured as:

$$\ln RER_t = \varphi + \delta \ln RER_{t-1} + e_t \text{ (Mean model)}$$

Where, $e_t \approx N(0, h_t)$ and:

$$h_t = \varphi + \delta e_{t-1}^2 + \gamma h_{t-1} + \mu_t$$

The conditional variance h_t is a function of the following terms:

- 1) The mean φ ;
- 2) Information about previous volatility measured as the lag of the squared residual from the mean equation e_{t-1}^2 (ARCH term); and
- 3) The previous forecast error variance, γh_{t-1} , which is the GARCH term

Exchange rate volatility is conditional on past information and consequently reflects the actual volatility perceived by investors.

It is important to note that before the conditional variance equation was run, some diagnostic tests were conducted on the residual after running a regression on the mean model so as to ascertain the validity of the chosen model. The tests included; a test for autocorrelation with the null hypothesis (H_0) being the absence of autocorrelation while the alternative hypothesis (H_1) being the presence of autocorrelation and a test for normality with the null hypothesis (H_0) being the residuals following a normal distribution whilst the alternative hypothesis (H_1) being the residuals not following a normal distribution.

CHAPTER FOUR

Findings and interpretations

4.1. Introduction

This section shall deal with the analysis and presentation of the results of the study conducted.

4.2. Impact of exchange rate volatility on FDI

4.2.1. Estimation of a volatility index

The results shown in table 1 suggest that the exchange rate follows a GARCH (1,1) procedure. From the results, the mean equation was found to be;

$$\ln REXR_t = 0.437358 + 0.906321 \ln REXR_{t-1}$$

While the variance equation was specified as;

$$h_t = 0.003026 - 0.158774 e_{t-1}^2 + 0.780588 h_{t-1}$$

The result found from the conditional variance equation indicates that the mean φ from the above equation is positive, hence indicating proper specification of the conditional variance which is statistically significant.

Table 1: GARCH (1, 1) model output

Sample: 1993 2013

Included observations: 21

Failure to improve likelihood (non-zero gradients) after 59 iterations

Coefficient covariance computed using outer product of gradients

Presample variance: backcast (parameter = 0.7)

GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.437358	0.159812	2.736709	0.0062
LNREXR_T_1_	0.906321	0.039869	22.73224	0.0000
Variance Equation				
C	0.003026	0.000625	4.838393	0.0000
RESID(-1)^2	-0.158774	0.094470	-1.680675	0.0928
GARCH(-1)	0.780588	0.256102	3.047960	0.0023
R-squared	0.916684	Mean dependent var		3.742843
Adjusted R-squared	0.912299	S.D. dependent var		0.566659
S.E. of regression	0.167813	Akaike info criterion		-1.523690
Sum squared resid	0.535061	Schwarz criterion		-1.274995
Log likelihood	20.99875	Hannan-Quinn criter.		-1.469717
Durbin-Watson stat	1.241614			

4.2.2. Autocorrelation test

The results obtained indicated the absence of autocorrelation given that the p-values were all above the 5% mark as shown in the table below therefore the null hypothesis was accepted.

Table 2: Autocorrelation

Date: 11/06/15 Time: 18:05

Sample: 1993 2013

Included observations: 21

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob*	
. * .	. * .	1	-0.188	-0.188	0.8494	0.357
. **	. **	2	0.324	0.299	3.5153	0.172
. .	. *	3	0.022	0.137	3.5281	0.317
. * .	. * .	4	-0.085	-0.184	3.7344	0.443
. * .	. ** .	5	-0.118	-0.249	4.1538	0.527
. .	. .	6	-0.056	-0.031	4.2565	0.642
. .	. *	7	-0.054	0.102	4.3588	0.738
. * .	. * .	8	-0.129	-0.104	4.9814	0.760
. * .	. ** .	9	-0.091	-0.237	5.3153	0.806
. * .	. * .	10	-0.115	-0.163	5.8993	0.824
. * .	. * .	11	-0.172	-0.129	7.3235	0.772
. * .	. * .	12	-0.101	-0.117	7.8669	0.795

4.2.3. Normality test

The results obtained, as shown below, indicate the presence of a normal distribution as the p-value is greater than 5% and the graph nearly exhibits a bell-shaped curve. The null hypothesis was therefore accepted. A normal distribution was preferred for accuracy of the model.

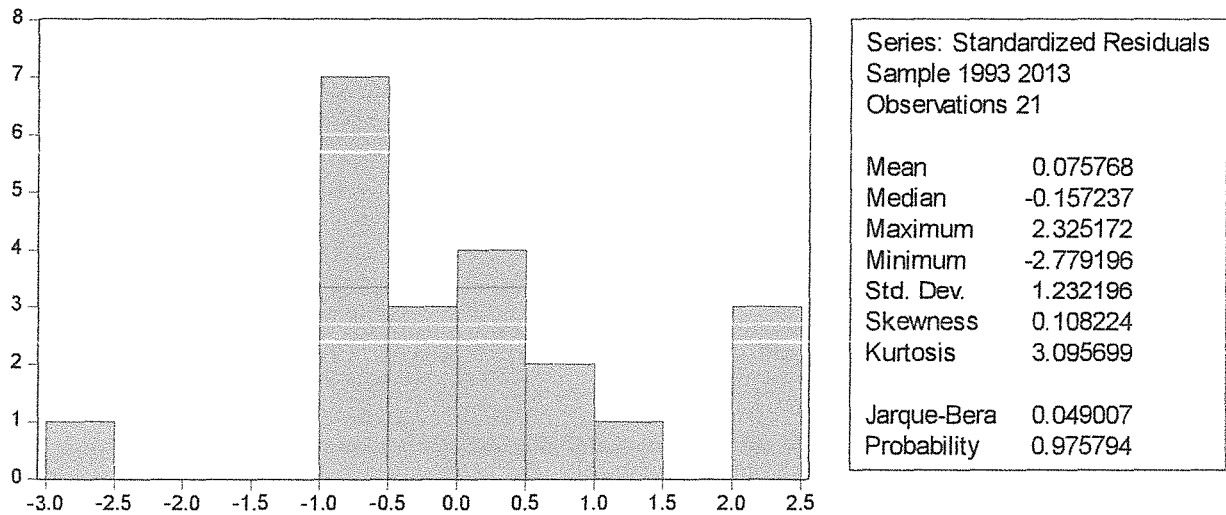


Figure 1: Normality of residuals

4.3. Relationship between exchange rate volatility and FDI

Of all the regressed variables, exchange rate volatility, the lagged value of FDI and the dummy variable of political stability exhibited stationarity while the remaining variables exhibited non-stationarity. To convert the non-stationary data into stationary data the variables were tested for stationarity after different levels of differencing after which, the variable representing the degree of openness of the economy became stationary after obtaining the first difference. Per capita GDP which was a proxy for mean wage rate presented stationarity after obtaining the second difference while the real exchange rate variable displayed stationarity after obtaining the first difference¹.

¹ Unit root tests indicated in the appendix.

The main regression formula was therefore run after accommodating the differences brought about by the stationarity or otherwise of the data. The following model was therefore run;

$$\begin{aligned} \ln FDI_t = & \phi + \alpha D(\ln REXR_t) + \delta \ln EXVL_t + \omega D(\ln OPN_t) \\ & + \varphi D(\ln GDPpC_t, 2) + \lambda D(\ln FDI_{t-1}) + \chi PLSIT_t + \varepsilon_t \end{aligned}$$

The following (table 3) below illustrates that exchange rate volatility was found to have a negative impact on FDI inflow into the country and was significant at the 5% level. This indicates that the volatility of the exchange rate plays a major part in the determination of FDI inflows into the country. This is in line with previous studies such as Bénassy-Quéré, Fontagné and Lahrière-Révil (2001) and Urata and Kawai (2000). Some studies such as that by (Tsikata, Asante, & Gyasi, 2000) found a negative impact of the volatility of exchange rate on FDI inflows however the relation was insignificant. This was attributed to the smaller time frame used in the study.

Table 3: Main regression output

Dependent Variable: LNRDFI_T_
 Method: Least Squares
 Date: 11/07/15 Time: 14:29
 Sample (adjusted): 1996 2013
 Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.582438	11.83427	0.809719	0.4353
D(LNREXR_T_)	0.813521	23.70443	0.709298	0.0929
LNEXVL_T_	-1.052326	1.754297	-0.599856	0.0468
LNRDFI_T_1_	0.110770	0.271439	0.408085	0.0310
D(LNOPN_T_)	0.786808	2.082858	-1.818083	0.0964
D(LNGDPPC_T_,2)	0.185842	4.008627	1.543132	0.1511
PLSIT_T_	-0.555640	0.655124	0.848146	0.0144
R-squared	0.564463	Mean dependent var		18.40320
Adjusted R-squared	0.696848	S.D. dependent var		1.109844
S.E. of regression	1.125579	Akaike info criterion		3.359774
Sum squared resid	13.93622	Schwarz criterion		3.706030
Log likelihood	-23.23797	Hannan-Quinn criter.		3.407518
F-statistic	0.921335	Durbin-Watson stat		1.786508
Prob(F-statistic)	0.515484			

The degree of openness of the economy was found to have a positive impact on the inflow of FDI. This implies that the liberalization of the Kenyan market has enhanced FDI inflows, even though the variable was found to be insignificant. This could be attributed to the fact that the liberalization in itself has not brought about the much needed inflows to the country required to boost economic growth.

The mean wage rate proxied by GDP per capita was found to have a positive effect on FDI inflow to the country, however its level of effect was found to be insignificant. This goes contrary to assumed knowledge that it should have a negative effect as foreign entities seeking to employ FDI see higher wage rates as an increase in costs which they tend to shy away from.

The lagged value of FDI was found to positively impact current FDI inflows and was statistically significant. The rationale behind including this variable was to attempt to illustrate the long-term effect of FDI; take, for example, when an investment is made today, does it lead to further investment as a local subsidiary receives assistance from its parent? Results obtained promote the idea that foreign investors tend to increase their investment amount in a country as time passes. This also added to the idea that the current investment climate in a country is an important determinant of future levels of investment in the country.

As expected, the presence of political instability; for example, in the form of undemocratic elections leads to a decline in FDI inflows. The variable was significant close to the 1% level. The decline in FDI usually is as a result of the uncertainty that political instability brings along coupled with the potential destruction of property and the decline in economic performance that usually follows such periods.

Lastly, the real exchange rate was found to have a positive impact on FDI, although it was insignificant. A positive relationship implies that a rise in the real exchange rate index (indicating an appreciation of the dollar or depreciation of the shilling) tends to favor FDI to Kenya as shilling-denominated assets become cheaper to acquire for foreign investors

CHAPTER FIVE

Discussion and Conclusion

5.1. Introduction

This chapter aims at capturing the interpretation and implications of the findings of the study based on the research objectives outlined and concluding the discussions carried out in the research study while discussing some of the limitations and recommendations for further research.

5.2. Discussion

5.2.1. Relationship between exchange rate volatility and FDI

The purpose of this study was to determine, empirically, if there exists a relationship between the volatility of the exchange rate and foreign direct investments in the country and if the relationship existed, what impact the former has on the latter (positive or negative). It was noted that FDI is an important variable in the development process of any country; more so for developing nations such as Kenya. This was illustrated by the impact of FDI inflows on the rising of the East Asia tiger economies. This study was chosen not only due to the aforementioned factors, but also because few studies have been conducted to ascertain the effect of the volatility of the Kenya Shilling on foreign direct investment inflows to the country.

The study found that there exists a relationship between the two variables and a significant one at that as illustrated by the findings in the previous section. The study's findings went hand in hand with studies such as that by Froot and Stein (1991) who utilized an imperfect market approach to argue that exchange rates act on wealth to affect FDI in that host currency depreciation is expected to have a positive impact on inbound FDI as it automatically increases the wealth of foreign investors thus allowing them to make more purchases of shilling-denominated assets.

5.2.2. Impact of exchange rate volatility on FDI

The study found that the volatility of the real exchange rate has a significant negative impact on FDI. This confirmed previous studies such as that by Bénassy-Quéré, Fontagné and Lahrière-Révil (2001) and Urata and Kawai (2000) that proposed that FDI inflows into any country tend to be reduced by exchange rate volatility.

The mean wage rate (proxied by per capita GDP) was found to have a positive impact on FDI; its impact was however found to be insignificant. This went against the assumption that foreign entities would tend to shy away from the country due to relatively higher labor costs.

Existing FDI in the country was found to have significant influence over potential future FDI inflows whereas political instability was found to be a huge inhibition to FDI inflows into the country.

The openness of the economy of the economy was found to have a positive impact of FDI, its impact, however was found to be insignificant, and this may be attributed to the fact that liberalization of the economy itself does not warrant higher FDI inflows. This was also observed in a study by Kyereboah-Coleman & Agyire Tettey (2008)

With regards to the real exchange rate, it was found that depreciation of the Kenya Shilling tends to lead to an increase in FDI inflows to the country. Intuitively, this can be attributed to the fact that shilling-denominated assets become cheaper to acquire for foreign entities.

While most variables go along with pre-assumed knowledge some, such as per capita GDP go against the grain.

5.3. Conclusion

5.3.1. Relationship between exchange rate volatility and FDI

A significant relationship between the aforementioned variables was established by the study. This falls in line with expectations as usually the entire FDI process involves parties that operate with different currencies. As such, constant changes in

the value of one currency relative to another is expected to influence the possibility and magnitude of potential investment by a foreign entity domestically.

The findings brought forward by the study confirms trade integrated models brought forward by Liargovas and Kosteletou (2000) that distinguishes between traded and non-traded goods in that for a developing economy such as that of Kenya, an exogenous inflow of capital would lead to exchange rate appreciation or depreciation hinged on whether the capital is intended to finance capital accumulation or domestic spending on traded and non-traded sectors. This view was also brought forward by Branson (1997).

5.3.2. Impact of exchange rate volatility on FDI

The study settled on exchange rate volatility having a negative impact on FDI in Kenya. The study, therefore fell in line with schools of thought brought forward by Urata and Kawai (2000) among other scholars, this is not to repudiate contrary findings of studies such as that by Goldberg and Kolstad (1995), Alba ET. Al. (2005) among other scholars who found a positive impact of exchange rate volatility on inbound FDI. The differences according to Sazanami, Yoshimura and Kiyota (2003) could be attributed to the different methodological approaches utilized in the different studies with a rift expected to exist between studies that focused on national aggregated FDI figures and those that focused on inbound FDI to specific industries. With this study falling under the former category.

5.4. Limitations

The study was faced with various constraints with regard to data availability.

First, it would have been more desirable to have FDI inflow data split into the various industries represented in the Kenyan economy. This is because aggregated data, such as that that is available for the Kenyan economy, tends to mask the true effects of exchange rate volatility on FDI as proposed by Froot and Stein (1991) and Sazanami, Yoshimura and Kiyota (2003), this implies that different industries experience different impacts, and therefore by using aggregated data, the different

impacts tend to offset each other thus giving a not so accurate view of the impact of the volatility of the exchange rate on FDI.

Secondly, the frequency of the data available was too low in that, even for the aggregated data, only annual data was available. Therefore, all variables had to be presented in an annual format.

Another limitation of the study was the assumption that all the explanatory variables chosen for the regression are exogenously determined. This may not be the case in reality as it is possible that there is a feedback effect between FDI and its determinants in which case the vector autoregressive model would have been a more suited estimation method. This limitation, however does not distort on the validity of the findings as it was not the focus of the study.

Lastly, the time frame of existing data was extremely short, with exchange rate data from the CBK only going as far back as 1993. A wider sample would enrich the study by making it more accurate.

5.5. Areas for further research

It would be important for future research to incorporate government policy implications. This is important as, for example, an overvaluation of the currency, which often comes about due to inappropriate macroeconomic policies dampens FDI inflows.

In line with the proposition brought forward by Liargovas and Kosteletou (2001) concerning the uncertainty as to the direction of the relationship between the real exchange rate and FDI, it would be important for future studies to determine the direction of causality between the two variables and determine whether it starts from FDI to the real exchange rate or vice versa.

Finally, given the availability of information, it would be better to include a wider time-frame so as to improve the accuracy of the results obtained.

5.6. Recommendations

Based on the findings presented by the study it would be important for policymakers to include exchange rate stabilization within the goals of monetary

policy given the sensitivity of inbound FDI to fluctuations of the exchange rate. This however, should be done while factoring in the alleged costs of exchange rate stabilization which include increases in the volatility of inflation, output and interest rates. Stabilization of the exchange rate would improve the trade and business environment by introducing an element of certainty.

References

- Abbott, A., David O., C., & Vita, G. D. (2012). Exchange Rate Regimes and Foreign Direct Investment Flow. *Review of International Economics*, 20(1), 95 - 107.
- Alba, J., Wang, P., & Park, D. (2005). *The impact of exchange rates on FDI and the interdependence of FDI over time*. Retrieved June 14, 2015, from <http://nt2.fas.nus.edu.sg/ecs/res/seminar-papers/09012007.pdf>
- Baek, I., & Okawa, T. (2001). Foreign exchange rate and Japanese foreign direct investment in Asia. *Journal of Business Economics*, 53, 69-84.
- Bénassy-Quéré, Fontagné, & (2001), L.-R. (20015). Exchange-Rate Strategies in the Competition for Attracting Foreign Direct Investment. *Journal of the Japanese and International Economics*, 15(2), 178-198.
- Branson, W. (1997). Asset markets and relative prices in exchange rate determination. *Socialwissenschaftlich Annalen*, 1(1).
- Cushman, D. (1985). Real exchange-rate risk, expectations, and the level of direct investment. *Review of Economics and Statistics*, 67, 302-307.
- Engel, C., & Rogers, J. H. (1996, December). How Wide is the Border. *The American Economic Review*, 86(5), 1112-1125.
- Goldberg, L., & Koslstad, C. (1995). Foreign direct investment, exchange rate variability and demand uncertainty. *International Economic Review*, 36, 855-873.
- Investment Climate Advisory Services and World Bank Group. (2010). *Investing Across Borders*. Washington D.C.: The World Bank Group.
- Kaplan Financial. (2012, December). *Foreign exchange risk management*. Retrieved from Kaplan Financial Knowledge Bank: <http://kfknowledgebank.kaplan.co.uk/KFKB/Wiki%20Pages/Foreign%20Exchange%20Risk%20Management.aspx?mode=none>
- Kiyota, K., & Urata, S. (2004, November). Exchange Rate, Exchange Rate Volatility and Foreign Direct Investment. *The World Economy*, 27(10), 1501-1536.

- Kosteletou, N., & Liargovas, P. (2000). Foreign Direct Investment and Real Exchange Rate Linkages. *Open economies review*(11), 135-148.
- Kothari C., R. (2004). *Research Methodology: Methods and Techniques*. New Dehli: New Age International Publishers.
- Kyereboah-Coleman, A., & Agyire-Tettey, K. F. (2008). Effect of exchange-rate volatility on foreign direct investment in Sub-Saharan Africa: The Case of Ghana. *The Journal of Risk Finance*, 9(1), 52-70.
- Madura, J. (2012). *International Financial Management* (11 ed.). Ohio: CENGAGE Learning.
- Markusen, R. J., & Venables, A. J. (1997). Foreign direct investment as a catalyst for industrial. *Working Paper No. 6241*. Cambridge, Massachusetts: National Bureau of Economic Research.
- McKenzie, M. (1999). The impact of exchange rate volatility on international trade flows. *Journal of Economic Surveys*, 13(1), 71-106.
- Njoroge, S., & Dr. Okech, T. (2011). An Assessment of the Factors Influencing Foreign Direct Investment Inflows in Kenya's Horticultural Industry. *International Journal of Business and Social Science*, 2(5).
- P. Agarwal, J. (1980). Determinants of foreign direct investment: A Survey. *Weltwirtschaftliches Archiv*, 116(4), 739-773.
- Phillips, S., & Ahmadi-Esfahani, F. Z. (2008). Exchange Rates and Foreign Direct Investment: Theoretical Models and Empirical Evidence. *The Australian Journal of Agricultural and Resource Economics*, 52, 505-525.
- Ray Barrell, S. D., & Stephen, G. H. (2007). Foreign Direct Investment (FDI) and Exchange Rate Uncertainty in Imperfectly Competitive Industries. In S. D. Ray Barrell, & G. H. Stephen, *Foreign Direct Investment (FDI) and Exchange Rate Uncertainty in Imperfectly Competitive Industries* (pp. 77-99). Physica-Verlag Heidelberg.

- Raymond Vernon. (1971). Sovereignty at bay: The multinational spread of U. S. enterprises. *Thunderbird International Business Review*, 13(4), 1-3.
- Rogers, J., & Venables, A. (1995). Haircuts or hysteresis? Sources of movements in real exchange rates. *Journal of International Economics*, 38, 339-360.
- Root, F. R., & Ahmed, A. A. (1979). Empirical Determinants of Manufacturing Direct Foreign Investment in Developing Countries. *Economic Development and Cultural Change*, 27(4), 751-767.
- Saddimbah, G. (2014). *Effect of Foreign Direct Investment (FDI) Inflow in Kenya on Economic Growth (GDP), Exports and Balance of Payments (BOP)*. Nairobi: United States International University.
- Tsikata, G. K., Asante, Y., & Gyasi, E. M. (2000). *Determinants of Foreign Direct Investment in Ghana*. London: Overseas Development Institute.

Appendices

Appendix 1: Unit root tests

Table A. 1: Exchange rate volatility unit root test

Null Hypothesis: LNEXVL_T_ has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.761545	0.0016
Test critical values: 1% level	-3.857386	
5% level	-3.040391	
10% level	-2.660551	

*MacKinnon (1996) one-sided p-values.

Table A. 2: Lagged FDI unit root test

Null Hypothesis: LNRFDI_T_1_ has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.614184	0.0151
Test critical values: 1% level	-3.808546	
5% level	-3.020686	
10% level	-2.650413	

*MacKinnon (1996) one-sided p-values.

Table A. 3: political stability unit root test

Null Hypothesis: PLSIT_T_ has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.717282	0.0127
Test critical values: 1% level	-3.831511	
5% level	-3.029970	
10% level	-2.655194	

*MacKinnon (1996) one-sided p-values.

Table A. 4: Openness of the economy unit root test

Null Hypothesis: D(LNOPN_T_) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.262326	0.0318
Test critical values: 1% level	-3.831511	
5% level	-3.029970	
10% level	-2.655194	

*MacKinnon (1996) one-sided p-values.

Table A. 5: Real exchange rate unit root test

Null Hypothesis: D(LNREXR_T_) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.254495	0.0005
Test critical values: 1% level	-3.831511	
5% level	-3.029970	
10% level	-2.655194	

*MacKinnon (1996) one-sided p-values.

Table A. 6: Per capita GDP unit root test

Null Hypothesis: D(LNGDPPC_T_2) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.105922	0.0001
Test critical values: 1% level	-3.857386	
5% level	-3.040391	
10% level	-2.660551	

*MacKinnon (1996) one-sided p-values.