Assessing the Impact of Oil Prices on Exchange Rate Dynamics in the Kenyan Economy

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DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the Research Project contains no material previously published or written by another person except where due reference is made in the Research Proposal itself.

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Abstract

This paper aims to investigate the role of murban adnoc oil import prices in explaining the dynamics of exchange rates in the Kenyan economy. The study uses monthly data covering the period 2005 to 2014. The Johansen Co-integration technique will be used to determine long run relationships of variables in the study. The vector autoregressive model is then used to analyse the regression by allowing the value of exchange rates to depend on more than just its own lags but also lags of lending interest rates and external reserves. The findings from this study show that in the Kenyan economy, murban adnoc oil import prices do not have a significant impact on exchange rates. Therefore, exchange rate stability could still be achieved even with fluctuating murban adnoc oil import prices in Kenya.

Key words: Oil price, Johansen Co-Integration technique, Vector Autoregressive model, Murban Adnoc Oil

Contents

List of Figures

List of Tables

List of Abbreviations

FOREX-Foreign Exchange Market

GDP- Gross Domestic Product

OPEC- Oil Producing and Exporting Countries

VAR- Vector Autoregressive Model

VECM-Vector Error Correction Model

1.0 Introduction

1.1 Background Information

The relationship between oil prices and exchange rates has been of considerable interest after the breakdown of the Bretton woods system[1], since it led to the collapse of the adjustable pegged foreign exchange rate system and caused the rise of imbalance of payments. According to Hethaway (2009), the importance of oil has risen to the extent that in a world suddenly without oil, all major distribution systems that allow economic transactions on a more than local basis would fail and the world economy would collapse. Oil is an important form of energy used globally and is a significant factor incorporated in the determination of a country's economic performance.

Oil price levels have varied effects on different economies. An increase in prices of oil causes a rise in production costs of goods and services therefore increasing price levels. Inflation concerns arise due to an increase in price levels causing negative perceptions among different players in the financial markets. Oil prices can dominate the gross domestic product, which is the total market value of all goods and services produced in a country within a given year, as well as the growth of a country by setting trends in the economy in turn affecting other asset classes. An increase in oil prices, additionally, affects the wealth of a country by enabling the transfer of income from countries that import oil to those that export which is ideally a shift in terms of trade.

The exchange rate, the price of a country's currency in terms of another country's currency, is expected to change through a shift in balance of trade, which is a summary of transactions of a certain economy with other economies within a specified period of time. According to Business Daily May 2015, Kenya's oil product imports add up to 2.66 million tonnes annually. More specifically, murban adnoc oil import prices that this paper focuses on is a benchmark of international oil set by Abu Dhabi National Oil Company(ADNOC), which Kenya mainly relies on to

[1] Bretton woods was an exchange rate system established in 1994 where currencies were pegged to gold and the International Monetary Fund intervened in case of any imbalance of payments.

fuel industries. It is therefore important to determine the effect of these large imports on exchange rates as an explanatory tool for economic performance.

Countries regarded as commodity producing depend on world commodity prices to determine their macroeconomic factors, such as inflation and exchange rates. Currencies of these countries tend to be influenced by commodity prices and are mostly termed as commodity currencies on the FOREX market, where the Australian, New Zealand and Canadian dollars denominations and other currencies issued by emerging countries that are commodity exporters are gathered together. Since oil traded in the world markets is priced in US dollars, oil importing countries that do not use the US dollar as their currency must obtain dollars in order to make oil purchases. Implications of this is that changes in the US dollar value will in effect, affect the price these countries pay in terms of their own currencies. This applies to Kenya which is an oil importing country.

The extent to which the price of oil changes over time, which is basically the measure of risk based on the standard deviation of the return on oil, affects countries in different ways. Oil-exporting countries benefit from high prices of oil while oil-importing countries face unfavourable terms of trade that could affect other sectors in the economy in the long-run. A number of empirical studies have been done on the effect of changes in oil prices on the exchange rate for different economies. Although the findings differ, most studies conclude that oil prices directly affect exchange rates (Amano & Norden, 1998). Changes in the real exchange rate tend to make external transactions of a country more risky and uncertain therefore exposing the country to exchange rate related risks.

The world has experienced growth from oil production to consumption in the past two decades. Due to the discovery of oil in various countries and especially emerging countries, such as Kenya, Uganda and Tanzania, this trend is expected to continue. With the current price of oil at $65 per barrel (June 2015), importing 31,040 barrels a day contributes to a lot of external spending in the Kenyan economy. Petroleum and related products accounted for 22% of GDP expenditure by 2010 as researched by the Kenya Bankers Association. Oil is important in the Kenyan economy because it

is used to run a number of operations, such as fuelling of vehicles, powering of machinery the manufacture of metal.

Effects of oil prices on different economies are one of the major issues that affect some growing economies globally, for example, Nigeria, where oil accounts for over 95% of its foreign earnings. Research by Darby (1982) and Hamilton (1983) found out that most economic recessions were preceded by a sharp rise in oil prices. Changes in oil prices cause economies to be uncertain about future economic performance, which is ideally reflected by exchange rates and highly affects spending and investment decisions of households and firms.

Trung and Vinh (2011) suggest two reasons why macroeconomic variables, such as, exchange rates and inflation should be affected by oil price shocks. To begin with, a rise in oil prices reduces its aggregate demand given income redistribution between net oil exporting and importing countries. Changes in oil prices alter economic activity because more income going to households is used in energy consumption and firms reduce purchases of oil leading to underutilization of factors of production, such as, capital, labour and land. Second, on the supply side, the production process considers oil as the basic input. An increase in oil prices leads to a reduction in the supply of other commodities because of the rise in the cost of oil production which decreases potential output of other commodities that depend on oil.

1.2 Problem Statement

There has been wide research on the effects of oil prices on exchange rates in different economies. Studies by Chaudhuri and Daniel (1998) and Chen and Chen (2007) conclude that exchange rates are affected by the real oil prices. Research by Lizardo and Mollick (2010), shows that an increase in the real price of oil leads to a significant depreciation of the US dollar relative to oil exporting countries. The World Bank Report (2015), identified Kenya as East Africa's largest economy with a projected growth rate of 6 per cent in 2015. The report also shows that Kenya is expected to move from being a frontier to an emerging economy in the near future. It is highly likely that such frontier economies will drive global growth in coming years according to the same report. Considering Kenya contributed the most GDP to the

East African Community, it is important study the effect of murban adnoc oil import prices on such important macroeconomic variables such as exchange rates.

This study aims to contribute to the exchange rate and oil price relationship literature through an empirical examination of this relationship in the Kenyan economy. The impact on these exchange rate movements as a result of oil prices will therefore be important to study to be able to anticipate and mitigate such an extreme depreciation of the local currency. This can be done by the government adopting appropriate monetary and fiscal policies depending on the behaviour of murban adnoc oil import prices to maintain price stability by influencing exchange rates. For example, an open market operation to raise domestic real interest rate makes domestic assets more attractive, causing foreign savers to demand the domestic currency and appreciating the local exchange rate. Other explanatory variables such as interest rates and external reserves will be included to examine the extent to which oil prices influence the Kenyan exchange rate.

1.3 Research Objectives

To examine the impact of real murban adnoc oil prices on the Kenyan real exchange rate

1.4 Research Questions

Is there a significant impact of real murban adnoc oil prices on the real exchange rate in the Kenyan economy?

1.5 Significance of this research

Since the two major oil price shocks which hit the global economy in the 1970s, consequences of oil price changes have been of concern among policy makers, economists and the general public. Policy makers and economists in Kenya will be able to plan for the future once they know the extent to which exchange rates are affected by murban adnoc oil import prices. The general public ideally represent consumers who will benefit from this information by appropriately choosing their consumption, savings and investment decisions at current and future time periods.

2.0 Literature Review

2.1 Introduction

This section provides general literature on the relationship between oil prices and exchange rates. Discussion of previous literature relating to oil prices and exchange rates, empirical literature of seminal works, the knowledge gap and the conceptual framework are covered in this section.

2.2 Discussion of previous literature relating to oil prices and exchange rates

Over the past years, many researchers have developed interest in investigating the empirical relationship between oil prices and exchange rates. This has led to diverse literature related to oil prices and exchange rates of different economies (Beckman, 2012).Since the hit of the global economy by the two major oil price shocks in the 1970s, economists, the general public and policy makers have been concerned about the effects of large oil price fluctuations on macroeconomic variables. This is the 1970 oil crisis that occurred in Japan and the United Kingdom and 1973 in the United States.

The significance of oil prices to determine exchange rate movements have been noted in existing economies (Golub, 1983). Exchange rates are expressed as relative prices because they are computed with price indices, figuring in varied commodities weighted differently. Chaudhuri and Daniel (1998) noted that changes in non-stationary oil prices should be reflected in variations in non-stationary exchange rates as different countries include oil as an output within the commodity price index. A strong consensus exists among researchers who analysed the consequences of oil price behaviour on exchange rate movements over the post-Bretton Woods period. Various studies show evidence that exchange rates and oil price changes are co-integrated. In addition, oil prices may have been the most dominant factor that caused persistent shocks and non-stationary movements of the US dollar exchange rates during the post-Bretton Woods period (Izraf, 2009).

According to AL-Ezzee (2011), the concept that oil prices are reliable enough as a determinant of real exchange rate long run movements is rather new. Kenya has been in continuous discussions focused on the foreign exchange reserves adequacy. The Central Bank of Kenya has adopted a floating exchange rate regime and a liberalised capital account to perform its mandate of maintaining the overall price

stability. Umar (2009) suggests that this practice aims to maintain stable exchange rates. For a non-oil sector, the capital formation and per capita income tend to be highly affected from movements in exchange rates caused by changes of oil prices (Bagella, 2006). For developing countries, it is reasonable to determine the effects of oil prices on exchange rates since the fluctuations are more evident in such countries.

In the case of Kenya, there have been recent fluctuations in the exchange rate. On 22nd of May 2015, the Kenya shilling was trading at Kshs.97 against the US dollar, while a month earlier on the 1st of April 2015; the Kenya shilling was trading at Kshs.92 against the US dollar. The depreciation of the Kenyan shilling led the Central Bank of Kenya to intervene in the foreign exchange market as well as employ policy instruments to try and stabilize the exchange rate. The impact on these exchange rate movements as a result of oil prices will therefore be important to study to be able to mitigate such an extreme depreciation of the local currency. This can be done by the government adopting appropriate monetary and fiscal policies depending on the behaviour of murban adnoc oil import prices to maintain price stability by influencing exchange rates. For example, an open market operation to raise domestic real interest rate makes domestic assets more attractive, causing foreign savers to demand the domestic currency and appreciating the local exchange rate.

In the theoretical sense, Corden (1984) established that exchange rates appreciate when oil prices increase for oil exporting countries and they tend to depreciate when oil prices fall. Ghalayini (2011) supports this finding by concluding that net oil-exporting countries experience an increase in real national income when there is a rise in oil prices because of higher export earnings, though this gain will partly be offset by losses from decrease in export demands due to recessions faced by trading partners. For net oil-importing countries, the direct consequence of a rise in oil price is a loss in income which depends on elasticity of demand in relation to oil production. More generally, increase in oil prices for an oil exporting country tends to exhibit appreciating exchange rates compared to countries that lack oil resources (MacDonald, 1998).

Generally, literature has established a positive relationship between oil prices and exchange rates for countries that export oil, that is, a rise in oil prices leads to a corresponding appreciation of the domestic currency. Korhonen & Juurikkala (2011),

in their analysis of the link between oil prices and exchange rates established that oil prices have a positive effect on exchange rates for oil producing and exporting countries. Koranchelian,Spatafora and Stavrev (2005), studied effects of changes in oil prices on the exchange rate for an oil exporting country, Algeria and Venezuela respectively. The result for Algeria was that the country's long-run real exchange rate depends on movements in oil prices and relative productivity. Zalduendo (2006), used the vector error correction model and found out that increases in oil prices are closely associated with pressures of appreciation while decreases in oil prices are associated with depreciation pressures. However, in Venezuela, there was a sharp decline in differentials in productivity causing depreciation pressures due to increased economic and market changes. Olomola (2006), obtained quarterly data between 1970-2003 to analyse the relationship between real oil price shock and real effective exchange rates, in Nigeria. The study applied the vector autoregressive model, using variance decomposition technique and concluded that increases in oil prices cause an appreciation of the real exchange rates.

Literature related to oil importing countries mainly focused on developed economies. Benassy-Quere, Mignon and Penot (2007), studied the causality and co-integration between real oil prices and the real U.S dollar prices over the period 1974-2004 and established that, *ceteris paribus*, a 10% increase in price of oil causes a corresponding appreciation of the U.S dollar in real effective terms by 4.3 % in the long run. Chen and Chen (2007), carried out a study that involved the G7 countries and showed that there is a positive relationship between oil prices and real exchange rate by finding out that prices of oil may have been the dominant source of movements in real exchange rates. Consistent with these findings, Amano and Norden (1998), found a strong link over the longer horizon between oil price shocks and the U.S real effective exchange rate. In their investigation of 16 countries that are members of the Organization for Economic Cooperation and Development, Chaudhuri and Daniel (1998) obtained results that suggested the main source of U.S real exchange rate movements is asserted to changes in real oil prices. Camarero and Tamarit (2002), incorporated the use of panel co-integration methodology to establish the competitiveness of the Spanish economy by analysing oil prices. The inclusion of another variable, the real interest rate to compare oil prices provided a

more reasonable model to explain exchange rate behaviour in Spain vis-à-vis a select group of European Union countries.

2.4 Empirical Evidence

A number of empirical studies have shown a strong effect of oil prices on exchange rate movements that then affects economic growth of economies. Recent studies on the relationship between oil price and economic growth of New Zealand by Gounder and Bartleet (2007), used oil price transformations for both linear and non-linear models and discovered a direct link between the two variables. Adding on to this study, they discovered that oil price shocks have a significant effect on inflation and exchange rates.

There have been several attempts to model long-run movements in real exchange rates which have generally produced mixed results. Time series models have tried to come up with a robust link between real exchange rate and its various determinants since the purchasing power parity hypothesis has been proved to be a weak model in determining real exchange rates in the long run. According to MacDonald (1993), existing exchange rate models are unsatisfactory. Bachus (1984), found that an extension of the sample period from the 1970s to the 1980s, rejected monetary models that appeared to fit the data in the previous period.

Due to varying results on the relationship between oil prices and exchange rates, Akram (2004), studied the possibility of a non-linear relationship between oil prices and the Norwegian exchange rates. Comparison of similar linear and random walk models with non-linearity of the adopted model improved the model's predictive power. Findings from this study showed that when oil prices were below US $14, there was a negative relationship to the value of the Norwegian exchange rates, which is contrary from results from other studies. Estimating Algeria's long-run equilibrium real exchange rate path, Koranchelian et al.,(2005) showed that movements in long-run equilbrium real exchange rate in Algeria was explained by oil prices and the Balassa-Samuelson effect. This effect suggests that a rise in wages of tradable goods in an emerging economy leads to a corresponding increase in wages in the non-tradable goods sector.

An empirical study on the impact of oil prices on aggregate economic activity in Nigeria by Olomola (2006), incorporated a vector autoregressive model to analyse

quarterly data from 1970 to 2003. Changes in oil prices were measured as the percentage change variance of the oil prices. Gross Domestic Product, rate of inflation, real oil prices, domestic money supply and the real effective exchange rate were the main variables used in the study. The findings confirmed that oil prices influence the exchange rate of the country significantly using the non-linear transformation of oil price. The conclusion was that a rise in oil prices leads to wealth effects therefore causing the exchange rate to appreciate and demand for non-tradable goods to increase.

To examine the effect of real oil price on exchange rates of three oil-exporting countries namely, Norway, Russia and Saudi Arabia, Habib and Kaamova (2007) adopted a measure of the real effective exchange rates. The period used for Norway and Saudi Arabia was 1980-2006 and for Russia, 1995-2006. They tested whether productivity differentials and real oil prices for 15 OECD countries affect exchange rates. Findings indicated that in Russia, a positive relationship between real oil price and real exchange rate was established in the long-run. However, the cases of Norway and Saudi Arabia showed that there was no significant impact of real exchange rates from real oil prices. Further, the results indicated that the adoption of different exchange rate regimes for these countries failed to explain the difference in the findings across countries. However, the regimes adduce to development of policy responses, such as sterilisation, particular institutional characteristics and the accumulation of net foreign exchange assets.

Determinants of equilibrium real exchange rates in some selected oil importing economies were examined using data from OPEC countries between the periods of 1975 to 2005 by (Korhonen and Juurikkala, 2007). Three oil producing countries that are members of Commonwealth of Independent States were used in the study. The pooled-mean group and mean-group estimators were the estimation techniques employed. Results from the study showed that for the group of oil-producing countries, oil prices had significant impact on real exchange rates since high oil prices lead to an appreciation of exchange rates in these countries (Sosunov & Zamulin, 2007).

To analyze whether the 80 per cent real appreciation of the Russian ruble between 1998 to 2005 could be explained by the increase in oil revenues, Sosunov and

Zamulin (2007) used a calibrated general equilbrium model. The findings showed that oil price alone is not sufficient to completely explain the appreciation of the Russian currency without the assumption of permanent increase in oil price. The conclusion was that accounting for increased oil exports could be significant if permanent oil prices were assumed.

A vector autoregressive model was employed by Jin (2008) to assess the impact of oil price and real effective exchange rate on the economic activity of China, Japan and Russia. The lag augmented vector autoregressive approach was first applied to investigate if the oil price shock and exchange rate movements affected economic growth in the three countries. Thereafter, the cointegration technique was used to examine the extent to which real GDP is affected by oil price changes and real exchange rate movements in the long-run. The short-run analysis of the model employed a vector-error correction model to assess real Gross Domestic Product short-run dynamics. Findings from the study indicated that increase in oil prices negatively affect economic growth in Japan and China but positively affect economic growth in Russia. To be more specific, a permanent increase in international oil prices by 10 per cent results in a 1.67 per cent decline in Japanese GDP but a similar growth in Russian GDP. Adding on to this, real exchange rate appreciation increases GDP in Russia but decreases GDP in China and Japan according to this study.

2.5 Research/Knowledge gap

Studies done by Trung and Vinh (2011) suggest that there are two reasons why oil shocks affect macroeconomic factors. First, a rise in oil prices leads to a decrease in aggregate demand on the basis of income redistribution between oil-importing and oil-exporting countries. Secondly, an increase in oil prices leads to a decrease in its demand, meaning that oil production has to be reduced to be at equilibrium with the quantity demanded, which then leads to a decline in output. Oil price changes may also lead to a significant impact on economic growth in this regard.

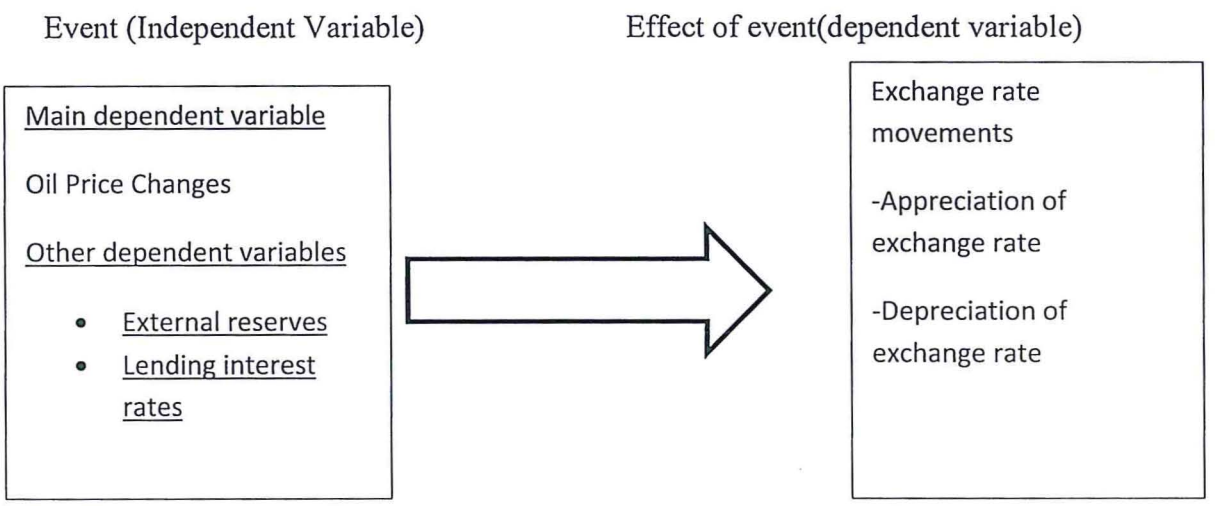
Considering Kenya contributed the most GDP to the East African Community, it is important study the effect of murban adnoc oil import prices on such important macroeconomic variables such as exchange rates. This study aims to contribute to the exchange rate and oil price relationship literature through an empirical examination of this relationship in the Kenyan economy. The impact on these exchange rate

movements as a result of oil prices will therefore be important to study to be able to anticipate and mitigate such an extreme depreciation of the local currency. This can be done by the government adopting appropriate monetary and fiscal policies depending on the behaviour of murban adnoc oil import prices to maintain price stability by influencing exchange rates. For example, an open market operation to raise domestic real interest rate makes domestic assets more attractive, causing foreign savers to demand the domestic currency and appreciating the local exchange rate. Other explanatory variables such as interest rates and external reserves will be included to examine the extent to which oil prices influence the Kenyan exchange rate.

2.6 Conceptual framework

A conceptual framework is an important tool of research intended to create awareness and a clear understanding of the topic of discussion to enable easy communication of the same (Kombo & Trop, 2006). The framework is very useful in research since it seeks to set the foundation of the relationship between the concepts under study. It represents graphically and theoretically the main dimensions being studied and illustrates the relationship between the main variables. The relationship between the variables in the study is as depicted below:

Figure 1: Conceptual Framework Representation



The diagram above shows the relationship between the occurrence of an event, which in this case is oil prices and movements in real exchange rates. According to Lizardo

and Mollick (2010), an increase in the real price of oil leads to a significant appreciation of the U.S dollar in oil exporting countries, while the currency of oil-importing countries depreciates.

According to Zhou (1995), in United States, among various sources of real shocks that explain movements of real exchange rates, oil prices play a major role in explaining these real exchange rate movements. However, there are other macroeconomic variables apart from murban adnoc oil import prices that affect the real exchange rate and will be considered in the study as control variables. These include; lending interest rates and external reserves. Including these variables into the specification increases the fit of the model. For this reason, these variables will be other independent variables used in the analysis.

3.0 Methodology

3.1 Introduction

To achieve the objective of this study, a methodology proposed by Mukhriz (2009) later adopted by Abwaku, Omolora, Toyin and Fatima (2010) is used. In an attempt to assess the impact of oil prices on the exchange rate , this research will first employ a unit root test to find out if the variables are stationary or non-stationary. The Johansen Co-integration test will assess whether a linear combination of the dependent and independent variables becomes stationary in the long-run. The Vector Autoregressive Model will determine how the exchange rate movements react in the long- run to the chosen independent variables. This analysis is drawn from the methodology of Jin (2008) in a comprehensive analysis of Russia, China and Japan on the effects of oil on exchange rates. The study adopted a Vector Autoregressive Model and cointegration technique to study the relationship exisiting among murban adnoc oil import prices, exchange rates, lending interest rates and external reserves.

3.2 Research Design

This study is exploratory in nature as it seeks to assess the extent to which movements in exchange rates in Kenya can be attributable to oil prices. The design was further selected based on previous studies that indicated oil prices contribute a great deal to movements in exchange rates. Therefore, a hypothesis can be formulated on the relationship between oil prices, external reserves, interest rates and exchange rates. The hypothesis is whether murban adnoc oil prices, external reserves and interest rates affect exchange rates.

3.3 Target Population

The study's target population was frontier economies in East Africa. Kenya was selected since it is the fastest growing economy compared to Uganda and Tanzania as reported by the World Bank Report 2015.

3.4Sampling Design

This study analyses the exchange rate dynamics resulting from murban adnoc oil import prices in Kenya using monthly data for 120 months for the period January 2005 to December 2014. This period is selected to assess the impact before the after Kenya regained stability after the post-election violence of 2007. Kenya was chosen

since the World Bank Report 2015, identified Kenya as East Africa's largest economy with a projected growth rate of 6 per cent in 2015.

3.5Data Collection

Secondary data was used in the study. Monthly data from the period of January 2005 to December 2014 of murban adnoc oil import prices were collected from the Kenya National Bureau of Statistics Website while exchange rates were collected from the World Bank website. Data on external reserves and lending interest rates were collected from Central Bank of Kenya website.

3.6 Data Analysis

3.6 1 Empirical Model

The VAR model is used in determining the dependence of exchange rates on murban adnoc oil import prices.

3.6.1.1 Unit Root Test

Prior to estimating a VAR model it is imperative that the structure of the data is examined to ensure that the data is stationary. Due to the likelihood of serial correlation this study uses the Augmented Dickey Fuller (ADF) and Phillips and Perron (PP) test to determine stationarity and to obtain the order of integration. The model used was:

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \beta Y_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta Y_{t-i} + U_t \quad (3.1)$$

Where ΔY_t represents the first difference of exchange rate or oil prices, m is the lag length of augmented terms and U_t is the error term. The null hypothesis in the Augmented Dickey Fuller and Phillips and Perron unit root test is that y_t is non-stationary or has a unit root.

3.6.1.2 Johansen Cointegration Test

Further, the Johansen Cointegration test was carried out to determine whether the linear combination of oil prices and exchange rates is integrated of order zero i.e. I (0). This test will provide an understanding of the equilibrium relationship between the two variables by revealing whether they are bound by some long run relationship.

3.6.1.3 Granger Causality

The Granger causality test proposed by Granger (1969) was used to establish the causality between murban adnoc oil prices and exchange rates.

The Granger causality test will aid in explaining whether changes in murban adnoc oil import prices affect exchange rates. It is also plausible that a change in exchange rates could affect oil prices or that there is a bi- directional relationship between the two variables.

In this case murban adnoc oil prices are able to increase the accuracy of the precision of exchange rates with respect to a forecast, considering past values of murban adnoc oil import prices.

However, it is difficult to understand whether a variable in a VAR is significant or not. This is because VAR treats all variables as endogenous and provides no theoretical foundation in addition to the introduction of lags. To counteract this, Granger causality test is employed to test for joint significance of a given variable. In this study, the F- tests will be used to test the statistical significance of each variable on condition that the VAR variables are stationary. The null hypotheses will be:

1. Lags of Y_{1t} do not explain Y_{1t}
2. Lags of Y_{2t} do not explain Y_{1t}
3. Lags of Y_{2t} do not explain Y_{2t}
4. Lags of Y_{1t} do not explain Y_{2t}

3.6.1.4 Lag Selection

The optimal number of lags to be included within the framework will be determined by information criteria: Akaike's information criteria (AIC), Schwarz information criteria (SIC) or Hannan Quinn information criteria (HQIC).

3.6.1.5 VAR Model

The VAR model to be estimated within this framework will be given as:

$$Y_{1t} = \alpha_{10} + \alpha_{11}Y_{1t-1} + \cdots \alpha_{1k}Y_{t-k} + \beta_{11}Y_{2t-1} + \cdots . \beta_{1k}Y_{2t-k} + U_{1t} \quad (3.2)$$

$$Y_{2t} = \alpha_{20} + \alpha_{21}Y_{2t-1} + \cdots \alpha_{2k}Y_{t-k} + \beta_{21}Y_{1t-1} + \cdots . \beta_{2k}Y_{2t-k} + U_{2t} \quad (3.3)$$

Where U_{1t} and U_{2t} are identically independently distributed error terms and k is the lag length. The basis for using a VAR model to evaluate the relationship between oil prices and exchange rates is that VAR, in addition to treating all variables as exogenous, captures more features of the data and therefore provides fairly good results that can be used to make inferences about the data.

3.6.1.6 Impulse Response

In understanding the size and sign of the effects of oil prices on exchange rates within the VAR model estimated in equation (3.2) an impulse response function will be used. This function will evaluate how an increase in oil prices will change the exchange rate levels in Kenya over a period of time. For an impulse response function to be used the VAR model will be expressed as a vector moving average such that equation (3.3) becomes:

$$\begin{matrix} Y_{1t} \\ Y_{2t} \end{matrix} = \begin{matrix} \alpha_{10} \\ \alpha_{20} \end{matrix} + \begin{pmatrix} \alpha_{11} & \beta_{11} \\ \beta_{21} & \alpha_{21} \end{pmatrix} \begin{matrix} Y_{1t} \\ Y_{2t} \end{matrix} + \cdots . \begin{pmatrix} \alpha_{1k} & \beta_{1k} \\ \beta_{2k} & \alpha_{2k} \end{pmatrix} \begin{matrix} Y_{1t-k} \\ Y_{2t-k} \end{matrix} + \begin{matrix} U_t \\ U_t \end{matrix}$$

(3.4)

Equation (3) can further be simplified as:

$$A_t = \lambda_t + \lambda_{t-1}A_{t-1} + \cdots \lambda_k A_{t-k} + \varepsilon_t$$

(3.5)

The effect of an increase in oil prices at time $t-1$ on exchange rates will be determined by the coefficient λ_{t-1}.

4.0 Data Analysis

4.1 Unit Root Test

Macroeconomic data have been shown to be characterized by a stochastic trend unless treated where such trend influences statistical behaviour of the estimators. This involves using the ADF and PP tests outlined in the methodology section to difference the data and to determine the order of integration.

Table 1: Unit Root Tests at level

VARIABLES	**C.V**	**1%**	**5%**	**10%**	**Conclusion**
		-3.4870	**-2.8860**	**-2.5799**	
	ADF t-statistic		**PP t-statistic**		
Log exchange rate	-2.0025		-2.7881		Non-stationary
Log murban-adnoc oil prices	-2.6958		-2.6366		Non-stationary
Log external reserves	-1.1939		-1.0905		Non-stationary
Log interest Rate	-2.8460		-2.3940		Non-stationary

Equation (3.1) estimation with constant and trend yields results presented in the table 1 above. The null hypothesis is that the variable under consideration is stationary or has a unit root. If the t-statistic is greater than the critical value, we reject the null while if it is less than the critical value, we fail to reject the null. The results indicate that all the variables are not stationary at the 5% level of significance.

Table 2:Unit Root Tests at first difference

VARIABLES	C.V	1%	5%	10%	CONCLUSION
		-3.4870	-2.8860	-2.5799	
	ADF t-statistic		PP t-statistic		
Log exchange rate	-11.3566		-20.9041		Stationary
Log murban-adnoc oil prices	-6.4990		-6.5300		Stationary
Log external reserves	-13.3160		-21.343		Stationary
Log interest Rate	-4.5020		-7.5072		Stationary

All variables were found to be stationary at 1% level of significance when taken at first difference using ADF and PP tests. To ensure consistency, they were all taken as first difference and considered as order 1(1).

4.2 Cointegration Test

The Johansen Cointegration test was carried out to determine whether the linear combination of murban adnoc oil prices and exchange rates is integrated of order zero i.e. I (0). This test will provide an understanding of the equilibrium relationship between the two variables by revealing whether they are bound by some long run relationship.

Table 3:Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob. **
None	0.0134	34.6567	47.8561	0.4663
At most 1	0.1158	18.0100	29.7971	0.5654
At most 2	0.0323	3.8591	15.4947	0.9146
At most 3	0.0007	0.0813	3.8415	0.7755

Trace test indicates no cointegration at the 0.05 level

*Denotes rejection of the hypothesis at the 0.05 level

**Mackinnon-Haug-Michelis (1999) p-values

Table 4:Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob. **
None	0.0134	16.6472	27.5843	0.6104
At most 1	0.1158	14.1504	21.1316	0.3528
At most 2	0.0323	3.7780	14.2646	0.8820
At most 3	0.0007	0.0813	3.8415	0.7755

Max-eigenvalue test indicates no cointegration at the 0.05% level

*Denotes rejection of the hypothesis at the 0.05 level

**Mackinnon-Haug-Michelis (1999) p-values

Tables 3 and 4 below present the test results for the number of cointegrating vectors. The results indicate that both the trace statistic and the maximum eigen value show no cointegrating variables. This is evidenced by the fact that the trace statistic is less than the critical value for all the hypothesis tests, that is, none, at most 1, 2 and 3. Therefore, because the variables are not cointegrated, the process that follows is carrying out a VAR analysis and not a VECM.

To get the long run coefficients of the model, the Johansen procedure is applied. The table 5 below represents values of normalized (β) , that is, the standard error, of variables in the model. At 1% level, all coefficients were correctly signed and

statistically significant. The three dependent variables show a negative relationship with the log of exchange rates.

Table 5: Normalized Cointegrating Eigenvector (β')

Cointegrating Equations	Log likelihood	Log likelihood	-2149.447
Lkexchangerates	Lexternalreserves	llendingrates	lmurbanadnocoilprices
1.0000	-0.0027	-0.1970	-0. 2436
	(0.0028)	(53.6969)	(9.7479)

These results are expected for oil importing countries as evidenced by Gounder and Bartleet (2007) in their study of countries like New Zealand. According to Jin(2008), Japan also showed such a negative relationship being an oil importing country. A cointegrating equation is therefore derived from the results with the log of exchange rates being regressed while the log of external reserves, lending interest rates and murban-adnoc oil prices as the regressors. Values in brackets are standard errors of the regression. The equation is as below;

$$lexchrates = 3.841 - 0.002708 lextres_t - 0.197 lintrates_t - 0.2436 murbanoil_t$$

The equation above shows that a 1% decrease in external reserves explains a 0.002708% decrease in exchange rates, a 1% decrease in lending interest rates explains a 0.197% decrease in exchange rates and a 1% decrease in murban adnoc oil import prices explains a fall in exchange rates by 0.2436%. This shows that Kenya's exchange rates are affected more by import oil prices than by lending interest rates and external reserves.

Decrease in terms of trade and balance of payments from the perspective of oil importing countries result from an effect of high oil prices which transfer income from oil importing countries to oil exporting countries. Therefore, the negative sign associated with the murban adnoc oil import prices is as expected. The exchange rate, *ceteris paribus,* is also expected to have a negative relationship for oil importing countries mainly because of the large income transfers to oil exporting countries. This is as expected for the Kenyan economy since it is an oil importing country.

4.3 Granger Causality Test

The Granger causality test will aid in explaining whether changes in murban adnoc oil import prices affect exchange rates. It is also plausible that a change in exchange rates could affect oil prices or that there is a bi- directional relationship between the two variables.

Table 6:Pairwise Granger Causality Test

Sample:1120 Lags:2			
Null Hypothesis	Observations	F-Statistic	Probability Value
Dmurban-adnoc oil prices does not granger cause dexchangerates	118	4.3088	0.0157
Dexchangerate does not granger cause dmurbanadnocoilprices	118	0.3974	0.6730

The causality test of murban adnoc oil import prices granger causing exchange rates or exchange rates granger causing murban adnoc oil import prices was carried out using granger causality as proposed in the methodology. The table 6 above shows the results of pairwise granger causality between the two variables. The results show that there is a unidirectional causality where murban adnoc oil import prices cause exchange rate movements. This is clearly indicated by the probability value of 1.57% which is less than 5 % which means we reject the null hypothesis that murban adnoc oil import prices do not granger cause exchange rates. Exchange rates do not granger cause murban adnoc oil import prices evidenced by the high p-value of 6.73% which is greater than 5%. This is consistent with the objective of this research of determining the extent to which murban adnoc oil import prices cause exchange rate dynamics in the Kenyan economy.

4.4 Optimal lag selection

The optimal number of lags to be included within the framework will be determined by information criteria: Akaike's information criteria (AIC), Schwarz information criteria (SIC) or Hannan Quinn information criteria (HQIC).

Table 7:VAR Lag Order Selection Criteria

Endogenous variables: Exchange rates, Murban adnoc oil prices, External reserves, Interest rates

Lag	LogL	LR	FPE	AIC	SC	HQ
0	44.9404	NA	5.66e-06	-0.7310	-0.6339	-0.6916
1	487.6936	845.974	2.77e-09	-8.3516	-7.8662*	-8.1547
2	519.5380	58.5708	2.09e-09	-8.6346	-7.7608	-8.2800*
3	530.0426	18.5705	2.32e-09	-8.5364	-7.2743	-8.0243
4	552.3223	37.7960	2.08e-09*	-8.6486*	-6.9980	-7.9789
5	561.7890	15.3833	2.36e-09	-8.5319	-6.4930	-7.7047
6	569.1463	11.4301	2.79e-09	-8.3776	-5.9503	-7.3928
7	597.7366	42.3749*	2.26e-09	-8.6024	-5.7868	-7.4600
8	604.3864	9.3809	2.74e-09	-8.4354	-5.2315	-7.1355

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

To determine the optimal lag length, a test for statistics which include Akaike Information Criterion (AIC) and the Schwarz Information Criteria (SIC), Sequential Modified Likelihood Ratio (LR) test, Final Prediction Error (FPE) and Hannan Quin Information Criterion (HQ) are diverse. From table 7 above, the FPE and AIC indicate lag length of four, while LR shows lag length of seven, SC shows two and HQ shows two. We therefore choose lag length of four since two criteria suggest have this as their lowest values.

4.5 The Unrestricted VAR Model

The unrestricted VAR model is carried out to determine the relationship between the variables of study since the analysis established no cointegration after the Johansen test of cointegration. Also, this analysis is carried out with stationary data. The lag

used in this analysis is four adopted from the lag selection criteria. Seventeen coefficient values are used in the VAR model since the lag is four and the variables being considered are four as well plus a random error term to estimate the Ordinary Least Squares regression.

Table 8: Vector Autoregressive Estimates

Standard errors in () and t-statistics in []

	LOGEXCHRATE	LOGOILPRICES	LOGINTRATES	LOGEXTRES
LOGEXCHRATE(-1)	0.3599 (0.0926) [3.8837]	-0.1258 (0.1274) [-0.9875]	-0.0895 (0.2093) [-0.4277]	0.0579 (0.0991) [0.5850]
LOGEXCHRATE(-2)	0.2194 (0.0974) [2.252]	-0.0566 (0.1339) [-0.4230]	0.2458 (0.2199) [1.1175]	-0.0264 (0.1041) [-0.2544]
LOGEXCHRATE(-3)	0.1033 (0.0969) [1.0658]	0.1376 (0.1334) [1.031]	0.0458 (0.2190) [0.2094]	-0.0069 (0.1036) [-0.0675]
LOGEXCHRATE(-4)	0.1558 (0.0924) [1.6849]	0.1457 (0.1272) [1.1456]	-0.0822 (0.2088) [-0.3936]	-0.0116 (0.0988) [-0.1176]
LOGOILPRICES(-1)	-0.1391 (0.0751) [-1.8545]	1.2639 (0.1032) [12.2424]	-0.0155 (0.1695) [-0.0918]	0.1010 (0.0802) [1.2596]
LOGOILPRICES(-2)	0.1464 (0.11754) [1.2462]	-0.2057 (0.16169) [-1.2726]	0.2072 (0.2654) [0.7808]	-0.0895 (0.1256) [-0.7128]
LOGOILPRICES(-3)	0.0048 (0.1177) [0.0410]	-0.1996 (0.1620) [-1.23221]	-0.2348 (0.2659) [-0.8831]	-0.0003 (0.1258) [-0.0023]
LOGOILPRICES(-4)	0.0096 (0.0746) [0.1286]	0.0642 (0.1026) [0.6253]	0.1242 (0.1685) [0.7372]	0.0169 (0.0797) [0.2128]
LOGINTRATES(-1)	0.0111 (0.0418) [0.2665]	0.0674 (0.0576) [1.1706]	1.4170 (0.0946) [14.9781]	-0.0489 (0.0447) [-1.0927]

LOGINTRATES(-2)	-0.0973 (0.0696) [-1.3969]	-0.0786 (0.0962) [-0.8206]	-0.8301 (0.1573) [-5.2744]	0.0733 (0.0744) [0.9841]
	LOGEXCHRATE	LOGOILPRICES	LOGINTRATES	LOGEXTRES
LOGINTRATES(-3)	0.23578 (0.0699) [3.3715]	-0.0186 (0.0962) [-0.1939]	0.6608 (0.1579) [4.1840]	-0.0521 (0.0747) [-0.6976]
LOGINTRATES(-4)	-0.1754 (0.0417) [-4.1980]	0.0123 (0.0574) [0.2140]	-0.3340 (0.0943) [-3.5396]	0.0331 (0.0446) [0.7431]
LOGEXTRES(-1)	0.0709 (0.0953) [0.7447]	0.1118 (0.1311) [0.8529]	-0.2030 (0.2152) [-0.9433]	0.6990 (0.1018) [6.8607]
LOGEXTRES(-2)	0.0030 (0.1165) [0.0257]	0.1398 (0.1603) [0.8725]	0.1066 (0.2631) [0.4050]	0.1153 (0.1245) [0.9258]
LOGEXTRES(-3)	-0.0557 (0.1162) [-0.4801]	-0.0756 (0.1598) [-0.4736]	0.1758 (0.2623) [0.6704]	-0.0485 (0.1241) [-0.3913]
LOGEXTRES(-4)	0.0225 (0.0950) [0.2372]	-0.1766 (0.1306) [-1.3512]	-0.1395 (0.2145) [-0.6506]	0.1934 (0.1016) [1.9048]
C	0.1532 (0.3025) [0.5064]	-0.0601 (0.4162) [-0.1446]	0.0420 (0.6833) [0.061]	0.3334 (0.323) [1.031]
R-squared	0.8008	0.9392	0.9333	0.9582
Adj. R-squared	0.7686	0.9294	0.9225	0.9515
Sum sq. resids	0.3129	0.5921	1.5960	0.3575

The setup of this VAR model is such that current values of a variable can be explained by past values of these variables hence the lagged values. Further, to explain whether an independent variable, say murban adnoc oil import prices, is significant to explain, exchange rates, we compare the probability value to 5 % critical value. If the p-value is greater than 5%, the variable is significant, if it is less than 5%, it is not significant.

Table 9:Ordinary Least Squares Estimation

Sample: 5 120

Included observations: 116

Total system (balanced) observations 464

	Coefficient	Standard Error	t-statistic	Probability value
C(1)	0.3599	0.0926	3.8837	0.0001
C(2)	0.2194	0.0974	2.2524	0.0248
C(3)	0.1033	0.0969	1.0658	0.2871
C(4)	0.1558	0.0924	1.6848	0.0928
C(5)	-0.1391	0.0750	-1.8544	0.0644
C(6)	0.1464	0.1175	1.2461	0.2134
C(7)	0.0048	0.1177	0.0401	0.9673
C(8)	0.0096	0.0746	0.1286	0.8977
C(9)	0.0111	0.0418	0.2665	0.7899
C(10)	-0.0973	0.0696	-1.3969	0.1632
C(11)	0.2357	0.0699	3.3715	0.0008
C(12)	-0.1754	0.0417	-4.1980	0.0000
C(13)	0.0709	0.0953	0.7447	0.4568
C(14)	0.0030	0.1165	0.0257	0.9794
C(15)	-0.0557	0.1161	-0.4801	0.6314
C(16)	0.0225	0.0950	0.2372	0.8126
C(17)	0.1532	0.3025	0.5064	0.6128

The table 9 above represents the probability values associated with different coefficients. The Ordinary Least Squares estimation is used to come up with the probability values in this case.

The following equations were derived from the OLS estimation method

Equation 1:

LOGEXCHRATE = C(1)*LOGEXCHRATE(-1) + C(2) *LOGEXCHRATE(-2) + C(3)*LOGEXCHRATE(-3) + C(4) *LOGEXCHRATE(-4) + C(5)*LOGOILPRICES(-1) + C(6) *LOGOILPRICES(-2) + C(7)*LOGOILPRICES(-3) + C(8) *LOGOILPRICES(-4) + C(9)*LOGINTRATES(-1) + C(10) *LOGINTRATES(-2) + C(11)*LOGINTRATES(-3) + C(12) *LOGINTRATES(-4) + C(13)*LOGEXTRES(-1) + C(14)*LOGEXTRES(-2) + C(15)*LOGEXTRES(-3) + C(16)*LOGEXTRES(-4) + C(17)

Table 10: Equation 1 OLS Regression Results

R-squared	0.8008	Mean dependent variable	4.4334
Adjusted R-squared	0.7687	S.D. dependent variable	0.2911
S.E. of regression	0.0562	Sum squared residual	0.5921
Durbin-Watson stat	1.8688		

In this equation, the only values that are significant to explain variation in exchange rates are lagged values of exchange rates at period 1 and 2 and the lagged values of lending interest rates at period 3 and 4. This is evidenced by the probability values of coefficients of these values which are 0.01%, 2.48%, 0.08% and 0% respectively, which are all less than 5%. This analysis is valid followed by the high R squared of 80.08% which shows the significant percentage of variance explained by the regression. However, oil prices do not have a significant impact on exchange rates.

To establish whether lagged values of a variable can influence the dependent variable, the Wald coefficient test was employed. In this case, the joint analysis of murban adnco oil import prices was carried out to determine whether it could influence exchange rates according to equation (1).

Table 11: Wald Test

Test Statistic	Value	Df	Probability
Chi-square	5.4451	4	0.2446

Null Hypothesis: C(5)=C(6)=C(7)=C(8)=0

Table 11 above shows the results of the Wald test. The p-value is 24.46%, which is more than 5 %, meaning we fail to reject the null that these lagged values of murban adnoc oil import prices can jointly influence exchange rates.

To make sure the coefficients of the normalized cointegrating model are reliable, the AR root stability test is carried out.

Table 12: Stability condition

Root	Modulus
-0.2376 - 0.7474i	0.7842
-0.2376 + 0.7474i	0.7842
0.3985 - 0.6702i	0.7797
0.3985 + 0.6702i	0.7797
0.1493 - 0.7215i	0.7368
0.1494 + 0.7215i	0.7368
0.6495 - 0.2926i	0.7124
0.6495+ 0.2926i	0.7124
-0.5885 - 0.3983i	0.7106
-0.5885 + 0.3983i	0.7106
-0.6239	0.6239
0.4733 - 0.3763i	0.6047
0.4733 + 0.3763i	0.6047
-0.5152 - 0.3027i	0.5975
-0.5152+ 0.3027i	0.5975
0.1472	0.1472

- No root lies outside the unit circle
- VAR satisfies the stability condition

The estimated VAR is stable if all roots have modulus less than one and lie inside the unit circle. The result of AR root stability test satisfies the stability condition of the model as shown in the table below.

4. 6 Variance Decomposition

VAR models are often difficult to interpret given the large numbers of variables and the various interactions: one solution is to construct the impulse responses and variance decompositions. The variance decomposition is used to interpret the VAR model above by indicating the amount of information each variable contributes to other variables in the regression. The process determines how much the forecast error variance each of the variables can be explained by exogenous shocks to other variables.

Table 13:Variance decomposition of the VAR models

PERIOD	S.E	LOGEXCHRATE	LOGOILPRICES	LOGEXTRES	LOGINTRATES
1	0.056224	100.0000	0.000000	0.000000	0.000000
2	0.061411	96.65455	2.812549	0.479696	0.053200
3	0.066657	93.25742	3.049370	0.691210	3.002001
4	0.070260	91.73257	3.052522	0.637727	4.577186
5	0.073737	90.84404	2.878989	0.590722	5.686254
6	0.075571	90.95597	2.777414	0.618075	5.648540
7	0.077693	90.40154	2.855022	1.142541	5.600902
8	0.079167	89.74460	3.105105	1.755802	5.394490
9	0.080594	88.59685	3.661177	2.189376	5.552593
10	0.082392	86.55550	4.410845	2.641816	6.391841

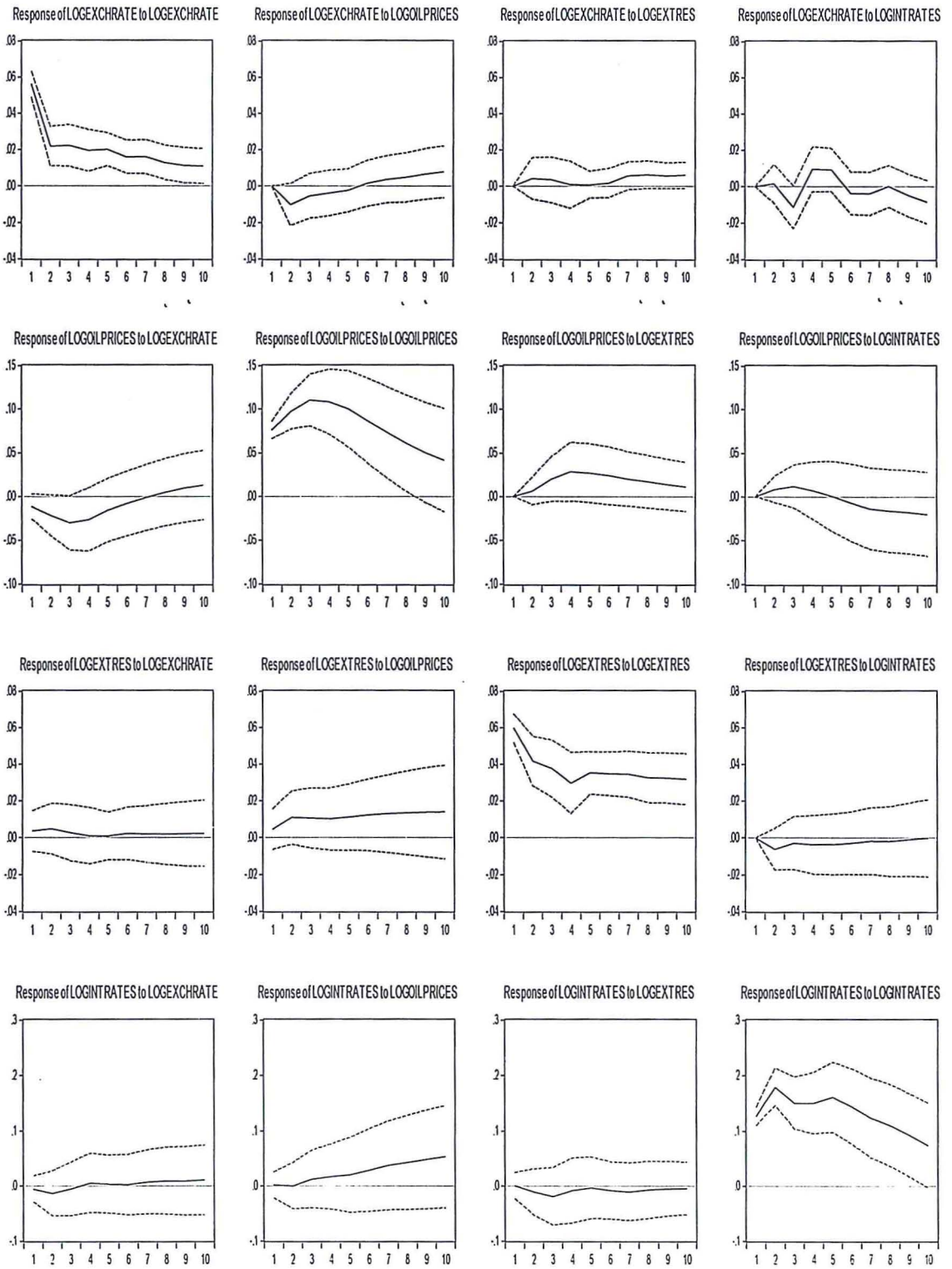
The variance decomposition results for the 10 months of study, show that external reserves and oil prices explain a very small percentage of the variance of the exchange rates, that is they explain 2 to 4 per cent of the forecast error variances. On the other hand, interest rates and exchange rates have 6 per cent and 86 per cent respectively of their forecast error variance explained . From all these results, the conclusion is that murban adnoc oil prices have little predictive power on exchange rates while exchange rates seem to have a strong internal phenomenon that might be caused by expectations or relative expectations.

4.7 Impulse Response

The impulse response traces out the responsiveness of the dependent variables in the VAR to shocks to the error term. A unit shock is applied to each variable and its effects are noted. Impulse responses allow us to examine the impact of a shock in a particular variable. Specifically, impulse response analysis enables us to answer the question: what is the likely response of variable at time t, $t+1$, to a shock at time t?

Table 14: Impulse Response Graphical Analysis

Response to Cholesky One S.D. Innovations ± 2 S.E.



The impulse response functions displayed in the previous page support the variance decomposition results. Shocks to prices in oil, external reserves and lending interest rates result in an impact in exchange rates both in the short run and long run. However, a shock in exchange rates is more explained by a unit shock in interest rates than a unit shock in murban adnoc oil import prices.

5.0 Conclusion and Recommendation

This study employs an empirical analysis to examine the effects of murban adnoc oil import prices on the exchange rate dynamics in Kenya using a sample of observations from 2005 to 2014. The first step in the empirical analysis involved testing the time series properties of stationarity using ADF and PP tests. The Johansen Cointegration technique was then carried out to estimate long run cointegrating vectors. An unrestricted VAR analysis was then carried out, followed by a stability test, variance decomposition and impulse response functions.

It was found that the variables were characterized by a unit root at level, but, the hypothesis of non-stationarity was rejected at first difference. This is consistent with strand of empirical studies on characteristic of time series data, which according to Engle-Granger require differencing before attaining stationarity.

Next, the Johansen cointegration test revealed one cointegrating equation at 1 percent level using both the trace statistic and the maximum eigenvalue. Using the long run vector coefficients, the study examined the sensitivity of exchange rates in the Kenyan economy to changes in murban adnoc oil import prices. A 1% decrease in external reserves explains a 0.002708% decrease in exchange rates, a 1% decrease in lending interest rates explains a 0.197% decrease in exchange rates and a 1% decrease in murban adnoc oil import prices explains a fall in exchange rates by 0.2436%. This shows that Kenya's exchange rates are affected more by import oil prices than by lending interest rates and external reserves.

The Granger pairwise causality test showed that murban adnoc import oil prices granger cause exchange rate but exchange rates do not granger cause murban adnoc oil import prices in the period of the study. The results from the VAR analysis showed the coefficient is correctly signed and statistically significant by the high R squared (80.08%). This implies that long run equilibrium condition influences the short run dynamics. Exchange rate in Kenya has an automatic adjustment mechanism and the economy responds to deviations from equilibrium in a balancing manner. This is evidenced by the variance decomposition and impulse response results.

Therefore, in the Kenyan economy, murban adnoc oil import prices do not have a significant impact on exchange rates. However, it is shown that interest rates have more of an impact on exchange rates. Therefore, exchange rate stability could still be

achieved even with fluctuating murban adnoc oil import prices. The basis of this is that is simpler to allow the price of foreign exchange to change according to the macroeconomic environment than to rely upon changes in commodity prices that together constitute the internal price structure.

The study answers the research question by the concluding that murban adnoc oil import prices do not have a significant impact on exchange rate dynamics in the Kenyan economy.

5.1 Limitation of the study

The main limitation is that this study focused on murban adnoc oil import prices that account for 85 per cent of Kenya's oil imports. However, the other 15 per cent of refined oil was not considered.

5.2 Future areas of research

Further research can be done in other East African Community countries that import murban adnoc oil to establish whether it has an impact on exchange rate dynamics.

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