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THE EFFECTS OF EXCHANGE RATE LIBERALIZATION IN KENYA ON FRENCH BEANS EXPORTS

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ABSTRACT

The adoption of a floating exchange rate system in Kenya was an effort to make it more aligned to the market determined equilibrium rate. However, there is limited empirical evidence that success has since been achieved in realizing the objective for which the foreign exchange market was liberalized. The exports of French beans are one of the leading contributors to foreign exchange earnings in Kenya. Nevertheless, the economic impacts of exchange rate liberalization on French beans exports in Kenya are unclear. This paper evaluates the magnitude and direction of the effects of exchange rate liberalization on French beans exports from Kenya to its major trading partners in the European Union. Monthly data for a fixed exchange regime represented by the period from 1990-1993 and a flexible regime represented by the period from 1994-2011 was used in the estimation of an export demand model. The empirical results show that the liberalization of the exchange rate led to an increase in the French beans export volumes from Kenya to the European Union. The paper recommends that, even if the Kenyan exchange rate system is flexible, exchange rate stability is necessary to avoid adverse effects of exchange rate volatility on French beans exports. Therefore, stability of the exchange rate is needed, not at a fixed level but by controlling exchange rate volatility using the exchange rate target band.

Keywords: Exchange rate, Liberalization, Exports, Time series.

1. INTRODUCTION

The economic liberalization in Kenya during the early 1990s meant greater freedom for the market mechanism in economic activities. The market mechanism means that the economic activities such as production, consumption, savings and investments are guided and decided by the

price without government intervention (Gertz, 2008). The privatisation of state-run businesses, removal of state controls on prices and quantities in markets and private property ownership are some of the key measures of economic liberalisation. This policy direction was supported by the evidence on socio-economic cost and inefficiencies in state-run enterprises and state interventions and economic principles of markets (Gertz, 2008). In this model, if the state wishes to run state enterprises, it is expected to do so in a market environment without resorting to state powers. In addition, the regulatory role of the state to promote market discipline and resolve market problems that may not be warranted for market solutions is also advocated (Gertz, 2008).

The exchange rate liberalisation is a major ingredient of economic liberalisation. The exchange rate liberalization means the permission for the currency to be exchanged with foreign currencies for economic transactions that promote the economy and economic welfare of the general public (Adam *et al.*, 2010). The exchange rate liberalization is the route to link the domestic economy with the global economy in pursuit of economic benefits advocated by principles of international economics. In Kenya, exchange rate policy has undergone various regime shifts mostly driven to a large extent by the economic events, especially balance of payments crises (Adam *et al.*, 2010).

The period 1990-1993 was characterised by a fixed exchange rate regime while a floating exchange rate system was adapted from 1994 to 2011.

A foreign exchange rate is the price at which one currency may be converted into another. An exchange rate is important aspect in a nation's international trade, balance of payments and overall economic performance. An exchange rate is referred to as nominal exchange rate when inflation effects are embodied in the rate and as the real exchange rate when inflation influences have not been factored in the rate (Pugel, 2007). There are fixed and floating exchange rate systems. Fixed exchange rates are meant to be fixed for a specified period of time. On the other hand, floating exchange rates move up and down from year to year, week to week, and minute by minute (Clark *et al.*, 2004). Under a fixed exchange rate regime, the rise and fall of the exchange rate are referred to as exchange rate devaluation and exchange rate revaluation (Sadoulet and Janvry, 1995).

Nevertheless, fixed exchange rates are frequently devalued or revalued, implying that they can change over time and may also be volatile. There are a wide variety of factors that influence the exchange rate, such as interest rates, inflation, and the state of politics and the economy in each country (Pugel, 2007).

The French beans sub-sector contributes significantly to the growth of the Kenyan economy since it generates foreign exchange earnings and creates employment opportunities. The crop is the second largest vegetable export in Kenya after the Asian vegetables and supports more than 1 million people with 34 percent of the produce destined mainly for the European Union export market (Horticultural Crops Development Authority, 2011). French beans contribute to over 60 percent of all exported vegetables and approximately 21 percent by value of the horticultural export earnings (HCDA, 2011).

The adoption of a floating exchange rate system in Kenya after 1993 was an effort to make the exchange rate more aligned to the market determined equilibrium exchange rate (Adam *et al.*, 2010). However, there is limited empirical evidence that success has since been achieved in

realizing the objective for which the foreign exchange market was liberalized. The purpose of this paper is therefore to evaluate the impact of exchange rate liberalization on Kenya's French beans exports to its major trading partners in the European Union (EU) market. The specific objective of this study is to assess the magnitude and direction of the effect of exchange rate liberalization on the volumes of French beans exports in Kenya. The findings of this study will assist policy makers in Kenya and other developing countries to design appropriate exchange rate and trade policies to boost their exports.

2. LITERATURE REVIEW

The previous empirical studies by Sapir and Sekkat (1995) and Froot and Klemperer (1989) have shown that the effect of exchange rate policy varies in accordance with sectors and exchange rate regimes and aggregation of several commodities and regimes leads to erroneous conclusions.

Analysis in this study is conducted at the disaggregated level and it distinguishes between the period before and after exchange rate liberalization in Kenya. This approach is better than that taken in most of the previous studies carried out in Africa such as those of Cottani and Cavallo (1993) and Ghura and Grennes (1993) which do not use disaggregated data and by exchange rate regime. Indeed, there exists an abundant literature on exchange rate policies that affect export performance, and hence economic growth and development. The differences in results arrived at in different country studies depend mainly on the level of development and the structural differences in their economies. There is no clear relationship between the level of trade and the type of exchange rate regime. This is the motivation underlying this study.

3. METHODOLOGY

3.1. Data

This study used secondary time series monthly data from various sources for a period of 21 years from January, 1990 to December, 2011. The prices of French beans exports in US$ were obtained from the Monthly Trade Reports of the customs department of the Kenya Revenue Authority (KRA). On the other hand, volume and value of French beans exports in Kenya were obtained from the Ministry of Agriculture (MoA), Horticultural Crops Development Authority (HCDA) and the United Nations Food and Agriculture Organization Statistical Database (FAOSTAT). The volumes of French beans supply in the markets of 25 EU countries were obtained from the European Statistical Database (EUROSTAT).

The nominal exchange rates were obtained from the Ministry of Finance and the Central Bank of Kenya (CBK). The foreign exchange rate used in this study is the Kenyan shilling (Kshs) against the US$. This exchange rate was chosen because the US$ is the leading currency in the foreign exchange market trade and most of the official reserves and foreign currency transactions in Kenya are held in this currency. The exchange rate volatility was evaluated using the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model and incorporated as an independent variable. The export volumes of French beans from Kenya to the EU market are given in tonnes while export prices are in US$. Other sources of the secondary data were the International

Financial Statistics (IFS) of the International Monetary Fund (IMF), where world non-fuel commodity prices which together with export prices of French beans in Kenya were used to derive relative prices (which are export prices divided by world non-fuel commodity prices). The foreign incomes were proxied by the industrial production index of EU countries and were obtained from the IFS of the IMF.

The secondary data were collected by the researcher and the assistants through making visits to relevant organizations. The study made use of Stata computer software package to analyze the data. The unit root tests were used to test the data series for stationarity or the order of integration in order to avoid spurious regression results while Johansen's maximum likelihood cointegration analysis was carried out and a cointegrating long run relationship of the export demand model developed. Finally, an error correction model was developed and estimated to determine the short-run effects of the explanatory variables of exports of French beans in Kenya to the EU market.

The Consumer Price Index (CPI) statistics for the period under consideration were obtained from the Kenya National Bureau of Statistics (KNBS) and EUROSTAT. The real values of monthly French beans export volumes, export prices and exchange rates were obtained by deflating the nominal values using the monthly CPI from the KNBS. At the same time, the real values of foreign incomes and supply volumes were obtained by deflating the nominal values using the monthly CPI from EUROSTAT. The base year of analysis was 2002, such that September 2002 = 100.

3.2. Empirical Model

His study developed an export demand model based on Goldstein and Khan (1978) and applied by Chowdhury (1993) and Arize *et al.* (2000). The model suggests a long-run relationship between exports, foreign economic activity, relative prices and exchange rate volatility. According to Chowdhury (1993) and Arize *et al.* (2000) the export demand model can be written as:

$$\ln X_t = \alpha + \beta_1.\ln Y_t + \beta_2.\ln P_t + \beta_3.\ln V_t + \beta_4 L_t + \beta_5.\ln Q_t + \varepsilon_t \quad \textbf{(1)}$$

Where *ln* stands for the natural logarithm of the relevant variable, t is the time dimension, E_t is export volume of French beans to 25 EU countries (Tonnes), Y_t is foreign incomes proxied by the industrial production index of EU countries (US$), P_t is Kenya's French beans export price to the EU relative to world non-fuel commodity prices (US$), V_t is an exchange rate volatility which is a measure of risk given by the GARCH method, L_t is a dummy variable to represent exchange rate liberalization with a value of 1 representing the liberalization period (1994-2011) and 0 to stand for the period before exchange rate liberalization (1990-1993) and ε_t is the error term which represents all the unknown and unmeasured variables that affect French beans exports in Kenya. Q_t represents the total volume of monthly supply of French beans to the EU market by other countries except Kenya (Tonnes).

The theory of demand suggests that quantity of trade rather than value is the appropriate dependent variable (Learner and Stern, 1970). The application of the industrial production index as a proxy variable for the economic condition of the importing country is used due to the lack of

monthly data for income or GDP. The variables X, Y, P, V and Q are in logarithm form so that the estimated parameters are interpreted as elasticities. If the coefficient of a variable is less than one, it implies that the export demand is inelastic. Hence an increase in the variable leads to less than proportionate change in demand of French beans exports in Kenya to the EU market.

Exports of French beans is expected to be affected by exchange rate liberalization which is represented by a dummy variable; L_t. A value of 1 represents the period during exchange rate liberalization, which is the period from January 1994 to December 2011 while 0 stands for the period before exchange rate liberalization, which is the period from January 1990 to December 1993. The exchange rate liberalization is meant to increase exports through provision of an enabling macroeconomic environment and hence β_4; the coefficient of the exchange rate liberalization dummy variable is expected to be positive.

4. RESULTS

4.1. Descriptive Statistics

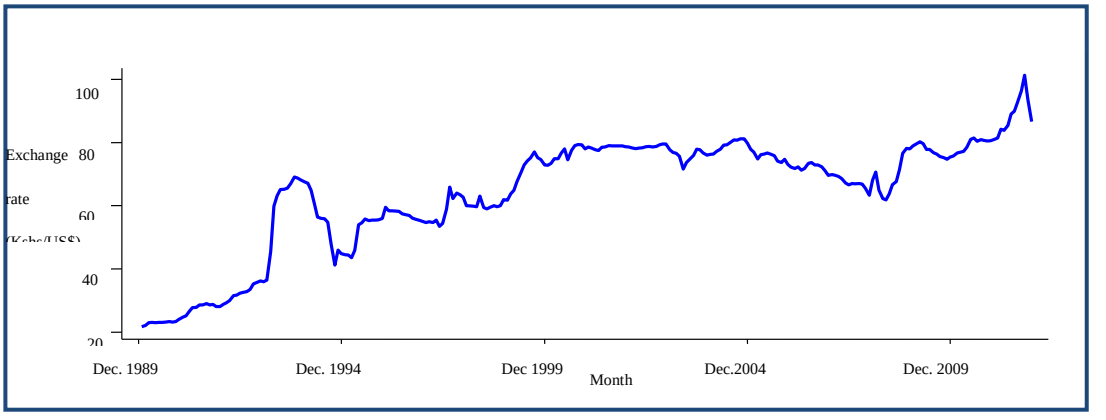
The exchange rate of Kenya Shilling to the US$ from 1990 to 2011 has been described by the fixed exchange rate era and the floating era. The evolution of real exchange rates of the shilling against the US$ before and after the exchange rate liberalization period is depicted in Figure 1.

The exchange rate series are characterized by rapid changes which are random; with an increasing trend (Figure 1). The upward trend indicates that the mean and variance of the monthly exchange rate series changes over time, thus implying nonstationary property and therefore the need for carrying out formal unit root test. The shilling exchange rate depreciated in 1992 due to the severe drought experienced in the period which negatively affected agriculture and hence the key export crops. There is a large increase in the Kshs/US$ exchange rate after the Kenyan shilling was allowed to float in 1993 (Figure 1) leading to the one of the highest inflation rate experienced in the country. Notably, there is also another sharp increase in the shilling exchange rate against the US$ in 2011 as a result of a rapid rise in oil prices and the Euro crisis (World Bank, 2011).

The sharp depreciation of the shilling in 1996 (Figure 1) came as a result of the El Nino rains which disrupted agricultural production and economic activities (World Bank, 2011). The decline in agricultural production during the El Niño phenomenon led to high food prices which led to rising inflation leading to the weakening of the shilling (World Bank, 2011). There was also a large depreciation of the shilling exchange rate in 1998 and 2000 (Figure 1) as a result of the drought experienced in Kenya during these years. The drought led to high food and electricity prices thus contributing to rising inflation which led to the depreciation of the shilling (Figure 1). In 2008, the Kshs/US$ exchange rate slightly increased (Figure 1) due to the effects of the post election violence which brought political uncertainty thus deterring domestic and international investment plus consumption leading to the weakening of the shilling. In 2011, the Euro crisis created uncertainty in the global market. Since Europe is the main market for Kenya's horticulture and the third destination for Kenya's tea, the economic meltdown in Europe along with the crisis in the Arab world, a significant destination for Kenya's tea, negatively impacted the growth of Kenya's key exports due to reduced demand leading to a large depreciation of the shilling (Figure 1). The

depreciation of the Shilling in 2011 was also as a result of high oil prices which led to high import bill thus increasing the demand for US$ leading to depreciation of the Shilling exchange rate (Figure 1).

Figure-1. Evolution of Kenya's Monthly Exchange Rates (Kshs/US$) (1990-2011)



Source: Author's Computations

The descriptive statistics of the exchange rates (Kshs/US$) during the period prior to and post-exchange rate liberalization periods are as presented in Table 1.

As indicated in Table 1 and Figure 1 the mean exchange rate was higher during the post-exchange rate liberalization period compared with the pre-liberalization period. In particular, the mean exchange rates of the shilling depreciated from 36 Kshs/US$ to 71 Kshs/US$; representing a 99 percent increase in the mean exchange rate. This followed an announcement by the International

Table-1. Descriptive Statistics of Exchange Rates (Kshs/US$) in Pre-liberalization and Post-liberalization Periods

Independent variable	Pre-liberalization period (1990-1993)		Post-liberalization period (1994-2011)		Entire period (1990-2011)	
	Mean	CV[a] (%)	Mean	CV[a] (%)	Mean	CV[a](%)
Exchange rates (Kshs/US$)	35.60	43.39	70.70	14.99	64.32	27.75

Note: [a] The Coefficient of Variation (CV) is a ratio of the standard deviation to the mean.

Source: Author's Computations

Monetary Fund (IMF) that it was delaying an expected disbursement awaiting reforms on governance (World Bank, 2011). This was interpreted by some players in the financial markets as an aid freeze and other development partners followed suit leading to depreciation in the shilling exchange rate.

On the other hand the variability of the shilling to US$ exchange rate as indicated by the CV declined during the post liberalization period from 43 percent to 14 percent (Table 1). This implies that the liberalization led to a stabilization of the exchange rate. The reduction of the variability of the exchange rate implies that Kenyans received more stable exchange rates during the post-liberalization period as compared to pre-liberalization period. However, this does not rule out volatility during the post-liberalization period as depicted by the marked difference in the mean exchange rate during the two periods. The volatility in exchange rate may have led to an increase in variability of the French beans exports to the EU during the shilling exchange rate liberalization period.

To determine whether the mean exchange rates were significantly different between the pre-liberalization and post-liberalization periods, a two sample mean comparison test is carried out and the results are as shown in Table 2. The null hypothesis is that the mean Kshs/US$ during the pre-liberalization and post-liberalization periods is equal against the alternative that it is not equal.

Table-2. Two Sample Mean Comparison Test on the Kshs/US$ Exchange Rates

Period	Number of observations		Mean	Standard error	Standard deviation
Pre-liberalization	48	35.60	2.23	15.45	
Post-liberalization	216	70.70	0.72	10.60	
Entire period	264	64.32	1.10	17.85	
Difference		-35.10	2.34		
t value	-14.98				
α	0.05				
Rejection region	t < -1.96 or t > 1.96				

Note: α represents the level of significance and t is the test statistic.

Source: Author's Computations

The test statistic falls in the rejection region and the null hypothesis is rejected at the 95 percent level of significance (Table 2). This confirms the finding from descriptive statistics that the liberalization of the shilling exchange rate led to an increase in the mean Kshs/US$ exchange rate (Table 2). The economic implication of this is that the mean Kshs/US$ exchange rate was higher during the shilling floating exchange rate period compared to the fixed exchange rate period. An increase in the mean Kshs/US$ exchange rate represents depreciation thus increased competitiveness. As Kenya's competitiveness improved, French beans exports to the EU increased after the liberalization of the shilling exchange rate.

The descriptive statistics of volumes of French beans exports from Kenya to the EU market during the period before and after the exchange rate liberalization periods are as presented in Table 3.

Table-3. Unit Root (ADF and PP) Tests Results

Series	**Level Series**			**First**	**Differences**
I (d)					
	ADF	**PP**	**Lags**	**ADF**	**PP**
Dependent Variable					
Export Volumes (T)	-2.88	-2.88	1	-5.57[c]	-4.30[c]
I (1)					
Independent Variables					
Exchange Rates (Kshs/US$)	-2.89	-2.88	1	-6.88[c]	-6.94[c]
I (1)					
Foreign Incomes (US$)	-2.90	-2.82	1	-6.26[c]	-7.40[c]
I (1)					
Relative Prices (US$)	-2.90	-3.00	1	-6.47[c]	-6.91[c]
I (1)					
Supply Volumes (T)	-2.89	-2.88	1	-6.93[c]	-6.85[c]
I (1)					
5% Critical Values	-3.50	-3.50		-3.50	-3.50

Note: [c] Denotes rejection of the null hypothesis of a unit root at 5 percent level of significance (Mackinnon, 1991).

Source: Author's Computations

The null hypothesis of nonstationaity or unit root is accepted if the absolute values of the computed ADF and PP statistics exceed the absolute critical values at 5 percent level of significance. The ADF and PP test critical values at 5 percent level of significance are given as -3.5 (Enders, 2010) at the level and first difference series (Table 3). As can be seen from Table 3 the computed test statistic for the French beans export volumes was -2.88 in the ADF and PP level series. In the first difference of the export volumes series the ADF and PP statistics were calculated as -5.57 and -4.30 respectively. The absolute values of the computed test statistic for the export volumes level series are less than the critical absolute values at 5 percent level of significance in both the ADF and PP test. However, the absolute values of the computed test statistics for the export volumes first difference series are greater than the critical absolute values at 5 percent level of significance in both the ADF and PP tests (Table 3).

The results show the presence of a unit root or that the export volumes are nonstationary in their level series. However, the first difference series are stationary, hence we conclude that the export volumes series is integrated of order one, that is; they are **I (1)**. Similarly, comparisons of the computed and critical values of the ADF and PP test statistics for the exchange rates, foreign incomes, relative prices and supply volumes shows that all variables are integrated of order one; **I**

(1) in levels and of order zero; **I (0)** in first differences, meaning that they are nonstationary in levels and stationary in first differences (Table 3). From the results of the unit root tests, the conclusion is that the data series used in the export demand model in this study are **I (1)** in the level series and the first differences series are **I (0)**. A key implication of these findings is the existence of a long run relationship between the dependent and independent variables. This means that in the long run, the dependent variable; French beans export volumes can be well predicted using the specified independent variables.

The nonstationarity of the level series of export volumes, exchange rates, foreign incomes, relative prices and supply volumes imply that the means and variances of these variables vary over time. In addition, regressions carried out on nonstationary variables often gives spurious results implying that the estimates are invalid and have no economic implications; hence the need to formally test for unit roots to determine the right choice of model to apply (Enders, 2010). This indicates that the variables are **I (1)** and specifying the export demand function of the variables in the level of the series will be inappropriate and may led to problems of spurious regression. The econometric results of the model in the level of series will not be ideal for policy making and such results cannot be used for prediction in the long-run. Hence given that the level series are **I (1)** and the first difference are **I (0)**, the Johansen and Juselius (1990) cointegration test therefore becomes appropriate for assessing the existence of long-run relationships among the variables.

4.2. Cointegration Analysis

Cointegration analysis refers to the process of getting equilibrium or long-run relationships among non-stationary variables. The idea is that although the variables are non-stationary, linear combination of them may be stationary, given that all variables are integrated of the same order (Enders, 2010). The vector that links the variables in the long-run relationship is called the cointegrating vector. The cointegration analysis is useful because it shows whether the time series variables can jointly be used in the long run and avoids spurious regressions results. If long-run elasticities are present, then it is rational to evaluate how short-run behaviour responds to long-run elasticities (Enders, 2010). Various tests for the presence of cointegration among **I (1)** variables have been proposed beginning with Engle and Granger (1987). The procedure used in this study was a multivariate procedure based on maximum likelihood methods introduced by Johansen (1988, 1991) and expanded upon by Johansen and Juselius (1990).

Having tested the stationarity of each time series, the next step was to apply the co-integration procedure as developed by Johansen and Juselius (1990) in order to test the presence of long-run equilibrium relationships among the variables in the export demand model. Before proceeding to the results of the cointegration test, the optimal lag length for the vector autoregressive (VAR) model specification was determined using the Akaike Information Criterion (AIC), Schwarz Information Criterion (SCIC) and the Hennan-Quinn Information Criterion (HQIC). Table 4 shows the results of the lag length for the different information criteria used. The results explicitly show that the optimal lag length for the VAR model is 1. This arises from the fact that all the information

criteria adopted chose 1 as its optimal lag length since it gave the minimum value for each of the evaluated information criterion in AIC, SCIC and HQIC.

Table-4. Optimal Lag Length Selection

Dependent variable: Monthly export volumes of French beans to the EU

Independent variables: Foreign incomes, relative prices, exchange rates and supply volumes

Lag	Log L HQIC	FPE	AIC	SCIC
0	-599.8353 4.709972	6.155779	4.655231	4.791428
1	-602.1732 4.696831*	6.10956	4.647705*	4.769946*
2	-597.844 4.725859	6.219219	4.666472	4.8157
3	-592.4404 4.715608	6.12103	4.649542	4.813881

Notes: * indicates the lag length selected by the criterion

FPE: Final Prediction Error

AIC: Akaike Information Criterion

SCIC: Schwarz Information Criterion

HQIC: Hennan-Quinn Information Criterion

Source: Author's Computations

On the basis of the optimal lag length chosen by the lag selection criteria, the results of the maximum eigenvalue and the trace statistic were obtained from the Johansen and Juselius (1990) method to ascertain the number of cointegrating relationships. Except for the exchange rate volatility and liberalization variables the other variables were converted into their logarithmic forms in order to remove heteroscedasticity problem from the VAR model. This implies that the parameter estimates generated from the VAR model are interpreted as elasticities. The model was normalized on the export volumes variable X_t, in order to obtain the long run parameter estimates as reported in Table 5.

The appropriate cointegrating vector is indicated by the first column under the largest eigenvalue and trace statistics. Hence, starting with the null hypothesis of no co-integration ($r \leq 1$) among the variables; the maximum eigenvalue and trace test statistics both reject the null hypothesis of more than one cointegrating vector at the 5 percent significance level (Tables 5). Therefore we conclude that on the basis of the eigenvalue and the trace test statistics, there is one cointegrating vector for the VAR model. In particular, this suggests that there is a unique long run equilibrium relationship amongst the variables.

Table-5. Johansen Multivariate Cointegration Test Results

	λ-max Statistics					Trace Statistics				
H_0	r = 0	r ≤ 1	r ≤ 2	r ≤ 3	r ≤ 4	r = 0	r ≤ 1	r ≤ 2	r ≤ 3	r≤ 4
H_a	r = 1	r = 2	r = 3	r = 4	r = 5	r = 1	r = 2	r = 3	r = 4	r =5
	63.47	31.95	22.06	9.25	2.79	34.82	22.48	16.13	9.66	2.35
5% Critical values	59.46	39.89	24.31	12.53	3.84	30.04	23.80	17.89	11.44	3.84

Note: The critical values are from Osterwald (1992).

Source: Author's Computations

4.3. Estimation of the Export Demand Model

The results of the Johansen Multivariate Cointegration test indicate the presence of a long run cointegrating relationship between the variables. The estimation of the French beans export demand model results is the following cointegrating long-run relationship:

$$X_t = 12.87 + 4.96Y_t - 0.45P_t - 2.30V_t + 0.53L_t - 0.86Q_t \quad (2)$$

(3.27) (2.14) (0.15) (0.89) (0.21) (0.34)

t-Ratio 3.94** 2.32** -3** -2.58** 2.52** 2.53**

Note: ** denote significance at 5 percent level.

Where the values in parentheses () are standard errors and all the estimated coefficients are significant at 5 percent level of significance (Equation 2). X_t is export volumes of French beans to the 25 EU countries (Tonnes), Y_t is foreign incomes proxied by the industrial production index of EU countries (US$), P_t is Kenya's French beans export prices to the EU relative to world non-fuel commodity prices (US$), V_t is the exchange rate volatility given by the GARCH method, and L_t is a dummy variable to represent exchange rate liberalization with a value of 1 representing the liberalization period (1994-2011) and 0 to stand for the period before exchange rate liberalization (1990-1993) and Q_t represents the total volumes of monthly supply of French beans to the EU market by other countries except Kenya (Tonnes).

The long run exchange rate liberalization (L_t) coefficient estimate is 0.53 (Equation 2), significant at 5 percent level of significance and has a positive sign in line with a priori expectation. This implies that the responsiveness of French beans export volumes to exchange rate liberalization was inelastic. This indicates that French beans export volumes increased after the liberalization of the shilling exchange rate. This result reveals that the shilling exchange rate liberalization in Kenya had a positive effect on French beans export volumes to the EU. A positive long run exchange rate liberalization dummy coefficient implies a higher export volume during the exchange rate liberalization period. Thus the monthly Kenyan French beans export volumes to the EU were

higher for the period from January 1994 to December 2011 as compared to the period from January 1990 to December 1993. We conclude that the liberalization of the shilling exchange rate led to a rise in the monthly French beans export volumes to the EU. This result confirms the preliminary finding from the descriptive statistics that during the exchange rate liberalization period there was an increase in the volumes of French beans exports to the EU market.

The coefficient of the exchange rate volatility variable (Vt) has negative long run effects on French beans real exports with elasticity of 2.30 (Equation 2). Thus the responsiveness of French beans export demand in the EU market to exchange rate volatility is elastic. This implies that an increase in the shilling exchange rate volatility leads to a more than proportionate decrease in demand for French beans real exports from Kenya in the EU market. The result rejects the second hypothesis in this study; that the volatility of real exchange rates in Kenya has no effect on the volumes and competitiveness of French beans exported. As the results indicate, a unit increase in exchange rate volatility in Kenya leads to a two-fold decrease in French beans real exports to the EU. This is in concurrence with the expectation in African countries where a negative sign is predicted due to the absence of forward exchange markets.

Thus increased exchange rate volatility increases uncertainty about future exchange rate behaviour. This implies that French beans exporters in Kenya are therefore risk-averse and with an increase in exchange rate volatility exporters reduce their exports in order to reduce their risk exposure. These results are explained by the fact that Kenya's French beans exports compete with the local market, as there is a substantial amount that is consumed domestically. Hence in conditions of high exchange rate volatility which causes uncertainties regarding exporters' profits, their option is to reduce production or sell to the domestic market. According to the risk aversion theory, this is due to lack of well developed hedging facilities and institutions in Kenya's foreign exchange markets (Doroodian, 1999). Therefore under high exchange rate volatility, exporters prefer to sell in domestic markets rather than foreign markets, negatively affecting exports. The implication is that economic policies aimed at stabilizing the exchange rate will increase the volume of French beans real exports in Kenya.

4.4. Error Correction Model

Having concluded on the inherent long run relationships, we proceed to evaluate the short run dynamics of the export demand function. As the Engle and Granger (1987) suggests, the existence of the cointegrating relationship among a set of variables that are not stationary in levels, implies there will be a short run error correction relationship associated with them. The relationship represents an adjustment process by which the deviated actual export is expected to adjust back to its long-run equilibrium path (Engle and Granger, 1987). Engle and Granger (1987) provided a principal feature of the cointegrated variables in that their time paths are influenced by the deviation from the long run relationship, given that cointegration implies error correction representation. Thus the cointegrated system in this study can be represented by an Error Correction Model (ECM), which represents the short-run relationship described as:

$$\Delta E\,X_t = C + \gamma E\,C_{t-1} + \sum_{i=0}^{n} \beta_{1i}\Delta E\,X_{t-i-1} + \sum_{i=0}^{n} \beta_{2i}\Delta Y_{t-i} + \sum_{i=0}^{n} \beta_{3i}\Delta P_{t-i} + \sum_{i=0}^{n} \beta_{4i}\Delta V_{t-i} + \varepsilon_t \quad \textbf{(3)}$$

The first difference of export is a function of lagged exports value, current and lagged values of the independent variables, and the lagged value of the long run disturbance term $E\,C_{t-1}$. The parameter γ describes the short run adjustment and indicates the speed of adjustment towards the long run equilibrium state so that a high coefficient implies rapid adjustment and a low coefficient slow adjustment (Engle and Granger, 1987). Table 6 provides the regression results for the error correction model.

Table-6. Regression Results for Vector Error Correction Model (1990-2011)

Variable	**Coefficient**	**Standard error**	**ρ value**
Constant	2.04**	0.57	0.035
$\Delta \ln X_{t-1}$	-0.23**	0.11	0.026
$\Delta \ln Y_t$	4.86**	2.33	0.019
$\Delta \ln P_t$	-0.38**	0.12	0.027
ΔV_t	-1.73**	0.70	0.044
$\Delta \ln Q_t$	-0.71**	0.19	0.021
L_t	0.42**	0.18	0.020
ECM_{t-1}	-0.77**	0.29	0.015
Summary statistics			
R^2= 0.74			
Durbin-Watson = 2.49			
Serial Correlation, F = 1.15 (0.46			
Heteroscedasticity, F-statistic = 4.97(0.01)			
Normality, Jarque-Bera = 0.54 (0.91)			

Note: ** denotes significance at 5 percent level.

Source: Author's Computations

In Table 6, ln represents natural logarithm, the symbol Δ is the first difference operator, X_{t-1} is the French beans exports volume, Y_t is foreign incomes, P_t is relative prices, V_t is exchange rate volatility, Qt is French beans supply in the EU market, L_t is exchange rate liberalization dummy and ECM_{t-1} is the error correction term. The lag length for each variable and the sequence in which the variables were entered in the VECM was selected using Akaike (1969) Information Criterion. The coefficient of multiple determination, (R^2) is high at 0.74 (Table 6). The high value of R^2 indicates that the model fits the data well and 74 percent of the variance in the volumes of French beans exports are predicted by the independent variables. This shows a strong explanatory power of

74 percent of the independent variables in affecting change in volume of Kenyan exports of French beans to the EU market. The F-statistics of 4.97 with a statistical significance at 1 percent shows that the variation in the long-run French beans export volumes is attributable to changes in the independent variables (Table 6). The presence of autocorrelation test was carried out using the Durbin Watson statistics and found to be within the normal bound at 2.49 (Table 6). The model fulfilled all diagnostic tests of no serial correlation, homoscedasticity, and normality of residuals as indicated by the summary statistics (Table 6). The results show that Kenya's French beans export demand can effectively be explained using the specified independent variables.

The coefficients on the lagged values of $\Delta \ln Y_t$, $\Delta \ln P_t$, ΔV_t and ΔQ_t are short run parameters measuring the short run immediate impact of independent variables on ΔX_t. The coefficients on the lagged values of $\Delta \ln P_t$, ΔV_t and ΔQ_t have negative signs (Table 6). This means that a unit change in any of these variables will impact negatively on the level of export demand. The short run coefficients follow the same pattern as the long run coefficients but the magnitudes of the short run coefficients are smaller than the long run coefficients. The economic implication of this is that the independent variables have smaller effects on the volumes of French beans exports in the short run compared with the long run. With the dynamic specification of the model, the short-run dynamics are influenced by the deviation from the long run relationship as captured by ECM_{t-1} term. The regressor ECM_{t-1} corresponds to the one month lagged error correction term which is indicative of the measure of the average speed at which export volume adjusts to a change in equilibrium conditions or the average time lag for adjustment of exports to changes in the explanatory variables.

The coefficient on error correction term ECM_{t-1} is negative as theoretically predicted and is statistically significant at the 5 percent level (Table 6). The significant error correction term implies that Kenya's French beans exports demand model adjusts to changes in the specified independent variables. This further confirms the existence of a stable equilibrium long run relationship among the variables in the model (Banerjee *et al.*, 1993). The result justifies the use of ECM specification and further confirms that the variables are indeed cointegrated. The magnitude of the error correction term reveals the change in French beans exports per period that is attributable to the disequilibrium between the actual and equilibrium levels. The coefficient of the ECM_{t-1} shows the proportion of the disequilibrium that is corrected each month.

The economic importance of this finding is that the French beans exports speed of adjustment to correct long run disequilibrium between itself and its determinants is high, and 77 percent of the disequilibrium is eliminated in one month. This implies that 77 percent of the disequilibria of the previous month`s shock adjust back to equilibrium in the current month. These estimates of ECM suggest that in the absence of further shocks, the gap to at the adjustment of French beans export volumes to any change in the independent variables revert back to equilibrium would be closed within a period of 1.3 months. These results indicate thof the export demand model does not take a long time to return to equilibrium because market forces in the export market restore equilibrium rapidly.

5. DISCUSSION

The specific objective of this study was to evaluate the effect of exchange rate liberalization on French beans exports from Kenya to the European Union market using monthly data from January, 1990 to December, 2011. The results of the descriptive statistics show that the mean export volume of French beans from Kenya to the European Union was significantly higher and more variable during the post-exchange rate liberalization period than in the pre-liberalization period. The mean export volume rose from 2012 tones to 3789 tones which represent an 88 percent increase while the variability increased as indicated by an increase in the coefficient of variation from 140 percent to 267 percent. The conclusion from these results is that the liberalization of Kenya shilling exchange rate resulted to an increase in the mean French beans export volumes to the European Union. This indicates that Kenya's French beans exports were stimulated by a shift in the exchange rate regime from fixed to floating; with the export volumes increasing during the floating exchange rate regime.

The results of cointegration analysis using the Vector Autoregressive model indicated the presence of a long run equilibrium relationship between French beans exports, foreign incomes, relative prices, exchange rate volatility, liberalization and supply volumes. The long run liberalization coefficient estimate is 0.53 and has a positive sign as expected. This indicates that the responsiveness of French beans export demand to the liberalization of the shilling exchange rate is inelastic. The positive sign implies that the liberalization of the exchange rate led to an increase in the French beans export volumes from Kenya to the European Union countries. This result is consistent with the preliminary indication from the descriptive statistics that during the exchange rate liberalization period there was a rise in the volume of Kenyan French beans exports to the European Union.

The short-run dynamics of the French beans export demand model were estimated using a Vector Error Correction Model and the coefficient on error correction term was found to be -0.77 and was statistically significant thus confirming the existence of a stable equilibrium long run relationship among the variables. The negative sign of this coefficient indicates that the direction of correction is towards the long-run equilibrium while the size indicates the speed of adjustment towards the long-run equilibrium. The economic importance of this finding is that the French beans exports adjust to correct long run disequilibrium between itself and its determinants rapidly, and 77 percent of the disequilibrium is eliminated in one month. This implies that 77 percent of the disequilibria of the previous month`s shock adjusting back to equilibrium in the current month. The conclusion is that the adjustment of French beans export volumes to any change in the independent variables of the export demand model takes a short period to return to equilibrium because market forces in the export market restore equilibrium quickly.

6. IMPLICATIONS TO RESEARCH AND PRACTICE

The results of this study suggest that exchange rate liberalization in Kenya yielded the intended results of facilitation and promotion of exports. The study found that an increase in the shilling exchange rate volatility leads to a more than proportionate decrease in demand for French beans real exports from Kenya in the European Union market. As the results indicate, a unit increase in

exchange rate volatility in Kenya leads to a two-fold decrease in French beans real exports to the European Union. This is consistent with the expectation in African countries where a negative sign is predicted due to the absence of forward exchange markets. In order to realize the full benefits of exchange rate liberalization in Kenya; it is imperative that it is coupled with trade liberalization and an appropriate monetary policy. The paper recommends that, even if the Kenyan exchange rate system is flexible, exchange rate stability is necessary to avoid adverse effects of exchange rate volatility on Kenyan French beans exports. Therefore, stability of the exchange rate is needed, not at a fixed level but by controlling exchange rate volatility using the exchange rate target band. Hence, as long as the exchange rate falls within the tolerance zone, there will be no government intervention, and market forces will determine the exchange rate. However, as soon as the exchange rate moves above or below the set limits, the government ceases to allow the exchange rate to float freely and intervenes to move the price of the currency within the target zone.

7. CONCLUSION

The results of the cointegrating relationship of the export demand model show that the long run exchange rate liberalization coefficient estimate is positive and inelastic indicating that French beans export volumes increased after the liberalization of the shilling exchange rate. This result reveals that the shilling exchange rate liberalization in Kenya had a positive effect on French beans export volumes to the EU. A positive long run exchange rate liberalization coefficient implies a higher export volume during the exchange rate liberalization period. This result confirms the preliminary finding from the descriptive statistics that during the exchange rate liberalization period there was an increase in the volumes of French beans exports to the EU market. Thus, the conclusion is that monthly Kenyan French beans export volumes to the EU were higher for the period from January 1994 to December 2011 as compared to the period from January 1990 to December 1993.

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9. FUTURE RESEARCH

Future research could evaluate the effect exchange rate liberalization to other specific agricultural primary commodity exports in Kenya and other countries.

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