academicJournals

Vol. 10(3), pp. 71-78, March 2018
DOI: 10.5897/JDAE2017.0815
Article Number: 5D173BF55989
ISSN 2006-9774

http://www.academicjournals.org/JDAE

Journal of Development and Agricultural Economics

Full Length Research Paper

Effect of price and exchange rate volatility on Kenya's black tea export demand: A pooled mean group estimation

Winrose Chepng'eno

Department of Agricultural Economics and Resource Management, Moi University, Kenya.

Received 8 February, 2017; Accepted 10 May, 2017

The tea sector plays an important role in the Kenyan economy mainly through employment, contribution to Gross Domestic Product (GDP) and foreign exchange earnings. However, the sector faces a number of risks including but not limited to production, technological, price and market risks, legal and personal risks. Price and exchange rate volatility is one of the main sources of risk in the agribusiness sector. This paper sought to determine if foreign income, exchange rate, relative prices, price and exchange rate volatility have effects on Kenya's black tea export demand. The study used panel data from World Bank and Central Bank of Kenya statistical bulletins for the period 1997 to 2010. Price and exchange volatility cannot be observed directly and were thus computed using Moving Average Standard Deviation (MASD) method. Sixteen major importer countries of Kenya's tea were considered in the study. Im Peseran and Shin (IPS) unit root tests were used for testing the variables for the presence of unit roots. The study employed dynamic heterogeneous panel techniques developed by Peseran and Shin using autoregressive distributed lag (ARDL) model in the error correction form. The empirical model was estimated using pooled mean group (PMG) estimator. The study found that growth in foreign income and changes in price and exchange rate volatility were significant in the long and short run. Proportional changes in relative prices and foreign exchange rate were insignificant in the long run and short run.

Key words: Price volatility, exchange rate volatility, Kenya's black tea exports, autoregressive distributed lag (ARDL) model, pooled mean group (PMG) estimation.

INTRODUCTION

Research has shown that commodity price fluctuations in the era of economic globalization and increased liberalization of commodity markets have seriously affected the weaker economies of the developing world (Byerlee et al., 2006; Ivanic and Martin, 2008).

Economic reforms with the aim of liberalization of domestic markets were adopted by most developing countries in the 1980 and 1990s. The structural

E-mail: winroseck@gmail.com. Tel: +254 724 589 771.

adjustment programs (SAPs) were recommended by World Bank (WB) and were prescribed with the aim of restoring fiscal and current account balance, reducing or eliminating price distortions and facilitating efficient price transmission. The adoption of economic reforms meant that participation of governments, through parastatals in markets would be minimal.

Price volatility is one of the main sources of risk in the agribusiness sector. Exchange rate variability can further affect the transmission of world prices to domestic prices further increasing the risks faced by farmers particularly those producing for the foreign markets.

An understanding of risk as well as its impacts is critical in order to manage the inherent variability of agricultural income through price and yield volatility especially in low income countries. Commodity price volatility and its impact on the economy of low income countries are a critical concern for both economists and policy makers. The impact of commodity price variability can have effects on economies in various ways and can distinguish between *ex ante* effects of volatility and *ex post* effects of extreme output (Dehn et al., 2004).

Theoretical and empirical evidence both indicate that agricultural commodity prices are more volatile than those of manufactured goods in the short run (UNCTAD, 2008). Tea production in many developing countries is dominated by small scale farmers (60% in Kenya and 76% in Sri Lanka) (FAO, 2014) who rely on tea as a major source of income. Further, the economies of these developing countries rely on tea as a major source of income.

Random price variation adversely affects the welfare of both producers and consumers of agricultural products (Gardner and Gardner, 1977). It has been argued that price variability reduces welfare (Zheng et al., 2008) of both producers and consumers by exposing them to uncertainty and risk (Apergis and Rezitis, 2011). Price volatility creates uncertainty at farm level and variability in profit margins and lessens the incentive to invest. The effects are more pronounced in developing countries where opportunities for hedging against price risks are nonexistent.

Tea dependent households and economies are vulnerable to price volatility. Price variability negatively affects household incomes and welfare. Tea producers face dynamic and confusing price signals. Price movements can be viewed simply as indications of a well-functioning market, but even if there are no market distortions, tea producers may not respond in the short term to the price movements. Although, farmers of other crops face similar situations, tea producers face greater constraints on their ability to adjust production levels than farmers who grow annual crops, and do so in an environment with no hedging options, unlike farmers in developed countries. Further, Kenyan tea farmers cannot influence price levels even through deliberate reduction in supply.

Frequent fluctuations in world tea prices also have secondary effects along the tea value chain that implicitly affect tea producers. When faced with variable prices, tea buyers and other players in tea value chain may require large margins in order to minimize exposure to risk and thus reducing farmers' margin even further.

Tea production decisions are made well in advance of product sales, and there generally exists an uncertainty about the price that will be received for products when sold in the market at a future date (OECD, 2009). Stable prices and by extension incomes are critical for planning reasons and that is why many governments in developing countries intervened in pricing of agricultural commodities prior to adoption of market and economic reforms in general.

FAO (2014) acknowledges the role that tea production and export play in food security by covering food import bills in tea producing countries. FAO notes that in 2011, tea export earnings paid for 51% of Kenya's food import bills. Thus, the need for careful monitoring and analysis of international tea trade by policy makers concerned with food security, trade and rural development in Kenya.

Problem statement

In 1980 and 1990s, several governments of sub-Sahara Africa (SSA) adopted economic reforms under the wider context of SAPs following suggestions by World Bank (WB), International Monetary Fund (IMF) and governments of developed countries in line with the Uruguay Round of 1986 to 1994. Among the recommendations were the removal of price controls, trade liberalization and privatization of state-owned enterprises. It was purported that adoption of economic reforms would lead to improved producer prices and enhance trade efficiency (White and Levy, 2001).

Trade liberalization required gradual abolition of state interventions in agricultural markets. Governments were required to open up to international trade by eliminating trade barriers and tariffs in order to improve economic growth and welfare in developing countries (Amikuzuno, 2009). It was postulated that trade liberalization would lead to improved commodity market performance (Mofya-Mukuka and Abdulai, 2013) and improved efficiency by increasing productivity of human talent and physical assets (Akiyama et al., 2003). Increased efficiency is crucial for countries that rely on agriculture (Ankamah-Yeboah, 2012).

International commodity trade is associated with two main sources of risks: volatility in world prices and volatility in exchange rates. This is more pronounced in developing countries because primary commodities form the bulk of exports of these countries.

There are different theoretical views on the impact of price and exchange rate volatility on exports. One of the views is that exchange rate volatility does not have impact on the volume traded (exports or imports). For example Friedman (1953) and Johnson (1969) base their argument on the neoclassical paradigm and propose that with perfectly flexible markets, any shock arising from changes in the nominal exchange rate will be absorbed through changes in prices or hedging markets and thus the real effective exchange rate and trade volumes will be left unchanged.

According to De Grauwe (1988), a rise in nominal exchange rate fluctuations can either have a positive or a negative effect on the volume on trade depending on the substitution and income effects. He argues that risk-averse parties are likely to decrease export volumes due to the substitution effect while the income effect causes risk-averse agents to increase exports to avoid severe fall in revenues. The increased risk associated with volatility is likely to induce risk-averse agents to direct their resources to less risky economic activities. He further noted that when income effect is greater than the substitution effect, there will be a positive relationship between exchange rate volatility and trade. If substitution effect is greater than income effect, there will be a negative impact on trade.

Another view is that exchange rate volatility depresses trade (Cote, 1994; Hooper and Kohlhagen, 1978; Clark, 1973). Arize et al. (2000) and Hooper and Kohlhagen (1978) argue that higher exchange rate volatility will depress trade volume through a rise in adjustment costs like irreversible investment due to higher uncertainty and risks.

Contrary to the aforementioned proposition, Franke (1991) and Sercu and Vanhulle (1992) propose that exchange rate variability can influence trade volume positively. Exchange rate variability increases risk which creates higher opportunity for higher profits and thus leads to increased international trade.

The mixed theoretical literature has motivated many empirical studies to analyze the effects of exchange rate volatility on exports and the results of these studies, just like the theoretical propositions are mixed. However, most of the studies have focused on developed countries and few have focused on developing countries.

Sun et al. (2002) employed a gravity model within a panel data framework to evaluate the effect of exchange rate volatility on international wheat trade and found that exchange rate volatility had negative effect on world wheat trade. Yuan and Awokuse (2006) investigated the relationship between exchange rate volatility and U.S poultry exports and the results of their study indicated that exchange rate volatility had a negative effect on trade. They also found export volume to be sensitive to foreign income and price changes.

In Kenya, Kiptui (2007) investigated the impact of the real exchange rate on the demand for Kenya's exports. He established long-run relationships for coffee, tea and horticulture but rejected for manufactured export goods. His results suggested that the effects of real effective exchange rate were more likely to be long-run than short-run in nature and there could be a threshold level beyond which exchange rate fluctuations harm exports.

Alam and Ahmed (2012) estimated the export demand for Pakistan within ARDL framework using annual quarterly data from the first quarter of 1982 to the second quarter of 2008. The findings showed that relative price of aggregate exports and real effective exchange rate volatility real exports were significant, both in the long and the short run. Serenis and Tsounis (2014) examined the effect of exchange rate volatility on exports for Croatia and Cyprus using quarterly data for the period 1990Q1-2012Q1. Their results revealed that exchange rate volatility had a positive effect on exports of the two countries. Using monthly data from February 2001 to January 2010, Demirhan and Demirhan (2015) examined the effect of exchange rate stability on Turkish exports. The findings indicated that exchange rate stability had a positive significant on real export volume, both in the short and long run.

Theoretically and empirically, it is not clear whether there is a positive or negative relationship between exchange rate volatility and export demand thus leading to the question: Do price volatility and exchange rate volatility affect Kenya's black tea exports? The study sought to assess the long run relationship and short run dynamics between foreign income, exchange rate, relative prices, price and exchange rate volatility and Kenya's black tea export demand.

METHODOLOGY AND MODEL SPECIFICATION

Econometric model

This study adopted the standard trade model on export demand adopted by Goldstein and Khan (1985) in assessing the long term determinants of exports. According to the standard demand theory (the Marshallian type), the main determinants of demand are relative price and income.

Since the study focuses on the effect of price and exchange rate volatility, the model is further extended to capture price and exchange rate volatility. Consistent with economic literature, the extended model is therefore restated as:

$$EX_{it} = f(Y_{it}, DEP_{it}, WEP_{it}, EXR_{it}\ PV_{it}, ERV_{it}) \quad (1)$$

where EX_{it} is the tea export volume to country *i* at time *t*; Y_{it} is the level of economic activity in export market *i* in period *t*; DEP_{it} is the price of domestic tea exports country *i* at time *t*; WEP_{it} is the world price of tea exports at time *t*; EXR_{it} is the exchange rate between Kenya and importing country *i* at time *t*; ERV_{it} is the exchange rate volatility between Kenya and importing country *i* at time *t* and; PV_{it} is the price volatility between Kenya and importing country *i* at time *t*.

The ARDL specification of equation (1) above is presented as;

Table 1. Variable description and expected sign.

Variable code	Variable name	Description	Expected sign
Dependent variable			
EX_{it}	Kenya's black tea exports	Logarithm of Kenya's black tea exports in kilograms to a specific country in 1997-2010 period	
Independent variable			
Y_{it}	Foreign income	It is measured using the importing country's GDP in US dollars	+
$\frac{DEP}{WEP}_{it}$	Relative export prices	It refers to ratio of the price of Kenya's black tea per kilogram in Nominal USD to the price of black tea per kilogram in Sri Lanka in Nominal USD.	-
EXR_{it}	Exchange rate	Nominal Exchange rate between importing country and Kenya	-
PV_{it}	Price volatility	Price volatility was calculated using GARCH model (Equation 3).	+ /-
ERV_{it}	Exchange rate volatility	Exchange rate volatility was calculated using GARCH model (Equation 3).	+ / -

$$\Delta \ln EX_{it} = c_0 + c_1 t + \alpha_1 \ln EX_{it-1} + \alpha_2 \ln Y_{it-1} + \alpha_3 \ln \left[\frac{DEP}{WEP}\right]_{it-1} + \alpha_4 \ln EXR_{it-1} +$$
$$+ \alpha_5 \ln ERV_{it-1} + \alpha_6 \ln PV_{it-1} +$$
$$\sum_{j=1}^{p} \beta_j \Delta \ln EX_{it-j} +$$
$$\sum_{j=0}^{q} \gamma_j \Delta \ln Y_{it-j} + \sum_{j=0}^{r} \delta_j \Delta \ln \left[\frac{DEP}{WEP}\right]_{it-j} + \sum_{j=0}^{s} \pi_j \Delta \ln EXR_{it-j} +$$
$$\sum_{j=0}^{t} \tau_j \Delta \ln ERV_{it-j} + \sum_{j=0}^{v} \eta_j \Delta \ln PV_{it-j} + \mu_i + \omega_{it} \qquad \forall \leq i \leq N$$

and

$1 \leq t \leq T$: T=14

and

N=16 (2)

where Δ is the first difference; c_0 and c_1 t are drift and trend variables; $\alpha_1, \alpha_2, \alpha_3 \alpha_4, \alpha_5$ and α_6 are long term multipliers, while $\beta_j, \gamma_j, \delta_j, \pi_j, \tau_j$ and η_j are short term coefficients; *p, q, r, s, t* and *v* are optimum lags periods. The rest of the variables are defined in Equation 1.

Data

The study used annual panel data set to estimate the export demand for Kenya's black tea. The panel comprised of 16 countries and 14 years and thus, the number of observations was 224. Volume of black tea exports, GDP values, real exchange rates, foreign and domestic prices of black tea were obtained from http://wits.worldbank.org and UNCOMTRADE, statistics division. Data on real exchange rate of the Kenyan shilling against relevant currencies were also obtained from the Central Bank of Kenya (CBK) statistical bulletins.

Exchange rate volatility and price volatility cannot be observed directly and thus, were computed using generalized autoregressive conditional heteroscedasticity (GARCH) model. The GARCH model was estimated as follows:

$$\sigma^2 = \gamma_0 + \sum_{i=1}^{r} \emptyset_i \mu_{t-i}^2 + \sum_{i=1}^{s} \delta_i \sigma_{t-i}^2 \qquad (3)$$

where σ^2 is the conditional variance, γ_0 is constant, $\emptyset_i$ and δ_i are the parameters to be estimated, *r* refers to the number of autoregressive lags (ARCH terms), while *s* is the number of moving averages lags (GARCH terms) specified, and μ is the error term.

A summary of the description and the expected sign of each of the variables used in assessing export demand for Kenya's black tea are presented in Table 1.

Data analysis

Data was first tested for unit roots using Im Peseran and Shin (IPS) unit roots tests. The second step after testing for unit roots was to test for panel cointegration. The study employed PMG method by Pesaran et al. (1999) due to the following merits. Unlike Westerlund (2007), the test is consistent even if there is a mixture of *I(0)* and *I(1).* It is concise in the sense that, it estimates the functional Error Correction Model (ECM) and tests for cointegration at the same time. Pesaran et al. (1999) model for cointegration utilizes pooled mean group (PMG) estimator which provides for heterogeneity as it allows short run adjustment to differ across individuals (countries).

In the presence of cointegration in panel data frameworks, the next step requires one to estimate both the long run and the short run models. There are two estimation methods commonly used when dealing with dynamic panel data models. The first consists of

Table 2. IPS panel unit roots test.

Variable		Test statistic	Critical value ($\alpha = 0.05$)	Conclusion
$ln\, EX_{it}$	Level	-3.868	-1.870	Stationary at level *I(0)*
$ln\, Y_{it}$	Level	6.429	-1.870	Non-stationary
	1st Difference	-4.327	-1.870	Stationary *I(1)*
$ln\, EXR_{it}$	Level	0.000	-1.870	Non –stationary
	1st Difference	-4.450	-1.870	Stationary at level *I(1)*
$ln\, \left[\frac{DEP}{WEP}\right]_{it}$	Level	-4.632	-1.870	Stationary at level *I(0)*
$ln\, PV_{it-1}$	Level	-9.181	-1.870	Stationary at level *I(0)*
$ln\, ERV_{it-1}$	Level	-3.847	-1.870	Stationary at level *I(0)*

The null hypothesis is that all panels contain unit roots that is each series in the panel is integrated of order one.

averaging separate estimates for each group in the panel. According to Pesaran and Smith (1995), the mean group (MG) estimator yields consistent estimates of the parameter averages. It allows the parameters to be freely independent across groups and does not consider potential homogeneity between groups.

The second method is the pooled method which includes the random-effects, fixed effects and Generalized Method of Moments (GMM) models. These models force the parameters to be identical across groups, but the intercept can vary between groups. GMM estimations of dynamic panels could lead to inconsistent and misleading long-term coefficients, a possible problem that is exacerbated when the period is broad (Pesaran et al., 1999). The PMG involves both pooling and averaging and thus is an intermediate estimator.

Three different regression scenarios were considered; the first regression was unconstrained country equation yielding MG estimator, the second is ARDL-ECM with equal long run coefficient and different short run coefficients yielding PMG estimator, and dynamic fixed effects (DFE) which assumes homogeneity in both short and long run coefficients (except the constant term). PMG estimation method also allows one to estimate both long run and short run coefficients simultaneously from the underlying ARDL model. Further, endogeneity problems encountered in Engle and Granger (1987) approach are avoided by autoregressive distributed lag approach (Islam et al., 2014).

The MG estimator requires one to estimate a separate regression for each country and calculate the coefficients as unweighted means of the estimated coefficients for the individual countries (Islam et al., 2014; Persyn and Westerlund, 2008). Unlike PMG, there are no restrictions on the coefficients under this method. Rather, all coefficients are allowed to vary both in the short run and in the long run. The method, however, requires large time (T) and cross-section (N) components.

The DFE estimator, just like PMG restricts the coefficient of the cointegrating vector to be equal across countries in the long run. Further, it restricts the speed of adjustment and short run coefficient to be equal (Islam et al., 2014). The method is subject to simultaneous equation bias due to endogeneity between error term and the lagged dependent variable.

The next step was model selection. Firstly, the appropriate numbers of lags were to be estimated to find the most parsimonious model. Secondly, the three models allow estimation of both short run and long run models simultaneously. Hausman test was used to test whether there were significant differences among the three estimators. If the null hypothesis is not rejected, it implies there is no significant difference and PMG estimator is efficient and adopted for analysis (Peseran et al., 1999). If null is rejected, it means either DFE or MG are appropriate estimators. Five percent level of significance was used for significance test.

RESULTS AND DISCUSSION

The results of panel unit roots tests are presented in Table 2.

Existence of both *I(0)* and *I(1)* shows that test for cointegration is necessary to establish existence of long term relationship between the variables of interest.

Three dynamic panel regression models: PMG, MG and DFE were estimated and the results presented in Table 3. ARDL (1,1,1,1,1) was chosen because attempts to add lags led to non-convergence of the model due to overparametization a common problem with PMG, MG and DFE models (Samargandi et al., 2013). Hausman test was used to determine the most efficient and consistent estimator among the three models. Hausman test between PMG and MG had a score of 0.21 with a corresponding p-value of 0.9990. Hausman test between PMG and DFE had a score of 0.33 with a corresponding p-value of 0.9971. In both cases, the null hypothesis that there were no systematic differences between the estimators was not rejected at 1% significance level. Therefore, PMG is more efficient estimator than MG and DFE. Failure to reject the null hypothesis also indicates that the long run estimates were homogenous; hence, PMG is consistent and most efficient.

Cointegration results are discussed in Table 3. The error correction coefficient was -0.860. The results show that error correction coefficient was significant and less than -2. The significance of ECT in the model implies that both long run and short run models can be estimated.

Table 3. Pooled mean group versus mean group and dynamic fixed effect estimators.

Dependent variable: $ln\ EX_{it}$	Pooled Mean Group (PMG) Estimator		Mean Group (MG) Estimator		(DFE) Estimator	
Long run						
	Coefficient	**P-Value**	**Coefficient**	**P-Value**	**Coefficient**	**P-Value**
$ln\, Y_{i\ t-1}$	0.684*** (0.078)	0.000	2.00 (1.502)	0.183	-0.024 (0.035)	0.504
$ln\left[\frac{DEP}{WEP}\right]_{it-1}$	0.251 (0.158)	0.112	0.183 (0.618)	0.768	-0.816*** (0.288)	0.005
$ln\ PV_{it-1}$	0.111 (0.057)	0.051	0.229 (0.188)	0.222	0.167 (0.161)	0.297
$ln\ ERV_{it-1}$	0.081*** (0.016)	0.000	-0.316 (0.233)	0.174	-0.012 (0.040)	0.774
$ln\ EXR_{it-1}$	0.094 (0.165)	0.568	257.51 (253.46)	0.310	0.301 (0.347)	0.384
Short run						
$\Delta\ Y$	3.0776 (1.5760)	0.051	1.093 (2.3385)	0.640	-0.014 (0.0348)	0.584
$\Delta\ ln\left[\frac{DEP}{WEP}\right]$	0.06167 (0.0896)	0.491	-0.0556 (0.4487)	0.901	-0.291 (0.1663)	0.081
$\Delta\ ln\ PV$	0.1365*** (0.0292)	0.000	0.241 (0.1566)	0.122	0.135** (0.068)	0.047
$\Delta\ ln\ ERV$	0.1193** (0.0473)	0.012	-0.118 (0.1535)	0.443	0.040 (0.0282)	0.153
$\Delta\ ln\ EXR$	-9.287 (12.092)	0.442	113.31 (111.26)	0.308	-1.97*** (0.380)	0.000
Speed of convergence						
Error correction	-0.859*** (0.135)	0.000	-1.285*** (0.105)	0.000	-0.683*** (0.060)	0.000
Intercept						
Constant	-0.871*** (0.291)	0.003	-196.134 (173.97)	0.250	4.456*** (0.476)	0.000
Diagnostics						
Log Likelihood 95.166						
Number of observations (NT) = 224			Number of panels N=16		Number of years (T) = 14	
Hausman test: PMG versus MG			Chi^2 =0.21		P-value= 0.999	
PMG versus DFE			Chi^2 =0.33		P-value= 0.9971	

*** and ** indicates significance at 1 and 5% respectively. Standard errors are in the parentheses.

In the long run, the results show that the foreign income (proxied by of GDP) had a positive elasticity of 0.68 which was significant at 1 per cent. Exchange volatility had a positive coefficient of 0.081 and was significant at 1% level. Proportional changes in relative prices, foreign exchange rate and price volatility had positive coefficients. However, the coefficients were not significant in the long run.

The significance of foreign income and exchange rate volatility variables justified the estimation of an error correction model can be estimated to capture the short-run dynamics of Kenya's black tea exports.

In the short run, the results show that price volatility and exchange rate volatility were significant at 1 and 5% level, respectively. Proportional changes in relative prices, foreign income and foreign exchange rate were insignificant in the short run.

The results show that foreign income was significant in the long run but insignificant in the short run. Price volatility had significant positive effect in the short run. On the other hand, exchange rate variability had significant positive effects both in the short-run and in the long run even though the effects are more in the short run than in the long run. In the long run exchange rate may tend towards equilibrium, hence, the reason for less effect in the long run. Positive significant results between Kenya's tea exports and price volatility and real exchange rate volatility in the short run shows that their volatilities increases the demand for exports in the world market and vice versa. This could be attributed to increase in these volatilities induce uncertainty and that may lead to increased demand for Kenya's black tea exports.

The PMG model also gives the speed of convergence of Kenya's tea exports to changes in identified explanatory variables. The results show that the speed of convergence coefficient of -0.859 was significant at one percent. First, these results confirm the existence of cointegration relationship between Kenya's tea exports and at least one of the explanatory variables. The negative sign implies that Kenya's tea export adjust towards long run equilibrium path. The results show that the speed of convergence of Kenya's tea exports to long run equilibrium after a shock is approximately 85.9% per year. This means that following a shock, 85.9% of the deviations (away from long run equilibrium) are corrected within one period (one year).

Conclusions

The results show that in the long run, two variables; foreign income (GDP as proxy), and exchange rate volatility were statistically significant. The foreign income variable had a positive and statistically significant effect on Kenya's tea exports. The study findings suggest that there is a positive relationship between foreign income and Kenya tea exports. The study therefore concludes that an increase in foreign income results in an increase in Kenyan tea exports. This means that Kenya should target countries with high GDPs and/or economic expansion in order to gain more from its black tea exports. Though FAO predictions indicate that in the near future Kenya is likely to continue being the largest exporter of black tea in world market, policy measures should be put in place to enhance its competitiveness in the world market.

In line with Serenis and Tsounis (2014) and Demirhan and Demirhan (2015), the study found a positive relationship between exchange rate volatility and exports. This is contrary to studies that point to a negative relationship between exports and exchange rate volatility such as Sun et al. (2002). Though the study found that exchange rate volatility had a positive and a statistically significant effect on the export demand function of Kenya's tea exports both in the long and short run, the effect was felt more in the short run than in the long run. The significance of exchange rate risk variable suggests that it has significant positive long run effect on real exports of Kenya's black tea. Based on the results, the study concluded that exchange rate volatility aids Kenya's tea exports in the long run. This implies that exchange rate variability is not a serious problem for the Kenyan tea sector. However, it would be vital for policy makers to take into account the existence and degree of exchange rate volatility and predict the likely impact of exchange rate volatility for each tea importing country when implementing policies for Kenya's black tea export demand.

Price volatility was significant in the short run. The study concluded that there is a positive and significant relationship between Kenyan tea exports and price volatility in the short run. Policy makers should be able to forecast the likely impact of price volatility on each tea importing country while pursuing policies to improve demand for Kenyan tea in the world market.

The speed of convergence coefficient was found to be highly significant with the expected negative sign further confirming a stable long run relationship. Thus, the study concludes that Kenyan tea exports adjust towards long run equilibrium path after a shock. This implies that strategies that can help tea exporters cope in the short run should be put in place since in the long run Kenyan tea exports revert to long run equilibrium.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

REFERENCES

Akiyama T, Baffes J, Larson DF, Varangis P (2003). Common commodity reform in Africa: Some recent experience. World Bank Research Working Paper No. 2995.

Amikuzuno J (2009). Spatial price transmission and market integration in agricultural markets after liberalization in Ghana: Evidence from

fresh tomato markets. Unpublished PhD Thesis, Georg-August University Goettingen, Germany.
Ankamah-Yeboah I (2012). Spatial price transmission in the regional maize markets in Ghana. MPRA Paper No. 49720.
Apergis N, Rezetis A (2011). Food price volatility and macroeconomic factors: Evidence from GARCH and GARCH-X estimates. J. Agric. Appl. Econ. 43(1):95-110.
Arize AC, Osang T, Slottje JD (2000). Exchange rate volatility and foreign trade: Evidence from Thirteen LDCs. J. Bus. Econ. Stat. 18:10-17.
Byerlee D, Jayne T, Myers R (2006). Managing food price risks and instability in a liberalizing market environment: Overview and policy options. Food Policy 31:275-287.
Clark PB (1973). Uncertainty, exchange risk, and the level of international trade. Western Econ. J. 6:302-313.
Cote A (1994). Exchange rate volatility and trade. Bank of Canada Working Paper Number 94.
De Grauwe P (1988). Exchange rate variability and the slowdown in growth of international trade. ZMF Staff Paper 35:63-84.
Dehn J, Gilbert CL, Varangis P (2004). Commodity price variability, in B. Pinto ed., Volatility and its consequences for crises and growth: A Handbook For Practitioners, Washington DC, World Bank.
Engle RF, Granger CWJ (1987). Co-integration and error correction: Representation estimation and testing. Econometrica 55:251-276.
FAO (2014). Contribution of tea production and exports to food security, rural development and smallholder welfare in selected producing countries. Committee on commodity problems. Food and Agriculture Organization of the United Nations, Rome, Italy.
Franke G (1991). Exchange rate volatility and international trading strategy. J. Int. Money Fin. 10:292-307.
Friedman M (1953). The case for flexible exchange rates. In Essays in Positive Economics, Chicago: University of Chicago Press. pp. 157-203.
Gardner BL, Gardner BD (1977). Discussion on Firch, Baker and Lins. Am. J. Agric. Econ. 59(1):185-191.
Goldstein M, Khan MS (1985). Income and price effects in foreign trade. In R.W. Jones and P.B. Kenen (Eds). Handbook Int. Econ. 2:1041-1105.
Hausman JA (1978). Specification tests on econometrics. Econometrica 46:6.
Hooper P, Kohlhagen S (1978). The effect of exchange rate uncertainty on the prices and volume of international trade. J. Int. Econ. 8:483-511.
Im KS, Pesaran MH, Shin Y (1995). Testing for unit roots in heterogeneous panels. Working Paper, Department of Applied Economics, University of Cambridge.
Islam SM, Kazi M, Sohag K (2014). CO_2 emission and agricultural productivity in South East Asian region: A pooled mean estimation approach. January to June 2014. Sci. J. COMSATS- Sc. Vis. 20:1.
Ivanic M, Martin W (2008). Implications of higher global food prices for poverty in low income countries. World Bank Policy Research Working Paper No. 4594. Washington, DC: World Bank.
Johnson H (1969). The case of flexible exchange rates. Federal Reserve Bank St. Louis Mon. Rev. 51(6):12-24.
Kiptui M (2007). Does the exchange rate matter for Kenya's exports? A bounds testing approach. Prepared for presentation at the African Econometric Society Conference, Cape Town, July 4-2007.
Kiptui M (2008). Does exchange rate volatility harm imports? Evidence from Kenya's tea and horticultural exports. Prepared for presentation at the CSAE Conference at Oxford University, 16-18 March 2008.
Mofya-Mukuka R, Abdulai A (2013). Effects of policy reforms on price transmission in coffee markets: Evidence from Zambia and Tanzania. Indaba Agricultural Policy Research Institute (IAPRI) Working Paper 79.
Organization for Economic Co-operation Development (OECD) (2009). Managing risk in agriculture: A holistic approach. Paris, OECD.
Pesaran MH, Shin Y (1995). An autoregressive distributed lag modelling approach to cointegration analysis. DAE Working Paper No. 9514, Department of Applied Economics, University of Cambridge.
Pesaran MH, Shin Y, Smith RJ (1999). Bounds testing approaches to the analysis of long run relationships. Cambridge Working Papers in Economics, 9907, Faculty of Economics, University of Cambridge.
Samargandi N, Fidrmuc J, Ghosh S (2013). Financial development and economic growth in an oil-rich economy: The case of Saudi Arabia. Working Paper Number 13-12, Department of Economics and Finance, Brunel University, London.
Sercu P, Vanhulle C (1992). Exchange rate volatility, international trade, and the value of exporting firms. J. Bank. Fin. 16:155-182.
Sun C, Kim M, Koo W, Cho G, Jin H (2002). The effect of exchange rate volatility on wheat trade worldwide. Agribus. Appl. Econ. Report No. 488.
UNCTAD (2008). Commodity price hikes and instability. Chapter 2, Trade and Development Report. UNCTAD.
Westerlund J (2007). Testing for error correction in panel data. Oxford Bull. Econ. Stat. 69(6):709-748.
White H, Levy J (2001). Economic reforms and economic performance: Evidence from 20 developing countries. Eur. J. Econ. Res. 2(13):120-143.
Yuan Y, Awokuse TO (2006). Exchange rate volatility and US poultry exports: Evidence from panel data. Agribusiness: Int. J. 22:233-245
Zheng Y, Kinnucan HW, Thompson H (2008). News and volatility of food prices. Appl. Econ. 40:1629-1635.