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Does Domestic Trade Policy Change Matters For International Price Volatility? Empirical Evidence from Coffee Price in Tanzania

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Abstract

For some decades coffee prices have been volatile to the extent of being regarded as one of the attributes that contribute to decline in economic growth in Tanzania despite of various reforms undertaken. This paper attempted to investigate the effect of changes in domestic trade policy and agricultural trade liberalization in Tanzania on the variability of coffee prices overtime. Using the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) framework, the study established that coffee experienced significant price volatility level after the introduction of agricultural trade liberalization policy in Tanzania during the 1990s and a slight change during the ICA policy regime. The study also finds that persistence of coffee price volatility overtime in both policy regimes displays memory decay. The likely explanation for this is that Tanzania is a price taker and cannot affect the setting of international prices. The policy response to this, include new marketing approach such as promotion and empowering of producers' groups and revitalization of co-operatives.

Keywords: Tanzania, Coffee price, volatility, policy changes, GARCH model

1. Introduction

Volatility in international price of agricultural commodities such as coffee is an increasingly important area of concern in the area of development economics. The continuous booms and bursts trend of coffee price have generally attracted diverse interests of many researchers to investigate the effects of various factors including changes in trade policies (Baffess, 2003 and World Bank, 2003). While these changes are having serious effects on price, its empirical investigation on Tanzanian coffee price is still anecdote. Thus, the more this phenomenon continues to be ignored, the higher it can precipitate economic stress, devastate individuals' livelihoods and income poverty to both coffee importing and exporting countries such as Tanzania.

In over 40 years, Tanzania has been registering a jagged pattern of coffee prices that is characterized by the persistent slumps and upswings that swift loss to about 400,000 producers' income (World Bank, 2010 and ICO, 2005). Along with this trauma, Lewin and Varangis (2004) found a deteriorating trend in the percentage share of export value from 19.31%, 14.50%, 11.89%, 8.00% and 3.7% in 1998, 1999, 2000, 2001 and 2002 respectively. Coffee being one of the important export crops for Tanzania, its price instability became a major issue for the economy at both micro and macro-levels as it has far reaching effects in terms of foreign exchange earnings as well as individual households' incomes and hence livelihoods.

To stabilize coffee prices, the government undertook agricultural policy and institutional reforms that included introduction of trade liberalization and restructuring of traditional crops marketing boards from January 1994. Furthermore, Tanzania withdrew from the International Coffee Agreement (ICA). Under ICA, coffee traded through quota system within a price band until July 1982. Despite the policy reforms, there is no improvement in soothing coffee price stability. Thus, a critical examination of conditional price volatility occasioned by changes of domestic agricultural trade policies is warranted.

This paper attempts to empirically investigate the differences and the effects of trade policy changes on the price variability overtime in Tanzania from 1980 to 2008. Specifically, the study establishes the degree of persistence of uneven conditional commodity prices that existed in both ICA and trade liberalization policy regime throughout the period under study. The study hypothesizes that the reforms made have had significant effects on coffee price volatility in developing countries particularly Tanzania. Thus, the escalating mixed consensus on the theoretical and empirical investigations on the effect of policy reforms on agricultural trade triggered the motives to further the investigation on this issue.

The study offers numerous contributions to existing stock of knowledge on the degree to which changes in trade policy influences dynamic volatility in coffee prices and contributes to the designs of trade policy. It considers the residual property of time-series that often is ignored in qualitative analysis. It recognizes the empirical role of the GARCH approach, hence making it unique in comparison to other studies done in Tanzania. Lastly, it goes with the objectives of the Millennium Development Goals (MDGs), Tanzania National Strategy for Economic Growth and Reduction of Poverty (NSGRP) and the country's Development Vision 2025 (TDV, 2025) that emphasizes a suitable, competitive economy and high quality livelihoods. Thus, the findings of this paper highlight the future situations and provide valuable evidences informing the policy makers and planners on the ongoing touchy debate on commodities price uncertainties. Thus, such a study helps in the formulation of suitable policies that addresses the potential economic shocks.

The paper is organized into five sections with section one providing the background information and organization of the paper. Section two contains literature reviews on price volatility and policy impacts. Section three presents data and the study methodology. Section four provides the empirical analysis and results. Finally, section five contains concluding remarks and recommendations.

2. **Literature Review**

Commodity price volatility is not a new phenomenon. The novelty and the effects of price volatility in primary commodities[10] for commodity-dependent developing countries has been investigated (Combs and Guilaumont, 2002; Depken and Sonora, 2002; ICO, 2005; Valadkhani *et a*l., 2005; and Jordan *et al.*, 2007). Diverse definitions have resulted. Many authors have defined price volatility as the variability of commodity prices about the trend and the origins of fluctuations in shocks to supply and demand of agricultural commodities (Tomek and Robinson, 1990; ICO, 2002; Gilbert, 2006 and Rezitis *et al.*, 2008). While there are varieties of definitions, this paper follows the definition that suggested by the ICO (2005) which defines price volatility as a statistical measure of price fluctuation over a given period of time and measures the size of the increase and decrease in a short period; that is, not price levels but their degree of variation from one period to the next. In this paper, this definition is used throughout; it is suitable for the goal of this study that focuses on trade policy changes as one of the causes of conditional behavior of international coffee price variances as good number of studies indicated their inclination basing on this definition.

Following the contentious debate on the causes of coffee price volatility, Bafes (2003), Shepherd (2004), World Bank (2003), Krivonos (2005), Gemech and Struthers (2007) address causes of coffee price volatility. These studies find that volatility of coffee prices, in common with other commodities, is an outcome of international market practices, including changes of trade policy regime. For example, Krivonos (2005), using monthly world market prices and prices paid to producers for twenty coffee exporting countries for the past twenty years, evaluates the impacts of coffee sector reforms during the late 1980s and early 1990s in the main coffee producing countries on coffee growers. He finds there is a closer relationship between producer prices and the world market prices after the reforms than before. In addition, the model shows that currently, domestic prices are adjusted further today to world market fluctuations than they were prior to liberalization.

Despite there is vast literature that examines the possible effects resulting from changes in domestic policies on coffee prices, there are relatively scanty studies that focus in the developing countries such as Tanzania. The available literature concentrate on other commodities and some are based on developed and emerging economies (for instance: Mehta and Chavas, 2008; Brown and Gibson, 2006; Potts, 2007; Gemech and Struthers, 2007; Bafes, 2003; Ponte, 2002; Voituriez, 2001; Yang *et al*., 2001; and Crain and Lee, 1996). These studies typically questioned the influence of policies on price instability of the primary commodities and they found mixed results. Such as in the work of Ponte (2001) and Nelson *et al*. (2002) where they found nationalization of coffee estates in Tanzania impacted negatively on coffee production hence reducing coffee supply by 13%. Thus, while other researchers such as Crain and Lee (1996) point out that policy changes reduces agricultural price instability, other researchers (e.g. Voituriez, 2001 and Yang *et al*., 2001) claim the opposite.

Mehta and Chavas (2008) use monthly average prices of coffee for 1975 to 2002 to specify an econometric model of coffee price dynamics in Brazil. The researchers find that, in the short run, the International Coffee Agreement (ICA) caused Brazilian farm prices to become disconnected from international prices. The authors further claim that ICA created a price cycle that did not exist in non-ICA periods. This argument is not new and

[10] Primary commodities referred to agricultural goods and minerals whose output relies heavily on the input of land (Begg *et al*., 2005)

has micro and macro-economic policy implications. Concerns about the influences of policies on price volatility have grown among scholars. In addition, Ponte (2002), Brown and Gibson (2006) and Brown *et al.* (2008), examined how quickly agricultural commodity prices can fluctuate in response to factors such as trade policies. They found out that disintegration of ICA and the introduction of trade liberalization policies influenced the precariousness of price and trade volumes. With the same view, Potts (2007) finds that volatility has exhibited an increase due to the removal of economic clauses (i.e. quotas) within the ICA. Although, notable evidences are found in some studies reviewed here, there are limited evidences on coffee in Tanzania and in particular the effects of changes in policies on coffee prices.

The available related literature on Tanzania's coffee have only attempted to examine sources of price volatility and not on the degree to which domestic policy reforms affect price volatility (such as World Bank, 2003; Bafes, 2003; World Bank, 1999 and Temu, 1995). However, no empirical investigation on the effects impelled by policy reforms on specific coffee prices, the little available only focused on theoretical explanation. Besides, measly attention is given to quantitative techniques that acknowledge capturing the dynamic behavior of the time varying volatility in price series. With these observations, the litigious answer on how changes in trade policies influence time-varying price uncertainties in the Tanzania coffee industry is still a debatable issue; this merits the use of Autoregressive Conditional Heteroskedacity (GARCH) model enhanced by R-statistics and E-view econometric software. This framework has been acknowledged for capturing the potential effects of past shocks of price series and policy responses (Floros, 2008; Engle, 2002: 2004; Bollerslev *et al*., 1992 and Nelson, 1991).

Despite the literature indicating numerous techniques such as Markov Regime Switching Process, Standard Deviation, Stochastic Volatility Model (SV), GJR asymmetric model, Structural econometric model of inventories, BEKK and the Vector Autoregressive Model (VAR) have been used to model volatility, inefficiency of these models to capture the stylized facts of conditional varying prices behaviors were observed (for example, Chang et al., 2010; Benavides, 2008 and Ahoniemi, 2006). The ARCH/GARCH (1, 1) framework introduced by Engle (1982) and generalized by Bollerslev (1986) has been widely acknowledged to be able to capture the stylized features of overtime volatility in time series. The ARCH/GARCH considers the existence of conditional volatility while other models neglect, hence appear to bias the estimation.

From the theoretical stand point of the ARCH/GARCH framework, many researchers and policy analysts have been engaging this model. For example studies by Jordan *et al*., 2007; Lux and Kaizoji, 2007; Moledina *et al*., 2003; Yang *et al.*, 2001; Engle, 2000; Patterson, 2000; Cox *et al.*, 1993; Aradhyula and Holt, 1988), claim that price changing variance attributed by various factors such as policy response is well captured by the ARCH/GARCH techniques.

Gemech and Struthers (2007) and Yang *et al* (2001), used GARCH model to examine the effects of recent radical agricultural trade liberalization policy on prices of agricultural commodities including corn, wheat and coffee. Using monthly prices, the model revealed that liberalization policy has caused an increase in price volatility. Similarly, Rezitis and Stravropolous (2008) use the GARCH model to examine the factors that affect supply response of meat in the presence of European Union's Common Agricultural Policy during 1993 through 2005. They found price volatility is among the central risk factors in the supply response function.

Consequently, the emerging conclusion from the review made depicts price instability is an acute risk that overwhelms growers at any time. Although vast numbers of studies have been done on price volatility, measly studies focused on the effects of trade policy changes on coffee price volatility. In addition these used qualitative technique that fail to establish the dynamic behavior of price series.

3. Empirical Methodology

3.1 Modeling Framework

To capture the possible effects of changes of policy regimes on international coffee prices in Tanzania, a GARCH (p, q) process with two dummy variables (D and Z) are employed and specified as follows:

$$y_t = f(t-1, x) + \varepsilon_t; \qquad (\varepsilon_t | I_{t-1}) \sim N(0, h_t), \quad h_t = \sigma_t^2 \tag{1}$$

$$\sigma_t^2 = \omega + \sum_{i-1}^{p} \alpha_i \varepsilon_{t-i}^2 + \sum_{j-1}^{q} \beta_j \sigma_{t-j}^2 + \lambda D_t + \delta Z_t \tag{2}$$

Where;

$$\Sigma_{i-1}^{p}\alpha_i + \Sigma_{j-1}^{q}\beta_i < 1 \quad (3)$$

$p \geq 0, q \geq 0$

$$\alpha_i \geq 0, \beta_j \geq 0, \omega > 0$$

i = 1,..... p and j = 1,.....q (4)

The coefficients, α_i and β_j are the GARCH and ARCH parameters respectively whereby p denotes length for the squared residuals and q stands for the lag length of the conditional coffee price variance. The equation y_t represents return (first difference of the log of coffee price), $f(t-1, x)$ is a deterministic component of the current return, ε_t stands for the innovation in the mean y_t, while ω is the volatility constant, σ_t^2 is the conditional coffee price variance that accounts for price volatility in equation (3) with the necessary condition that $\alpha_i \geq 0$, $\beta_j \geq 0$, $\omega > 0$.

Gemech and Struthers (2007) recommend that, although equation (3) determines the conditional volatility, it is designed to mimic the volatility clustering phenomenon that are large disturbances, positive or negative and become part of the information set used to construct the variance of the next period's disturbance. D_t is a dummy variable for market liberalization and Z_t is a dummy variable which stands for presence of the International Coffee Agreement. Both dummies explain the possible effects of trade policies in the period covered for this study. The magnitudes of the coefficients α_i describe the degree of persistence of volatility in coffee price. Equation (3) gives us the volatility persistence phenomenon such that if $\Sigma_{i-1}^{p}\alpha_i + \Sigma_{j-1}^{q}\beta_i < 1$, implies volatility response decay overtime varying and vice versa.

The study introduces dummy variables D and Z at different periods depending on when the respective policy regime was in place. The literature has shown that the introduction of dummy variables has grown in analysis to proxy the effects of any intervention of interest (Gemech and Struthers, 2007 and Yang *et al*, 2001). In particular, the actual effects of agricultural market liberalization in Tanzania began in January, 1994. In general this study considers this period as the period of market economic reforms, which means the dummy D used to proxy market reform from this period is considered as equal to one and zero otherwise as shown in the equation below.

Similarly, the study considers the effects of ICA in Tanzania from January, 1980 to July, 1989 equal one and zero otherwise as shown in the equation below. Altogether, these are analyzed in different phases depending when the policy was in operation which marks the structural breaks. A move from one to another market regime may signify a structural change (Alexander, 2008). For analysis purpose, possible effects were determined by first considering the when ICA was in place (Z=1; D=0). Next followed when Tanzania followed trade liberalization policy (D =1; Z= 0) and last the estimation treated Z=0 and D=0 for the period when both policy regimes were absent. Below is the summary of the whole process:

$$\sigma_t^2 = \begin{cases} \omega + \sum_{i-1}^{p}\alpha_i\varepsilon_{t-i}^2 + \sum_{j-1}^{q}\beta_j\sigma_{t-j}^2 + \delta Z_t; & if\ D=0, Z=1 \quad (i) \\ \omega + \sum_{i-1}^{p}\alpha_i\varepsilon_{t-i}^2 + \sum_{j-1}^{q}\beta_j\sigma_{t-j}^2 + \lambda D_t; & if\ D=1, Z=0 \quad (ii) \\ \omega + \sum_{i=1}^{p}\alpha_i\varepsilon_{t-i}^2 + \sum_{j=1}^{q}\beta_j\sigma_{t-j}^2; & If\ D=0, \quad Z=0 \quad (iii) \end{cases} \quad (5)$$

3.2 Data and Variables

The data set used in this paper consists of monthly international coffee prices amassed from the International Coffee Organization (ICO) office in London, UK. The time span covered by the coffee price series was from January 1980 to September 2008 giving a total of 345 observations. Data collected constitute two varieties of coffee grown in Tanzania: Arabica and Robusta. However, other information relating to this study was sourced from various sources including documentary review. In this paper conditional price variance (σ^2) was treated as the dependent variable that represents current coffee price volatility. These are Price of Arabica (PA) and Price of Robusta (PR). Lagged coffee price (σ_{t-j}) was applied as an independent variable with the assumption that all other factors associated with price variances such as weather, demand and supply are kept constant. All the coffee prices were measured in US cents /lb. All the coffee price series used in this study were expressed in log first differenced form.

Before embarking into evaluation of the effects of trade policy on coffee price volatility in Tanzania, inspection of time-series stochastic properties of the data set preceded the precise specification of the model. Some steps were involved including: eyeball inspection on the plotted logarithmic graphs, if the series displays non-Gaussian distributions with no real pattern, thus exhibit random walk, which suggested the use of unit root test.

The Augmented Dickey Fuller (ADF) test was used to test the presence of Unit root properties. The rationales for conducting unit root test are basically affixed into mainly two reasons. Firstly, to avoid the dilemma of spurious regression and correlation in each individual time-series that precludes the long-run relationships among levels of non-stationary variables. Secondly, to avoid possibilities of losing some relevant information only first differences of variables are used (Hill *et al*., 2008; Gemech and Stuthers, 2007; Cox *et al.*, 1996 and Bollerslev, 1986). Throughout this paper, the log first differenced prices are presented as DLPA (for Arabica) and DLPR (for Robusta). In this regard, the tests were applied for both log levels and then log first differenced coffee price series.

4.0 Empirical Findings and Discussion

4.1 Descriptive Results

The descriptive statistics for both monthly Arabica and Robusta Coffee price series are as reported in Table 1 and 2 respectively as logarithmic prices. The series display unsteady distribution properties. The skewness and kurtosis measures indicate both Arabica and Robusta coffee prices are negatively skewed and relatively flat to the normal distribution; since the kurtosis is less than three which is the condition for normal Gaussians.

The statistics show that the mean Arabica coffee price for the period covered from January 1980 to September 2008 has been around US Cents 4.13 per pound, with a maximum price of US Cents 4.92 per pound. Similarly, the mean Robusta coffee price for the period covered from January 1988 to September 2008 has been around US Cents 2.84 per pound, with a maximum price of US Cents 4.11 per pound. The monthly standard deviation is around US Cents 0.50 per pound and US Cents 0.69 per pound for Arabica and Robusta respectively, which show that the Arabica coffee price is less volatile than Robusta coffee price-series. The hypothesis of normality in both Arabica and Robusta coffee price time-series was rejected based on the Jarque-Bera test results as indicated in the Table 1 and 2 respectively. The test suggests absence of normality for all Tanzanian coffee price-series for the period under study.

Table 1: Descriptive Statistics on Monthly Arabica Coffee Prices (1988:01 - 2008: 09)

Mean	4.126132
Median	4.158721
Maximum	4.916473
Minimum	3.085194
Std Dev.	0.504681
Skewness	-0.371321
Kurtosis	2.058450
Jarque-Bera	20.31224
Probability	0.00039
Observations	339

Table 2: Descriptive Statistics on Monthly Robusta Coffee Prices (1988:01-2008:09)

Mean	2.839061
Median	2.884527
Maximum	4.111865
Minimum	1.059698
Std Dev.	0.689236
Skewness	-0.619100
Kurtosis	2.668773
Jarque-Bera	17.04460
Probability	0.000199
Observations	249

4.1 Unit root test and Data diagnoses results

The ADF results for non-stationarity levels for both Arabica and Robusta are respectively summarized in Table 3. The results indicate that all the coffee prices in log levels are non-stationary at 1% critical values. The null hypothesis of non-stationarirty failed to be rejected. However, after first differencing the log levels, the ADF tests revealed that in all cases the hypothesis of non-stationarity was rejected at 1% level of significance. Figures 2 and 4 presented in the Appendix "I" also support the results that the series are stationary. Hence, the hypothesis that the log first differenced price series have unit roots is rejected. It also implies that each variable is stationary and integrated of order one, I(1).

Table 3: Augmented Dickey-Fuller (ADF) unit root test results

Variable	ADF test statistic before differencing	ADF test statistic after differencing	Critical value(at 1% level of significance) before differencing	Critical value(at 1% level of significance) after differencing
Log(PA)	-2.069547	-17.64432	-3.985690	-3.986026
Log(PR)	-1.646074	-16.41415	-3.995492	-3.995645

Notes: PA represents price for Arabica coffee and PR represents price for Robusta coffee

After achieving the stationarity of the data series, the model was estimated for both the Arabica and Robusta price series. Diagnostic tests were carried out to check whether the model is well specified. The empirical results are presented and discussed in section 4.3. The first diagnostic test was to check for the presence of ARCH effects with the conjecture that there are no ARCH effects in the Tanzanian coffee price series.

The results presented in Tables 4 and 5, indicate that there were no ARCH effects in the series at five % level. The results from the LM statistic test for both Arabica (0.499) and Robusta (0.096) were not significant at 5 % level. Furthermore, the F-and t-statistics for both series did not corroborate the presence of the ARCH effects. In addition the Durbin-Watson statistics for both coffee price-series show that they are close to 2, all signifying failure to reject the hypothesis that there are no ARCH effects. This implies that price volatility varies overtime.

4.2 Empirical Results

Empirical investigations of the potential effects of policies on coffee price volatility suggest different results as revealed from the estimated GARCH equation. Tables 4 and 5 present the results from the examination of the conditional volatility with regard to changes in trade policies. The results indicate that the coefficients of the exogenous dummy variables for both Arabica and Robusta are statistically insignificant at 5 % level. This suggests that local policies have no effects on coffee prices at the world market but rather are among the contributing factors. These results show there was variability under both the ICA and liberalization, although Figure 5 and 6 show volatility under liberalization to be higher.

Table 4: Results for GARCH (1, 1) process for monthly Arabica prices (Jan1988- Sept 2008)

	Coefficient	Std. Error	z-Statistic	Prob.
DLPA(-1)	0.005960	0.074479	0.080021	0.9362
	Variance Equation			
C	0.007163	0.008217	0.871741	0.3833
RESID(-1)^2	-0.019337	0.003865	-5.002549	0.0000***
GARCH(-1)	0.439950	0.645759	0.681292	0.4957
DD	0.016518	0.018934	0.872399	0.3830
DZ	-0.001776	0.002787	-0.637108	0.5241

Notes: Dependent Variable: DLPA; Method: ML - ARCH (Marquardt) - Normal distribution; Sample (adjusted): 1980M03 2008M09. Included observations: 343 after adjustments; Convergence achieved after 20 iterations; *** denotes significance at 1% level and * denotes significance at 10% level.

Table 5: Results of GARCH (1, 1) process for Monthly Robusta prices (Jan 1988-Sept 2008)

	Coefficient	Std. Error	z-Statistic	Prob.
DLPR(-1)	-0.001752	0.052863	-0.033143	0.9736
	Variance Equation			
C	0.007163	0.008217	0.871741	0.3833
RESID(-1)^2	-0.019337	0.003865	-5.002549	0.0000***
GARCH(-1)	0.439950	0.645759	0.681292	0.4957
DD	0.016518	0.018934	0.872399	0.3830
DZ	-0.001776	0.002787	-0.637108	0.5241

Notes: Dependent Variable: DLPR; Method: ML - ARCH (Marquardt) - Normal distribution; Sample (adjusted): 1988M03 2008M09; Included observations: 247 after adjustments; Convergence achieved after 20 iterations; *** denotes significance at 1% level and * denotes significance at 10% level.

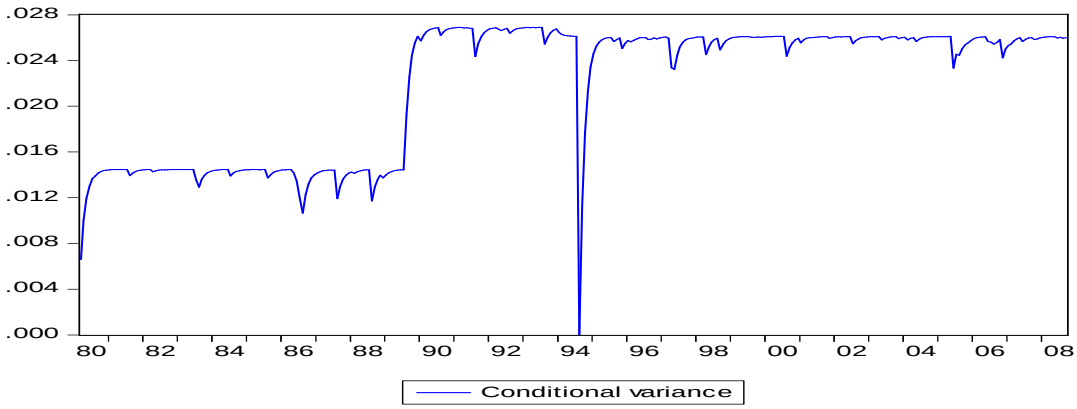

Figure 5: Conditional volatility for monthly Arabica price (Jan 1980-Sept 2008)

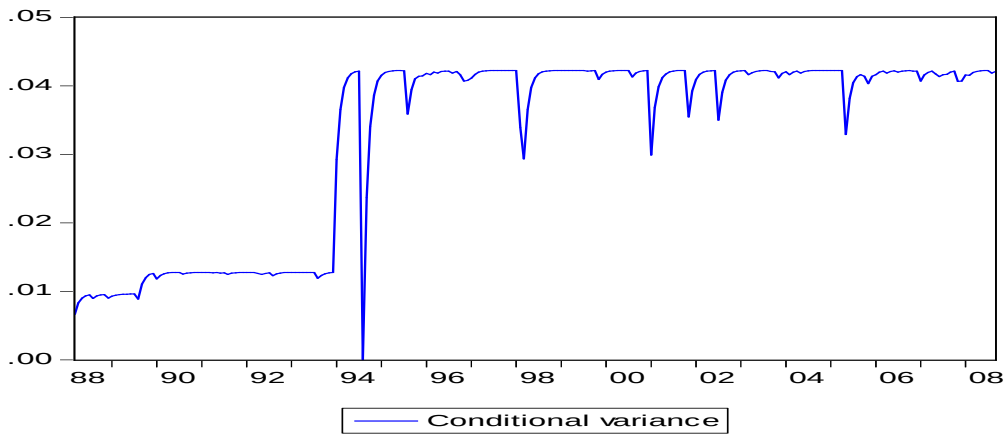

Figure 6: Conditional volatility for monthly Robusta (Jan 1988-Sept 2008)

Comparing the results on the effects of changes of trade policies on coffee price volatility such as when ICA was in operation and when Tanzania liberalized its trade regime, the results reveal that all the coefficients of the ICA have the expected positive sign albeit statistically insignificant at 5% level for all the coffee varieties. The ICA dummy is positive for Robusta (0.017, Table 5) but negative for Arabica (-0. 000, Table 4). The negative sign suggests that price for Arabica was less volatility when comparing the different policy regimes. However, both Arabica and Robusta were statistically insignificant at the 5 % level. Arabica coffee seemed to be sensitive because it is globally traded due to its high demand by consumers and also it is sensitive to climate change. When Tanzania liberalized its trade regime, there was a continuation of conditional variance in Robusta coffee prices compared to ICA albeit at a higher level, although less for Arabica, as both signs were negative (-0.005) for Arabica, -0.002 for Robusta) not significant, indicating no difference listed between the two policy regimes.

However, increase in price variability since trade liberalization (Fig 5 and 6), may have been attributed to an internal market shock resulting from the country opening its borders to the rest of the world. This is because traders and producers had to cope with new and unexpected players and entrants, but soon after this shock inducement in 1994, the coffee price resumed the same trend of consistent variability. Additionally, the results show that ICA had no influence on coffee price volatility, except that volatility was at a lower level. The argument behind this is that, Tanzania as a price taker has no influence on the world market for setting coffee prices. Indeed, the results show that volatility in coffee prices persisted not permanently in both policy regimes.

Evidently, Figure 5 and 6 show that under both policy regimes there was volatility but after liberalization in 1994 there was a higher level of volatility. This is confirmed by prices paid to producers. The conditional variances in prices were 0.28 for Arabica and 0.04 for Robusta, showing Arabica had slightly a lower variability level than Robusta. However, it is not possible to determine which portion of coffee price variability is only caused by regime change since many factors may have been involved such as weather, coffee quality and market forces. This caveat, however, have been highlighted qualitatively in literature (e.g. Temu *et al*., 2001; Bafess, 2003; ICO, 2005), and thus price instability is caused by mixed factors. Pursuit to the observation, in both policy regimes Arabica prices appeared to be more volatile than Robusta. Thus, the possible inference of the results may be that Arabica coffee price is more sensitive to any shock in policy change.

5.0 Conclusion

This paper is an attempt to empirically investigate the differences and the effects of trade policy changes on the price variability overtime in Tanzania from 1980 to 2008. Using the GARCH (1, 1) framework, the findings provided a new understanding that volatility in coffee prices persisted in both regimes and Tanzania has little or no influence on the international coffee price. This implies that Tanzania as a price taker has no influence on the world market coffee prices.

Returning to the central hypothesis posed at the beginning of this paper, it is now crystal clear to state that volatility persistence over time and the possible effects on coffee price are not permanently present. The study also concludes that for the entire period spanning from 1980s through 2008 both Arabica and Robusta prices displayed no permanent volatility persistence across all policy regimes.

In both policy regimes, Arabica prices appear to be significantly more volatile than Robusta. This could be that Arabica coffee is more sensitive to any shocks in policy changes. The results further show that when Tanzania liberalized its trade abruptly, price variability level increased. Which fraction of coffee price variability is caused only by policy change is difficult to assess as there are many factors involved in price instability such as weather, coffee quality, market forces etc., and an indication that there is a range of sources of price volatility.

The paper recommends few options that include consideration of new marketing approaches, such as use of niche market opportunities such as fair trade or ethical trading opportunities. In addition, promotion of domestic market is essential so as to increase domestic consumption of coffee. Special links can be made with supermarkets, for instance, Shoprite, Nakumat, Tesco, etc to enhance domestic use of coffee. In addressing the requirements for niche markets and domestic markets processing of coffee into various end products may have an added advantage. In international trade, Tanzanian coffee can be marketed as a ‘’brand’’ associating it with environmental protection of cultural diversity and ethical issues such as support for smallholder production and enhanced livelihoods. Improvement of quality should be looked into and the potential for promotion of high quality, such as Robusta.

This study further recommends to have greater regional co-operation so that interests of the region can be promoted, spreading costs of promotion, research and development and increasing economies of scale. Producers groups should be promoted, allowing greater producer control over production and themselves making contracts with supermarkets or potential private buyers. For smallholders to compete effectively they need to be organized through co-operatives or other forms of association so as to advance their concerns and their voices heard. Co-operative marketing has higher advantages as well. Smallholders need to work in co-operatives as they have only small quantities to sell, if groups of producers can get together to form producer groups, they can establish links with the buyers. Also quality can be tailored to consumer demand while groups can also have greater influence over price obtained than the individual farmer selling at the farm gate. Government can help to promote producer groups through policy, training and strengthening information systems, the aim should be that producers can seek advice that they need. Producers groups have worked well with other commodities in Tanzania, such as chick peas, and the model could be applied to coffee. Existing co-operatives should be reformed or revitalized, allowing greater farmer input and control.

This study also suggests to have further research regarding the spill-over effects of the volatility of the international coffee price on the trade of other traditional export crops such as cotton and sugar and the overall impact of volatility on the whole economy and at regional level would be of great help. Establishment of comparative volatility and elicit whether there exist a co-integration of price volatility among coffee producer countries such as Uganda, Kenya, Burundi and Tanzania so as to understand if there is any true economic

relationships.

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