

**AGRICULTURAL SECTOR INVESTMENT, OUTSOURCING AND POLITICAL
RISKS: THE CASE OF KENYA'S FLOWER TRADE WITH THE EU**

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This is a selected paper to be presented during the Sixth African Economic Conference jointly organized by the United Nations Economic Commission for Africa (UNECA), the African Development Bank (AfDB), United Nations Development Programme (UNDP), and the Development Bank of Southern Africa (DBSA) to be held from 25-28 October, 2011 in Addis Ababa, Ethiopia.

¹ The views expressed in this paper are those of the authors, and may not be attributed to the Economic Research Service or the U.S. Department of Agriculture.

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Abstract

Recent Kenyan agricultural policies have provided incentives for European entrepreneurs to continue investing in the growing cut flower industry, accounting for a large share of EU imports of roses to date. A key objective of this study is to determine if the December 2007 political conflict, following Kenya's presidential elections, may have caused EU rose importers to fundamentally shift their demand for Kenyan roses relative to other leading rose exporting countries. Using the Rotterdam model, we estimate EU demand for imported roses.

Import demand projections showed that the conflict had immediate impacts on EU demand for roses. Whereas EU rose imports from Kenya increased significantly by 3.2% annually prior to the conflict, it significantly decreased by 2.1% after the conflict. Cross-price elasticity estimates show that there has been significant substitution away from Kenyan roses to other competitors' imports from Ecuador and East Africa. However, the structural adjustment estimates suggest that Kenyan roses became significantly more sensitive to changes in EU expenditures following the conflict. Maintaining the flower industry's growth and trade competitiveness is crucial in advancing structural change in Kenya's economy that has traditionally depended on the agricultural sector (mainly tea and other horticultural products) for foreign exchange.

Keywords: Africa, Election violence, cut flower, Kenya, EU, import demand, price elasticity, roses, Rotterdam model.

JEL Classifications: F14, F23, F59, O13, Q17.

1. Introduction

African agriculture is generally viewed as the new frontier for technological innovation and diffusion such as occurred with the Asian Green Revolution decades ago. Additionally, because of land availability, African countries have the opportunity of modernizing their economies by recognizing agriculture as a knowledge-based entrepreneurial activity. As Juma (2011) argues, smart investments in agriculture will have multiplier effects in many sectors of the economy and help spread prosperity. According to the author, it is important to boost support for agricultural research as part of a larger agenda to promote innovation, invest in enabling infrastructure, build human capacity, stimulate entrepreneurship and improve the governance of innovation. To these, we add that African countries must also be viewed as potential destinations for outsourcing² agricultural products along the sector's value chain. Unfortunately, the sector currently faces many challenges that have brought it to a crossroads.

First, although agriculture is a major means of food and revenue generation in Africa, it has received relatively few investments in the past 50 years. Between 1980 and 2005, the World Bank was the largest lender to African agriculture. However, African governments, facing fiscal austerity measures stemming from the World Bank's and IMF's sponsored Structural Adjustment Programs (SAPs) in the 1980s, trimmed down significantly their budgets allocated to agriculture. Second, for those African countries that launched programs of reform to improve agricultural output in the 1970s and 1980s (such as Kenya, Nigeria and Zimbabwe), the reforms were episodic and funding was not sustained. Many countries, such as Zimbabwe, have since experienced erosion of agricultural production. However, Kenya launched the Strategy for Revitalising Agriculture (SRA) in 2004 that called for, among other things, fundamental sector

² Outsourcing is defined as the provision of a service or the production of various components of a good in a different country that are finally used or assembled into its final use in another location (Feenstra and Taylor, 2011).

policy changes, legal and regulatory reforms to achieve food and nutritional security and to facilitate a shift from subsistence to market oriented production (Republic of Kenya, 2004).

Third, African countries have become too dependent on external food aid, and many governments appear not to realize the urgency of deepening their agriculture sector investment. Moreover, persistent food shortages are being compounded by threats arising from climate change.

According to the Food and Agriculture Organization of the United Nations (FAO, 2004), although Africa has the largest agricultural area per capita in the developing world, yet it has the lowest irrigated area of about 3.7 percent, and fertilizer consumption of 12.6 kg/ha/arable land; much lower than the developing country average of 109 kg/ha/arable land. Additionally, only a quarter of the land in the total crop area is planted with modern crop varieties; although Asia adopted such modern varieties in the 1960s during the Green Revolution. Therefore, cereal yields for African farmers have stagnated since the 1970s and stand at about one-third of those in South Asia (World Bank, 2008). Without a doubt, Africa has been standing in the need of a new vision for agricultural sector innovation to, at the minimum, ensure food security, feed its people and transform the region from poverty and hunger. Can African governments provide political leadership and garner the necessary institutional reforms (including the overhaul of existing laws, systems of incentives, etc.) to promote investment and diffusion of new and appropriate technologies into the agricultural economy?

It was against this background that the New Partnership for African Development (NEPAD) proposed action steps in the 2002 Comprehensive Africa Agricultural Development Programme (CAADP), aimed to achieve at least 6 percent agriculture sector growth by the year

2015 for all countries by improving agricultural investments up to \$251 billion. The CAADP³ is an agriculture-led development scheme aimed at cutting hunger, reducing poverty (about 70 percent of which exists in rural areas where subsistence farming is mainly undertaken by illiterate women), generating economic growth, reducing the burden of food imports, and opening avenues for the expansion of agricultural exports. The CAADP has delineated four action steps to: (i) increase food supply, reduce hunger, and improve responses to food emergency crises; (ii) improve agriculture research, technology dissemination and adoption; (iii) extend the area under sustainable land management and reliable water control systems; and (iv) to improve rural infrastructure and trade related capacities for market access.

Three major opportunities can help transform African agriculture for economic growth (see Juma, 2011; p. xiv)⁴. First, global advances in science, technology, and engineering offer Africa new tools to promote sustainable agriculture. Second, ongoing efforts at creating regionally integrated markets provide incentives for agricultural production and trade. Third, a new generation of African leaders must help to focus long-term economic transformation of the continent by seeking to incorporate agricultural sector rejuvenation.

Finding African success stories in agricultural sector modernization and transformation can be illusive; which makes the recent success of Kenya's cut flower industry quite intriguing. However, Ksoll, Macchiavello and Morjaria (2009) in conducting a survey of Kenyan flower grower-exporters, showed that the December 2007 post-electoral conflict reduced cut flower exports by 24% overall, and by 38% for firms located in conflict areas, mainly through

³The CAADP is conceived as a strategy to create regional value chains by linking agriculture to other sectors of the economy. The value chain is a continuum of forward and backward linkages among agribusiness, agro-processing activities (including ethanol and other industrial processes), and soil management by using technology to develop high-yielding seed varieties, and fertilizer production and dissemination.

⁴Juma's book is a product of the Agricultural Innovation in Africa (AIA) project funded by the Bill and Melinda Gates Foundation. It provides policy-relevant information on how to align science, technology, and engineering missions with regional agricultural development goals.

displacing workers. Whereas the authors could not provide evidence to suggest that the conflict affected export volumes in the areas not affected by the conflict nor the sensitivity of competitor countries behavior for the EU market⁵, their evidence showed that the conflict did change Kenyan exporters' behavior. Specifically, shipments were more consolidated and exported less frequently, while security expenses increased.

Recent Kenyan agricultural policies have provided incentives for European entrepreneurs to continue investing in the growing cut flower industry, accounting for a large share of EU imports of roses to date. The overall purpose of this study is to analyze how the Kenyan political conflict in December 2007 affected trade in roses between the EU and Kenya. A key objective of this study is to determine if the political conflict may have caused EU importers to fundamentally shift their demand for Kenyan roses relative to other leading and competing rose exporting countries such as Ecuador, Ethiopia, Tanzania, and Uganda. We hypothesize that the conflict⁶ caused EU importers to view Kenya differentially relative to other exporting countries, resulting in a fundamental change in how they respond to factors such as domestic demand, import prices, and other trending factors.

Specifically, we: (1) to estimate EU demand for imported roses and derive the demand elasticities; and (2) assess the impacts of the Kenyan conflict on import demand parameters and the responsiveness of imports from Kenya and other leading exporters of roses to the EU. In the second section, we provide a general overview of the Kenyan cut flower sector. Then, the third section discusses the evolution of the 2007 post-election conflict and the immediate impacts of the violence and instability on the international trade of cut flowers. The fourth section provides the data, methods and model used for the study. The fifth section provides the discussion of

⁵ The EU market is the primary destination (90%) of Kenya's flowers.

⁶ Alesina *et al* (1996) document that political instability lowers economic growth generally, while Duke and Vargas (2007) relate how civil violence impacts the export sector.

results from the specified model. Finally, the sixth section provides conclusions and policy implications stemming from the study.

2. Overview of the Kenya Cut Flower Industry

Kenya is currently a leading global producer and exporter of cut flowers, with over 90% of total production being exported to European countries. An almost exclusively export-oriented industry, its growth is believed to have been significantly enhanced in the past by Kenya's duty-free access to the EU (Hughes, 2001). To date, the cut flower sector is the second largest earner of foreign exchange for the country. Roses are Kenya's most important flower export accounting for over 70% of all trees, plants, buds, roots, flowers and foliage produced and exported. Other favorites include carnations, alstromeria and summer flowers. Kenya is the primary supplier of roses to the EU, accounting for 63% of all EU imports in 2006 (Eurostat, 2010). In 2000, EU imports of Kenya's roses amounted to €108 million. However, EU imports of Kenyan roses reached a peak value of €270 million in 2008, although the 2009 value fell to €267 million in the aftermath of the political instability. As can be gleaned from Figure 1, EU imports of Kenya's roses have grown from 2000 through 2010; especially it grew rapidly following 2004 when the SRA was instituted. Most of the roses from Kenya are destined for the Netherlands, with the U.K. being a second market. The demand for flowers during Valentine's Day in February and Mother's day in May leads to large seasonal spikes in the demand for Kenyan roses. During the summer months, most of the EU demand for roses is filled by leading vertically integrated producers in the Netherlands. Therefore, for Kenyan producers of cut flowers, the export season lasts from September through June.

The flowers from Kenya are exported to the EU through two channels; the Dutch auctions and direct sales to wholesalers and specialist importers. However, the auction prices in

the Netherlands are relatively lower (see Figure 2) and vary substantially from the direct sale prices generally prevailing in the rest of the EU and the U.K., in particular, where flowers are sold directly to large retail and wholesale supermarkets such as Marks and Spencer, Sainsbury's, Tesco and Waitrose.

The cut flower industry in Kenya employs about 2 million people. There are currently about 160 flower growers who constitute mainly medium to large scale commercial operations. However, according to Kiptum (2005), the flower industry has been dominated by 24 very large commercial enterprises which contribute more than 72% of the total flower exports and which cultivate land of between 20 to 100 hectares each, and employ about 250 to 6,000 workers each. These large scale growers are a combination of foreign-owned and/or joint ventures between foreigners and Kenyan entrepreneurs. The predominant investors are European producers who outsource the cultivation of flowers to Kenya during the winter season in Europe. Such operations are vertically integrated, and require high capital investments in green houses, excellent managerial skills and marketing infrastructure (such as freight-forwarding and cargo planes), research laboratories, advanced technology and cultivation techniques. Large-scale cultivation accounts for about 97% of Kenya's exports of cut flowers, and they have marketing networks located in Europe to assist in the sale, distribution and collection of market information. Smaller scale growers, on the other hand, tend to be locally-owned with low capital investments, weak managerial skills, less advanced technology, and usually concentrate on growing summer flowers that are grown outdoors. The smaller-scale producers also experience difficulty in gaining access to export markets⁷, and cannot afford the high associated costs of freight and strict phyto-sanitary requirements. Therefore, they focus more on supplying flowers to street vendors in the local market.

⁷ This is because the summer supply of flowers is dominated by vertically integrated producers in the Netherlands.

Kenya's cut flower industry has been successful based on the following factors: good climate, excellent location, enabling government policy environment, and available infrastructure. Kenya enjoys a diverse range of climatic conditions from the hot coastal plains to the cool highlands. Moreover, a cool temperate climate occurs from the altitude of about 1500 meters above sea level, and adequate rainfall that are conducive to cultivating high quality flowers. It is estimated by the Horticultural Crops Development Authority⁸ (HCDA) that over 2,000 hectares of Kenya's agricultural land is currently used for cut flower cultivation. The major flower growing areas are the land surrounding Lake Naivasha, Thika, Limuru, Nairobi and Athi river plains to the west of Kenya, and further north in the Nakuru, Nanyuki, Mount Kenya region, and Eldoret. The Lake Naivasha area accounts for nearly 50% of the total land under cut flower cultivation, and about one quarter of Kenya's regular exporters. It is located about 100 kilometers northwest of the capital city Nairobi, in the Great Rift Valley, and the area stands about 1850 meters above sea level. Contiguous to the flower farms are complementary infrastructure consisting of research institutions, breeding farms, quality control and regulatory agencies, input suppliers, credit and finance institutions and other marketing intermediaries. The area has the ready availability of fresh water from the Lake and other aquifers for irrigation. The area was also the original settlement of white settlers⁹ who along with the government leased the land to the large-scale commercial flower growers. Moreover, the area is in proximity to the Jomo Kenyatta International Airport in Nairobi and it is linked by the Nairobi-Nakuru highway to enable both fast domestic and international logistics.

⁸ The HCDA was established by the Government of Kenya under the Agriculture Act of 1967 to help develop and regulate the industry.

⁹ Kenya has a history as a colonial "settler state" that promoted particular interactions between white settlers and indigenous populations. The Lake Naivasha area is known for its settler plantation culture. According to Maxon (1992), Kenya manifests a history of increasing its export revenues by encouraging white settlement and agricultural production in tandem with heavy state support and African proletarians by limiting indigenous farming and accumulation. The indigenous population provided cheap labor for white settlers.

The Government of Kenya, as part of its SRA¹⁰, has supported the industry by creating enabling legislations, intellectual property rights, availability of skilled labor, functional quality control, and other regulatory regimes and market incentives for private enterprises such as the flower industry to thrive. Following a Green Revolution orientation, the Kenyan SRA incorporates access to inputs and technology and capacity development, through among others, initiatives such as the Kenyan Agricultural Productivity Programme and National Agricultural Accelerated Input Programme¹¹.

3. The 2007 Political Elections and Instability

Kenya was ushered into six weeks of political instability, when the Electoral Commission declared the incumbent President Mwai Kibaki of the Party of National Unity (PNU) the winner by a narrow margin over his rival and leader of the opposition Orange Democratic Movement (ODM), Mr. Raila Odinga, on December 27, 2007. Prior to the elections, most polls had Mr. Odinga leading by a narrow margin. The polls showed that President Kibaki enjoyed support from the Central Province, sections of the Eastern Province and certain parts of Nairobi. Mr. Odinga enjoyed support from the Nyanza, Western, North-eastern and the Coastal provinces, and Nairobi. The results were widely viewed by observers as illegitimate, and it precipitated two months of political and ethnic violence across the country leading to deaths and human displacement. It took the intervention of high-level African Union and United Nations luminaries to broker a power-sharing agreement that made Mr. Kibaki President and established the position of Prime Minister for Mr. Odinga, and doubled the number of cabinet-level positions.

¹⁰ According to Anseeuw (2010), the SRA was prepared in Kenya as the national policy document for revitalizing the agricultural sector from 2004 to 2014 with general consensus as an integral part of its development trajectory.

¹¹ See President Kibaki's foreword to the SRA (Republic of Kenya, 2004; page v)

The political violence that followed the elections disrupted all sectors of the Kenyan economy resulting in estimated losses in the billions of dollars, as well as potential long lasting costs in social coherence such as ethnic distrust and suspicion. As soon as President Kibaki was sworn in on December 28, 2007 ethnic violence broke out in many regions of the country, with the ODM supporters targeting the Kikuyus who supported the PNU in their expression of discontent. A second outbreak of violence took place between January 25th and 30th of 2008 in a Kikuyu revenge attack on other ethnic groups targeted as supporters of Prime Minister Odinga, mainly in Nakuru and Naivasha in the Rift Valley, and Limuru in the Central province.

4. Import Demand Model

We estimate EU demand for imported roses assuming product heterogeneity due to country of origin while accounting for any structural change in demand due to the Kenyan conflict. In this context, roses from the i th source country is an individual good that is part of the product group *roses* and is an imperfect substitute for roses from other sources due to origin specific factors (Armington, 1969). Letting all other product groups be similarly defined, a multistage budgeting process is assumed where consumers first allocate total expenditures across the various product groups and then allocate group expenditures across the goods within each product group (Seale, Sparks and Buxton, 1992). For product groups unrelated to roses, preferences are assumed block independent, and for related product groups like other types of flowers, preferences are assumed blockwise dependent. This suggests that the utility interaction between roses and other products is a matter of the groups and not the individual goods (Theil and Clements, 1987). For instance, the interaction of roses and carnations should be the same regardless to the source country of production. With these assumptions, an import allocation system limited to roses is derived.

The absolute price version of the Rotterdam model is used in estimating demand. Let q and p denote the import quantity and price, respectively. Following Theil (1980) and Theil and Clements (1987), the demand for roses from the i th country is specified as follows:

$$w_{it} d(\log q_{it}) = \theta_i d(\log Q_t) + \sum_{j=1}^n \pi_{ij} d(\log p_{jt}) + \varepsilon_{it}. \quad (1)$$

w_{it} is the conditional budget/expenditure share which is the share of total expenditures on imported roses spent on imports from the i th country ($w_{it} = p_{it}q_{it} / \sum_{i=1}^n p_{it}q_{it}$).¹² θ_i is the marginal budget share of the i th import and is defined as

$$\theta_i = \frac{\partial(p_i q_i)}{\partial\left(\sum_{i=1}^n p_i q_i\right)}.$$

$d(\log Q_t)$ is the Divisia volume index where $d(\log Q_t) = \sum_{i=1}^n w_{it} d(\log q_{it})$. The Divisia volume index is a measure of the change in real total rose expenditures from all countries (Theil, 1980). π_{ij} is the Slutsky price coefficient or relative price effect which measures the impact of the price of roses in country j on the quantity imported from country i . ε_{it} is the error term.

The Rotterdam model requires that the following restrictions be met in order to conform to theoretical considerations: $\sum_i \theta_i = 1$ and $\sum_i \pi_{ij} = 0$ (adding up); $\sum_j \pi_{ij} = 0$ (homogeneity), and $\pi_{ij} = \pi_{ji}$ (symmetry). Additionally, the Slutsky price matrix $\mathbf{\Pi} = [\pi_{ij}]$ should also be negative semidefinite (Theil, 1980).

Following the methodology of Moschini and Meilke (1989), and the empirical applications of Gil et al. (2004), and Peterson and Chen (2005), the structural change in import

¹² Note that for any variable x , $d(\log x)$ is the derivative of $\log(x)$, which is also the rate of change in x , dx/x .

demand is modeled assuming a common time path for all parameters in the system. Denoting this time path as h_t , the Rotterdam model with structural change is parameterized as

$$w_{it}d(\log q_{it}) = \alpha_i + \delta_i h_t + (\theta_i + \lambda_i h_t)d(\log Q_t) + \sum_{j=1}^n (\pi_{ij} + \nu_{ij} h_t)d(\log p_{jt}) + \xi_{it}. \quad (2)$$

The constant term α_i is added to account for trends (in levels), and the term $\delta_i h_t$ is the structural adjustment in the trend effect. Similarly, $\lambda_i h_t$ is the structural adjustment in the expenditure effect and $\nu_i h_t$ is the structural adjustment in the relative price effect. The hypothesis of no structural change is implied by $\delta = \lambda = \nu = 0$. Additional restrictions are required for adding-up, homogeneity and symmetry as:

$$\sum_i \alpha_i = \sum_i \delta_i = \sum_i \lambda_i = \sum_i \nu_{ij} = 0 \text{ (adding up),}$$

$$\sum_j \nu_{ij} = 0 \text{ (homogeneity) and}$$

$$\nu_{ij} = \nu_{ji} \text{ (symmetry).}$$

The time path h_t is defined such that equation (2) becomes a gradual switching regression model where:

$$\begin{aligned} h_t &= 0 && \text{for } t = 1, \dots, \tau_1 \\ h_t &= (t - \tau_1) / (\tau_2 - \tau_1) && \text{for } t = \tau_1 + 1, \dots, \tau_2 - 1. \\ h_t &= 1 && \text{for } t = \tau_2, \dots, T \end{aligned} \quad (3)$$

τ_1 is the conflict starting point, τ_2 is the starting point of the post-conflict period, and T is the end of the sample period. Note that the transition path may be abrupt/immediate if $\tau_2 = \tau_1 + 1$ or gradual ($\tau_2 > \tau_1 + 1$) depending on the size of τ_1 and τ_2 (Moschini and Meilke, 1989).

Of particular interest is the impact of structural change on the demand elasticities. The conditional expenditure elasticity with structural change is

$$\eta_i = \frac{(\theta_i + \lambda_i h)}{w_i}, \quad (4)$$

and the conditional Hicksian (income compensated) price elasticity with structural change is

$$\eta_{ij}^c = \frac{(\pi_{ij} + \nu_{ij} h)}{w_i}. \quad (5)$$

Note that equation (4) measures the responsiveness of imports from the i th country to changes in total import expenditures, and equation (5) measures the responsiveness of imports from the i th country to changes in prices in the j th country. To test if structural change affected the demand elasticities, equations (4) and (5) are statistically compared when $h = 0$ and when $h = 1$.

5. Estimation and Results

Monthly data are used for estimation and the time period for the data is from January 2001 through December 2010. The External Trade Section of the Statistical Office of the European Communities (Eurostat) provided the import data used in this study which is the CN8 classification “fresh cut roses and buds of a kind suitable for bouquets or for ornamental purposes.” Import quantities of fresh cut roses are measured in units of 100 kg, and values are in Euros. Values are on a cost-insurance-freight (CIF) basis and import prices are calculated by dividing the value of the commodity by the quantity which results in a Euro per 100 kg unit of measurement. The exporting sources considered for the analysis are Ecuador, Kenya, East Africa, and the rest of the world (ROW). East Africa is an aggregation of Ethiopia, Tanzania, and Uganda. ROW is an aggregation of imports from the remaining source countries. Descriptive statistics for EU import values and quantities by country, as well as prices and market share values by country are reported in Table 1. Note that the largest rose imports for the EU are Kenyan roses which are sold at relatively lower prices.

The import demand system represented by equation (2) is estimated using the LSQ procedures in TSP (version 5.0) which uses the generalized Gauss-Newton method to estimate the parameters in the system (Hall and Cummins, 2005).¹³ When replacing continuous log differences with 12-period differences, it was found that the error term in equation (2) was not random but followed a first-order autoregressive process, $\xi_{it} = \rho \xi_{it-1} + \mu_{it}$ where $\mu_{it} \sim N(0, \sigma_\mu)$. The autocorrelation parameter ρ was estimated using the full maximum likelihood procedure for singular systems in Beach and MacKinnon (1979), where ρ is constrained equal across all equations to preserve the adding-up property. The benefits of the Beach and MacKinnon method are that the log likelihood function is specified such that the ξ_t process is stationary (the characteristic roots of \mathbf{p} lie within the unit circle) and the errors of the initial period have some effect on the parameter estimates. A likelihood ratio (LR) test rejected the hypothesis of no-autocorrelation.

For the analysis, we assume that the effect of the Kenyan political crisis on demand was immediate. Therefore, $\tau_1 = \text{December 2007}$ and $\tau_2 = \tau_1 + 1$ ($\tau_2 = \text{January 2008}$). LR tests were conducted to determine if there was structural change in all parameters. The hypotheses of no-structural change in trend effects ($\delta = 0$), expenditure effects ($\lambda = 0$), and price effects ($\nu = 0$) were each considered separately as well as jointly. Test results rejected the null hypothesis of no-structural change in the trend and expenditure effects but failed to reject the hypothesis of no

¹³In estimating the Rotterdam model, continuous log differences are typically replaced with finite one-period log differences. Given that the data are monthly, the 12-period log difference is used to remove the seasonality from the data (Duffy, 1990). Thus, the quantity and price terms are approximated as $d(\log q_t) = \log q_t - \log q_{t-12}$ and $d(\log p_t) = \log p_t - \log p_{t-12}$. w_{it} is replaced with $\bar{w}_{it} = 0.5(w_{it} + w_{it-12})$, which is the conditional budget share averaged over the periods t and $t-12$, and the Divisia volume index $d(\log Q_t)$ is replaced with a discrete measure DQ_t where

$$DQ_t = \sum_{i=1}^n \bar{w}_{it} (\log q_{it} - \log q_{it-12}).$$

structural change in the price effects. Therefore, we assume no change in the price effects in the results that follow.

Pre- and Post-conflict (pre- and post-adjustment) demand estimates are reported in Table 2. All estimates are homogeneity and symmetry constrained with first-order autoregressive disturbances. The trend estimates (α_i) reflect the pattern of rose imports holding prices and expenditures constant. Pre-conflict, the trend estimates are significant at the 10 percent level and positive for Kenya (0.017) and East Africa (0.009) and negative for the ROW (-0.023). These indicate that prior to the conflict imports from both Kenya and the other East African countries were growing in the EU while those from the ROW were declining (*ceteris paribus*).

Estimates of the expenditure effect (θ_i) for the pre-conflict period indicated a positive and significant relationship between the Divisia index (expenditures) and roses from all exporting countries¹⁴. The expenditure effect reflects how a dollar increase in real expenditures is allocated across the four countries and is relatively large for Kenya (0.488). This suggests that prior to the conflict imports from Kenya increased by €0.49 for every one-euro increase in total EU imports, other factors held constant. For the remaining countries, the marginal share estimates were 0.164 (Ecuador), 0.141 (East Africa), and 0.207 (ROW). The conditional own-price effects (π_{ii}) during the pre-conflict period are presented along the diagonal in Table 2. All own-price estimates were negative as expected and significant at the 10 percent level for all countries except the ROW. The conditional own-price effect is largest (in absolute value) for Kenya (-0.123). The own-price effects for the remaining countries are significantly smaller (in absolute value): Ecuador (-0.047) and East Africa (-0.025). The cross-price estimates (π_{ij}) for Kenya and Ecuador is 0.041, and for East Africa, 0.038. These indicate that during the pre-

¹⁴ In this paper, we refer to the East Africa region and ROW as countries.

conflict period, there was a significant competitive relationship (substitutes) between Kenyan roses and imports from Ecuador and East Africa.

The trend and expenditure structural adjustment estimates δ_i and λ_i are also reported in Table 2. The trend-adjustment estimate for Kenya (-0.028) suggests that the increasing trend in imports from Kenya during the pre-conflict period flattened to near zero (or became negative) during the post-conflict period. In contrast, the trend in imports from East Africa became even more positive (0.005) in the post-conflict period.

The conditional own- and cross-price elasticities are reported in Table 3. Overall, the demand for roses in the EU is highly inelastic for all countries. Given a percentage increase in import prices, imports from Ecuador decreased by 0.3%, Kenya by 0.241%, and East Africa by 0.191%. Although an increase in Kenyan prices would have a positive effect on imports from all countries, the responsiveness of competing countries are relatively small. Note that for every percentage increase in Kenyan prices, EU imports from the competing countries increases at most by 0.087% from the ROW.

The trend and expenditure elasticities are derived and statistically compared across the two time periods: pre-conflict and post-conflict. The trend elasticity is calculated as follows: $(\alpha_i + \delta_i h) / w_i$. Each elasticity is evaluated at the mean (average market share). Following Moschini and Meilke (1989), and Gil et al. (2004), the pre- and post-adjustment elasticities were evaluated using period-specific means. For the pre-conflict elasticities, the market shares were averaged over the period January 2001-December 2007, $\bar{w}_{it} = \sum_{t=1}^{\tau_1} \bar{w}_{it} / \tau_1$, and for the post-conflict elasticities, the market shares are averaged over the period January 2008-December 2010, $\bar{w}_{it} = \sum_{t=\tau_2}^T \bar{w}_{it} / (T - \tau_2)$. The results are presented in Table 4.

Kenya is the only country where the trend elasticity is significantly negative post conflict. Prior to the conflict, imports from Kenya increased by 3.2% per year on average (holding prices and total expenditures constant). Post conflict, imports from Kenya decreased by 2.1% per year on average. The only other significant difference was trend elasticity for ROW which became significantly positive after the conflict.

6. Summary and Concluding Remarks

African agriculture has been severely undercapitalized, starving for much needed investments to structurally transform the sector and create linkages to ensure growth and competitiveness in the value chain. Recent Kenyan agricultural policies, especially the 2004 SRA, are credited with providing the enabling environment and incentives to transform agriculture as a commercial entrepreneurial activity with greater private sector investment, development of infrastructure, access to credit, inputs, training and markets. The flower industry has rapidly grown with huge outsourced investments by European entrepreneurs that account for a large share of European imports of roses to date. A key objective of this study is to determine if the December 2007 political conflict, following Kenya's presidential elections, may have caused EU rose importers to fundamentally shift their demand for Kenyan roses relative to other leading rose exporting countries such as Ecuador, other East African countries and the ROW.

Estimates for imported roses are obtained using the Rotterdam model, and demand elasticities are derived to assess the potential impacts of the Kenyan conflict on import demand parameters and the responsiveness of imports from Kenya and the other leading exporters of roses to the EU. The results reveal that the conflict caused EU importers to shift their response to Kenya's rose imports. Import demand projections yielded the following results. First, the effect of the conflict on EU demand for roses was immediate. Whereas prior to the conflict the

largest significant marginal share of EU real expenditures in rose imports was allocated to Kenya and the trend in rose imports from Kenya to the EU was significantly growing, in the aftermath of the conflict Kenya's marginal share of expenditure was insignificant and the trend in rose imports significantly declined. Also, Kenya is the only country where the trend elasticity is significantly negative during the post-conflict period. Specifically, the results show that whereas prior to the conflict, rose imports from Kenya increased by 3.2% per year on average, imports fell by 2.1% per year on average following the conflict. Moreover, the cross-price estimates indicate significant competition (substitution) between Kenyan roses and imports from Ecuador and other East African countries. However, the structural adjustment estimates in Table 4 suggest that Kenyan roses became significantly more sensitive to changes in EU expenditures following the conflict; implying that if EU buyers experience increase in their expenditures, Kenya may stand to benefit from greater imports and vice versa.

The Government of Kenya has provided leadership in garnering consensus in developing policies to revitalize the agricultural sector by promoting commercial ventures stemming from foreign outsourcing and investment by entrepreneurs from the EU that aim to serve as a catalyst for Kenya's economic development. However, as the study reveals, when faced with a politically risky environment, EU importers of roses avoided that risk by structurally shifting their demand to other competing markets.

Maintaining the flower industry's growth and trade competitiveness is crucial in advancing structural change in Kenya's economy that has traditionally depended on the agricultural sector (mainly tea and horticultural products) for foreign exchange. Therefore, despite its leading exporting status in roses to the EU, the Government of Kenya should take into consideration the immediate economic impacts of political instability on its growing and very

important flower sector. Whereas rose imports from other East African countries such as Ethiopia, Tanzania and Uganda may not pose an immediate competitive threat to Kenya for the EU market, the results reveal immediate substitution of roses from those African markets to the EU following the political violence. Moreover, rose production in the East African countries has been growing recently with growing investments by the same European entrepreneurs who appear to be seeking to diversify their investments in the region so as to potentially reduce risks and expand output; presumably enticed by similarly favorable policies, improving infrastructure, availability of suitable land and favorable climatic conditions. Therefore, any potential intransigence by the Government of Kenya in ensuring political stability may be costly in the form of potential future loss of market access and share in the global markets for its products.

Additionally, although not directly measured empirically, the destruction of agricultural land, crops and related infrastructure associated with the political violence may have long-term implications for environmental sustainability and in raising the costs for Kenya's economic transformation as well. Therefore, the Government of Kenya must take into consideration the potential long-term costs of political instability relative to short term benefits in conceptualizing a transformative development path that would address grievances associated with political instability. Additionally, although the flower industry continues to contribute to transforming the Kenyan economy, the Government of Kenya must ensure that it is well-managed in order to ensure environmental sustainability¹⁵ and to maintain a "greener" economy.

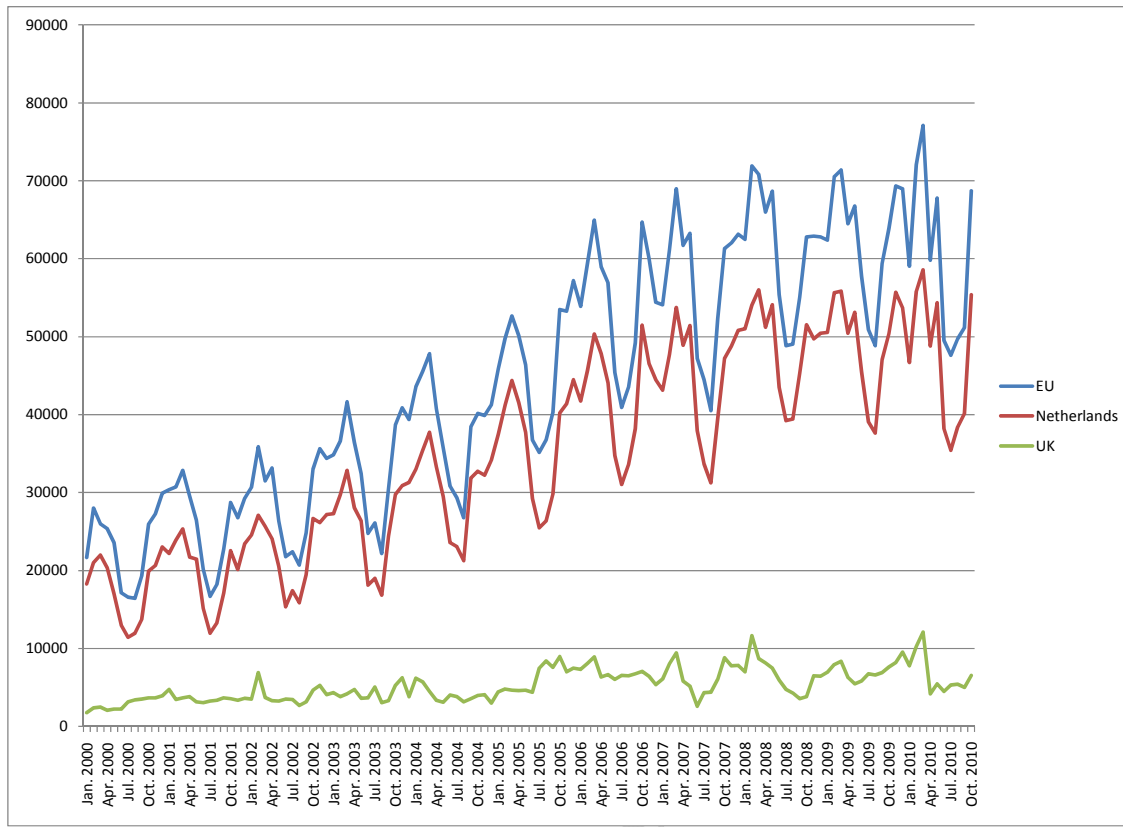
¹⁵ One anonymous reviewer decried the use of methyl bromide in fumigating the soil and chemicals which leads to eutrophication of the nearby water bodies such as Lake Naivasha.

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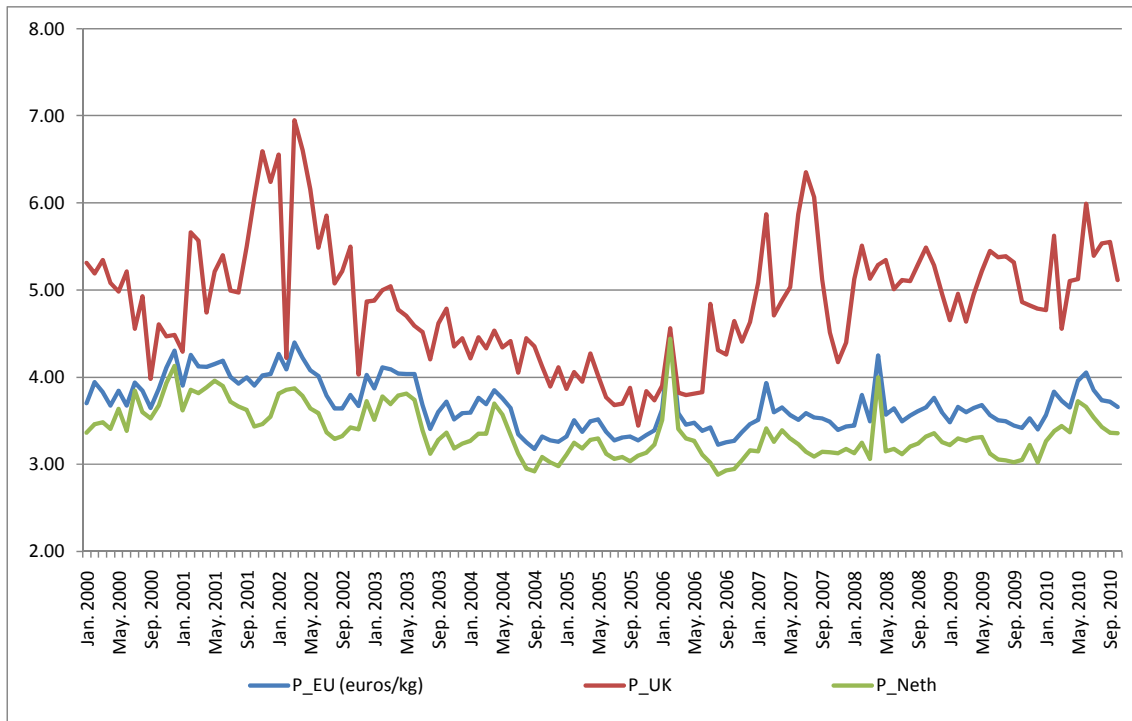
Figure 1. Quantity of EU Imports of Roses from Kenya (in 100 kg)



Source: Eurostat

Draft, not for publication

Figure 2. Prices of Roses in EU, UK and Netherlands (Euros per kg)



Source: Eurostat

Draft, not to

Table1. Summary Statistics for Model Variables: January 2001–December 2010

	Mean	Std. Dev.	Min.	Max.
Country	Monthly Quantity (kilograms)			
Ecuador	946,398	347,992	333,100	1,810,300
Kenya	4,705,073	1,534,441	1,667,900	7,711,800
East Africa	1,398,737	996,987	315,000	3,712,200
ROW	1,412,573	549,559	534,200	2,811,900
	Monthly Value (€)			
Ecuador	5,372,208	2,495,260	1,457,110	12,988,000
Kenya	17,128,900	5,451,303	6,679,374	28,743,400
East Africa	5,015,444	3,399,342	1,340,981	13,081,300
ROW	5,942,935	2,887,667	2,185,465	16,916,700
	Price (€/kilogram)			
Ecuador	5.519	0.755	2.463	7.795
Kenya	3.671	0.288	3.177	4.492
East Africa	3.811	0.551	2.838	5.479
ROW	4.131	0.644	3.028	6.185
	Market Share (%)			
Ecuador	15.49	3.18	9.51	24.50
Kenya	51.67	6.45	30.88	64.47
East Africa	13.99	6.26	4.71	30.02
ROW	18.86	8.97	7.53	42.31

ROW is the rest of the world. Std. Dev. is the standard deviation.

Table 2. Demand Estimates for EU Rose Imports

Parameter	Country			
	Ecuador	Kenya	East Africa	ROW
Trend (α_i)	-0.002 (0.002)	0.017* (0.004)	0.009* (0.002)	-0.023* (0.003)
Marginal Share (θ_i)	0.164* (0.029)	0.488* (0.049)	0.141* (0.024)	0.207* (0.034)
	Price Effects (π_{ij})			
Ecuador	-0.047* (0.013)	0.041* (0.019)	0.006 (0.010)	-0.001 (0.012)
Kenya		-0.123* (0.042)	0.038* (0.019)	0.044 (0.026)
East Africa			-0.025* (0.015)	-0.019 (0.013)
ROW				-0.025 (0.023)
	Structural Adjustment Estimates			
Trend (δ_i)	0.003 (0.004)	-0.028* (0.006)	0.005* (0.003)	0.020* (0.004)
Marginal Share (λ_i)	-0.017 (0.054)	0.095 (0.092)	0.051 (0.045)	-0.129* (0.064)

Homogeneity and symmetry are imposed on the price effects matrix.

Asymptotic standard errors are in parentheses. * Significance level ≤ 0.10 .

AR(1) parameter = 0.440

Table 3. Hicksian (Conditional) Price Elasticities of Import Demand

Quantity\Price	Ecuador	Kenya	East Africa	ROW
Ecuador	-0.300(0.085)*	0.081(0.037)*	0.046(0.073)	-0.003(0.061)
Kenya	0.265(0.120)*	-0.241(0.083)*	0.287(0.148)*	0.220(0.129)*
East Africa	0.039(0.062)	0.074(0.038)*	-0.191(0.115)*	-0.093(0.064)
ROW	-0.004(0.079)	0.087(0.051)*	-0.142(0.098)	-0.124(0.113)

Asymptotic standard errors are in parentheses. * Significance level ≤ 0.10 .

Table 4. Trend and Expenditure Elasticities and Structural Change

Country	2001:1- 2007:12	2008:1- 2010:12	2001:1-2007:12	2008:1-2010:12	Difference
	Market Share (%)		Expenditure Elasticity		
Ecuador	15.04	16.01	1.091(0.192)*	0.920(0.285)*	-0.170(0.344)
Kenya	52.35	52.37	0.932(0.094)*	1.112(0.149)*	0.181(0.175)
East Africa	10.31	20.70	1.368(0.235)*	0.929(0.185)*	-0.438(0.298)
ROW	22.30	10.92	0.929(0.154)*	0.711(0.495)	-0.217(0.517)
			Trend Elasticity		
Ecuador	15.04	16.01	-0.015(0.015)	0.004(0.018)	0.019(0.024)
Kenya	52.35	52.37	0.032(0.008)*	-0.021(0.010)*	-0.053(0.012)*
East Africa	10.31	20.70	0.086(0.019)*	0.069(0.012)*	-0.017(0.022)
ROW	22.30	10.92	-0.105(0.012)*	-0.034(0.032)	0.071(0.034)*

Asymptotic standard errors are in parentheses. * Significance level ≤ 0.10 .