The impact of the EU-GSP scheme on horticultural exports from Kenya, Tanzania and Uganda: A preference Margin approach

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Abstract

We evaluate the impact of the Generalised System of Preferences (GSP) on horticultural exports from Kenya, Tanzania and Uganda to the European Union. The preference margin, computed as the difference between trade-weighted Most Favoured Nation's (MFN) rate and the Ad Valorem Equivalents (AVEs) is used to proxy for the GSP scheme. Zero Inflated Poisson estimator is used to control for over-dispersion and excess zero trade flows while time invariant effects control for heterogeneity. Findings show that the GSP scheme promotes banana, beans and pepper exports from Uganda; and beans from Tanzania. Conversely, the scheme seems not to enhance asparagus and bean exports from Kenya to the EU.

Key words: Ad Valorem equivalent, Preference margin, Panel data, Gravity model, Fruit and vegetable exports

JEL classification: Q17, C33

Introduction

The United Nations Conference on Trade and Development (UNCTAD) (2008) argues that the export-driven growth of horticulture has been impressive in many African countries South of the Sahara. Furthermore, it is noted that the horticulture sector has greatly contributed towards poverty alleviation and rural development given that it involves a large number of small-scale growers who produce Fruits and Vegetables (F&V) for export. Minot and Ngigi (2004) opine that the sector is seen as the "African Success Story". Among other factors, Cardamone (2011) attributes such success to the non-reciprocal preferential trade policies granted by the European Union (EU) to developing countries so as to enhance economic growth and development through trade.

Recent studies that evaluate the role of trade policies on trade flows of agricultural commodities (Emlinger *et al.*, 2008; Cipollina and Salvatici, 2008; 2009; 2010; Cirera *et al.*, 2011; Philippidis *et al*., 2011; Raimondi *et al.*, 2011; Cipollina *et al*., 2013) reveal that the use of a continuous variable, generally referred to as the preference margin is a more apt approach in estimating the effect of preferential treatment on trade flows rather than using a dummy variable. This approach builds on the various policy instruments, *viz*: tariffs, quotas and entry prices embedded within the preferential treatment under consideration. Existing

literature based on preference margin measures provides conflicting findings about the role of preferential trade policies on trade flows.

Literature depicts that preferential trade policies, particularly the Generalised System of Preferences (GSP) selectively promotes trade flows of horticultural commodities into the EU market (*see*: Emlinger *et al.*, 2008; Cipollina and Salvatici, 2008; 2009; 2010; Cardamone, 2011; Cirera *et al.*, 2011; Philippidis *et al.*, 2011; Raimondi *et al.*, 2011; Cipollina *et al.*, 2013). Ardently, Cirera *et al.* (2011) and Raimondi *et al.* (2011) posit that the impact of a given non-reciprocal trade policy largely relies on the method used to measure it. In addition, none of the mentioned studies came across uses a combination of all the policy instruments (MFN, Tariff rates, Specific duties) embedded within the EU-GSP scheme to compute the preference margin, yet ignoring any of them jeopardizes the true value of the margin.

Therefore, the various preferential margin measures used to proxy the impact of the EU GSP scheme, under the gravity model framework do not provide an apt estimation of the effect of the GSP scheme on trade flows into the EU market. In addition, some studies (e.g. Cipollina *et al*., 2013) did not focus on particular commodities yet preferential treatments are tailored to suit different commodities with differing accruing benefits. Thus, the existing findings may not be apt to generalize the impact of the EU GSP scheme on agricultural exports to the EU. Thus, there exists in a knowledge gap regarding the impact of the GSP scheme on horticultural exports from developing countries (especially; Kenya, Tanzania and Uganda) to the EU. In this study, we use an augmented gravity model based on highly disaggregated data (HS-6 Digit level) to estimate the impact of the EU GSP scheme on selected horticultural exports from Kenya, Tanzania and Uganda to the EU market. It is thus hypothesized that the EU GSP scheme boosts exports of horticultural commodities from Kenya, Tanzania and Uganda to the EU.

To differ from Cipollina and Salvatici (2009), Cardamone (2011) and Cipollina *et al.* (2013), we consider Asparagus, bananas, beans, peppers and vegetables. The study is based on recent panel data from 2005 until 2011. Previous studies focussed on horticultural commodities like grapes, apples, pears, oranges and mandarins which are of less economic importance to Kenya, Tanzania and Uganda. According to Lubinga (2014), Asparagus, bananas, beans, peppers and vegetables considered in this study exhibit high export competitiveness within

the EU market. Furthermore, the specified model employs a preference margin measure that takes into account of world price (Most Favoured Nation rate (MFN)), ad valorem tariffs and specific duties; and we use advanced estimation techniques that take care of over-dispersion and the excess zero trade flows that are a key feature of highly disaggregated data.

The rest of the paper is organised as follows. Section 2 provides a brief overview of related literature while section 3 presents an insight of trends in trade of Asparagus, bananas, beans, peppers and vegetables. Section 4 describes the methodology used. Section 5 presents the results and discussions while section 6 provides the conclusion and policy implications

1. Literature review

Literature based on different methods of quantifying the value of preference margin indicates that the EU GSP scheme has both positive and negative effects on agricultural exports from developing economies to the EU. The effects of the scheme vary depending on the commodity under consideration and probably the exporting country. Within the gravity model framework, studies (*see*, Emlinger *et al.*, 2008; Cipollina & Salvatici, 2008b; Aiello & Demaria, 2009; Cardamone, 2009; 2011; Cipollina & Salvatici, 2010; Cirera *et al.*, 2011; Raimondi *et al.,* 2011; Cipollina *et al.*, 2013) reveal that the GSP scheme enhances exportation of agricultural commodities to the EU, irrespective of the method used to compute the Preference Margin (PM).

For instance, Cardamone (2011) expressed the PM in absolute terms, as the difference between the applied MFN duty minus the preferential tariffs, while Cardamone (2009) calculated the PM value as the variation between the uppermost tariff applied by the EU and the duty paid by an exporter for a given product. On the other hand, Cirera *et al.* (2011) used relative PM, computed as the ratio of absolute PM to the applied MFN rate. The author also took into account of the possible alternative versions of the MFN rate. Raimondi *et al.* (2011) expressed PM as the percentage difference between the tariff encountered by an MFN exporter and the Tariff Rate Quota Equivalent faced by the beneficiary country when it exports to the EU.

Cipollina and Salvatici (2008b; 2010) used a relative measure of PM, defined as the ratio of the maximum applied duty to the applied duty while Cipollina *et al.* (2013) used relative PM, denoted as the ratio of duties paid by all exporting countries to the applied tariff rate

subjected to each exporter within the EU market. On the contrary, Aiello and Demaria (2009) measured the relative PM as the ratio between the PM and the MFN rate. Noticeably, the PM was the difference between the MFN tariff and the preferential tariff.

2. Export trends of horticultural commodities from Kenya, Tanzania and Uganda

Over the past two decades, the volume of global agricultural trade from the East African economies has been increasing and it largely comprises of high-value products such as horticultural products (FAOSTAT database, 2014). According to Molloy (2014), horticultural exports from Africa rose from US$ 1.51 billion to US$ 9.74 billion, reflecting a rise of more than six folds within one decade (2001-2011). Figure 1 reveals that Kenya is the number one exporter of fruits and vegetables followed by Tanzania and then Uganda, in that order.

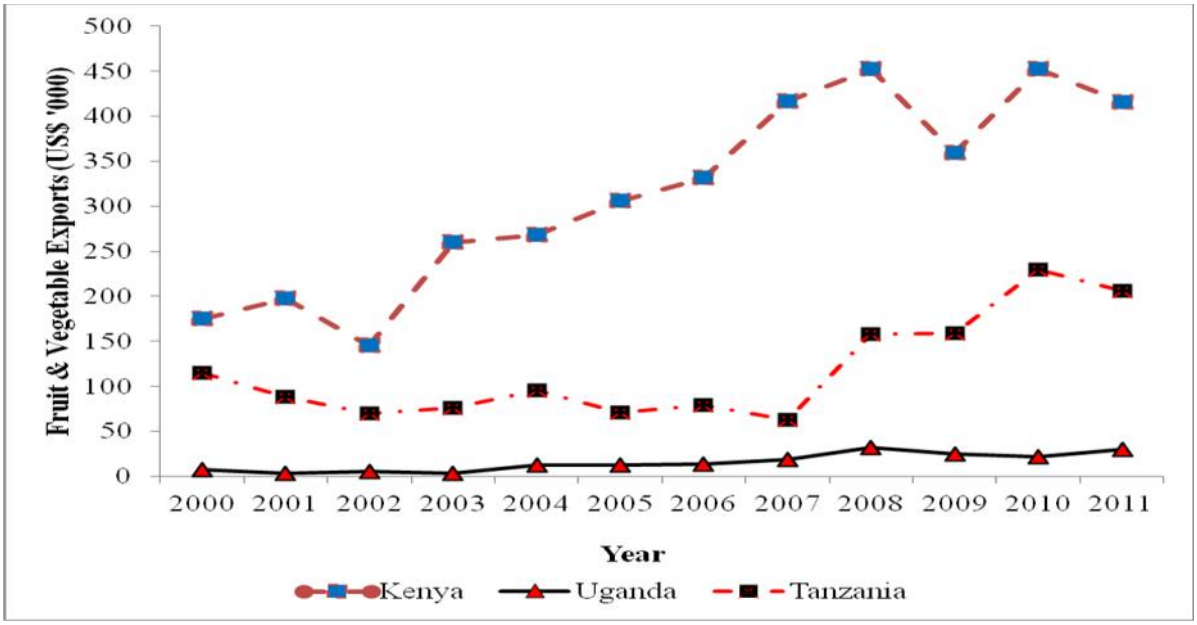

Figure 1 shows a general trend of fruit and vegetable exports from the three East African state

Source: FAOSTAT database (2014)

During the 12 years' period (2000-2011), Kenya's fruit and vegetable exports were on average valued at US$ 315.3 million while the value of Tanzania's and Uganda's exports were US$ 117.7 million and US$ 15.4 million, respectively. Kenya experienced a drastic rise in exports after 2002 (US$ 145.9 million) and by 2008 (US$ 453.2 million) the growth rate in exports was estimated at 66 per cent. Similarly, Uganda and Tanzania also registered gradual

increases in fruit and vegetable exports but the trend for Tanzania exhibits more fluctuations over time.

Fruit and vegetable exports destined to the EU mainly go to specific ethnic markets. Figure 2 below shows the trend in fruit and vegetable exports by value from Kenya to the EU. Unlike vegetable exports, fruits exhibit a lower gradual increase. A drastic rise in the value of vegetable exports was observed between 2002 (US$ 134.8 million) and 2008 (US$ 289.1 million), representing a 53.4 per cent increase. The highest value of vegetable exports (US$ 289.1 million) to the EU was registered in 2008.

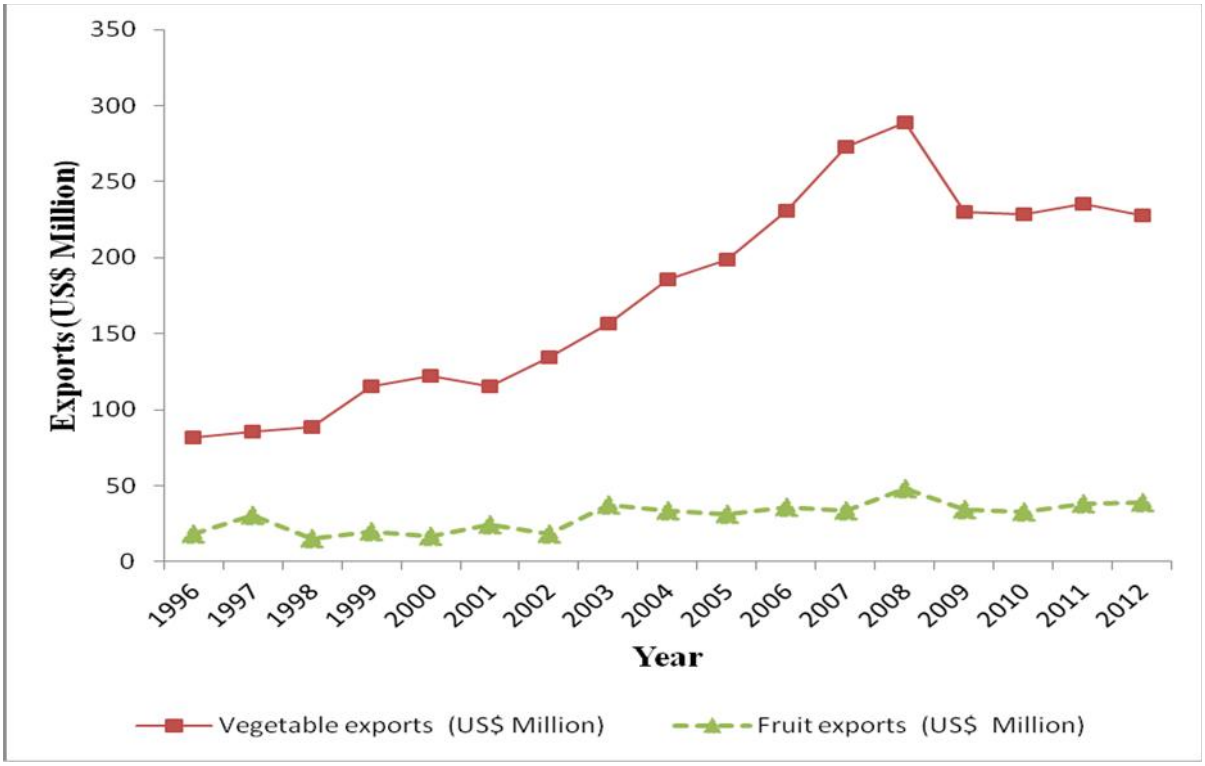

Figure 2: Kenya's fruit and vegetable exports to the EU, by value
***Source*:** COMTRADE database (2014)

Generally, Kenya's vegetables destined for the EU generate more foreign exchange than fruits. The value of Kenya's fruit exports to the EU was also highest in 2008 (US$ 48.4 million), while the lowest (US$ 15.5 million) was experienced in 1998. By 2009, exports in both fruits and vegetables declined by 41.9 per cent and 25.5 per cent, respectively.

For Tanzania, Figure 3 shows that EU-bound fruit exports gradually increased over the years, with a sharp rise between 2006 and 2009. During the 1996–2012 period, Tanzania exported fruits worth US$ 4.3 million, on average, with the lowest value in 1996 (US$ 0.45 million) and highest value in 2009 (US$ 14.2 million). From 2007, fruit exports brought more foreign currency into Tanzania than vegetables did. Between 2007 and 2012, EU-bound fruit exports were worth US$ 11.1 million, on average, while vegetables were worth US$ 7.5 million only. The figure also shows that the value of Tanzania's vegetable exports often fluctuated between 1996 and 2012. Generally, the value of Tanzania's vegetable exports to the EU varied greatly between 1996 and 2012. The highest value of vegetable exports was registered in 2004 (US$ 14.1 million) while the lowest was US$ 2.2 million in 2000.

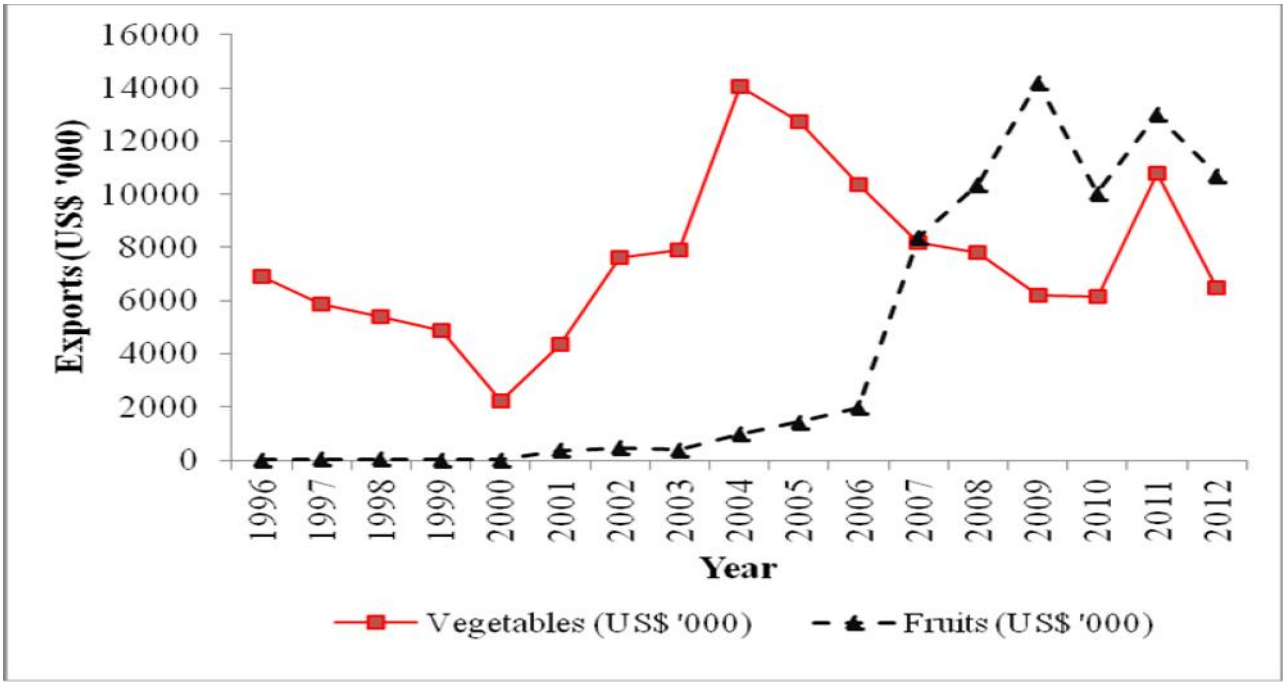

Figure 3: Tanzania's fruit and vegetable exports to the EU, by value

***Source*:** COMTRADE database (2014)

Figure 4 shows that the value of Uganda's fruit and vegetable exports to the EU has increased over time. Based on mean values, Uganda received more foreign currency from vegetable (US$ 4.71 million) than fruit exports (US$ 2.41 million) between 1996 and 2012. Vegetable exports were highest in 2011 (US$ 7.32 million) and lowest in 1996 (US$ 1.41 million). Despite the general increasing trend, the value of vegetable exports dropped sharply from

US$ 6.8 million in 2005 to US$ 4.9 million in 2006. The value of fruit exports rose sharply from US$ 0.572 million in 2003 to US$ 6.32 million in 2008, but by 2010 (US$ 4.4 million), a drastic 30 per cent decline had been registered.

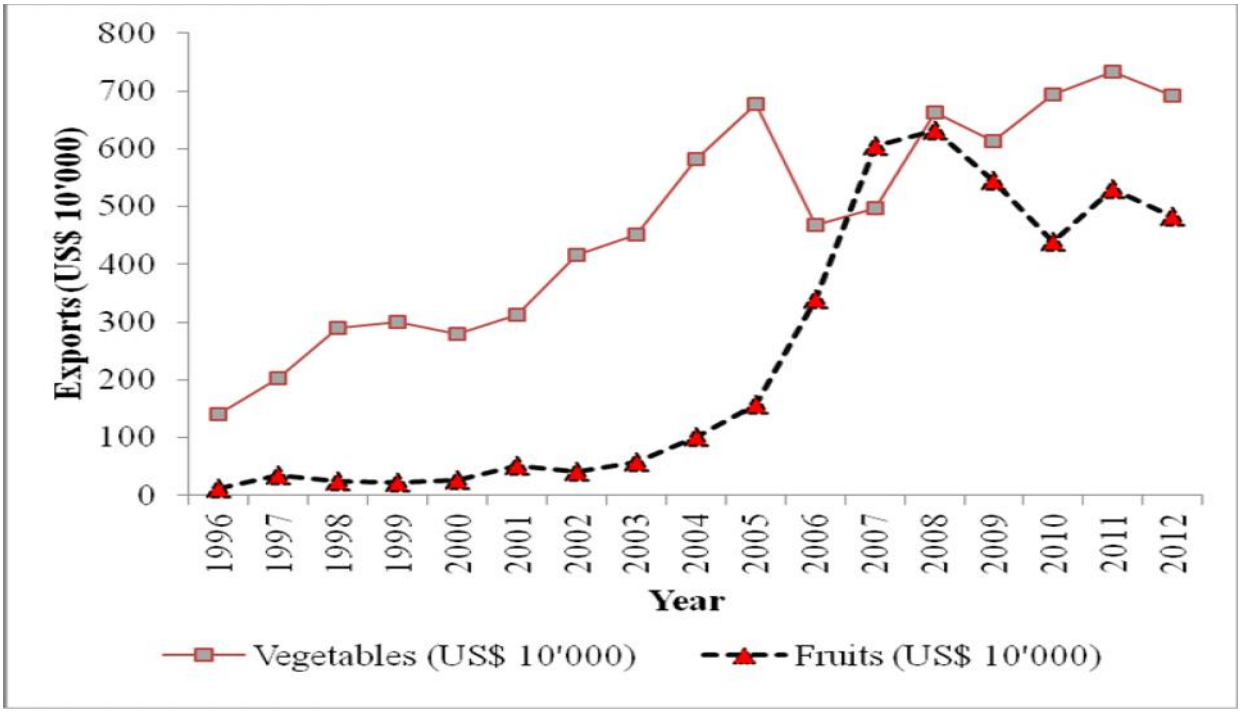

Figure 4: Uganda's fruit and vegetable exports to the EU, by value
***Source*:** COMTRADE database (2014)

A critical evaluation of competitiveness of horticultural exports from the East African states by Lubinga (2014) shows that asparagus, beans, bananas, vegetables and peppers among others perform well in the EU. Figure 5 shows that Kenya exported more beans than asparagus. On average, beans exports earned Kenya US$ 111.4 million as compared to asparagus (US$ 2.53 million) between 2000 and 2011. Highest earnings from exports were in 2008 (US$ 162 million for Beans and US$ 0.73 million for Asparagus).

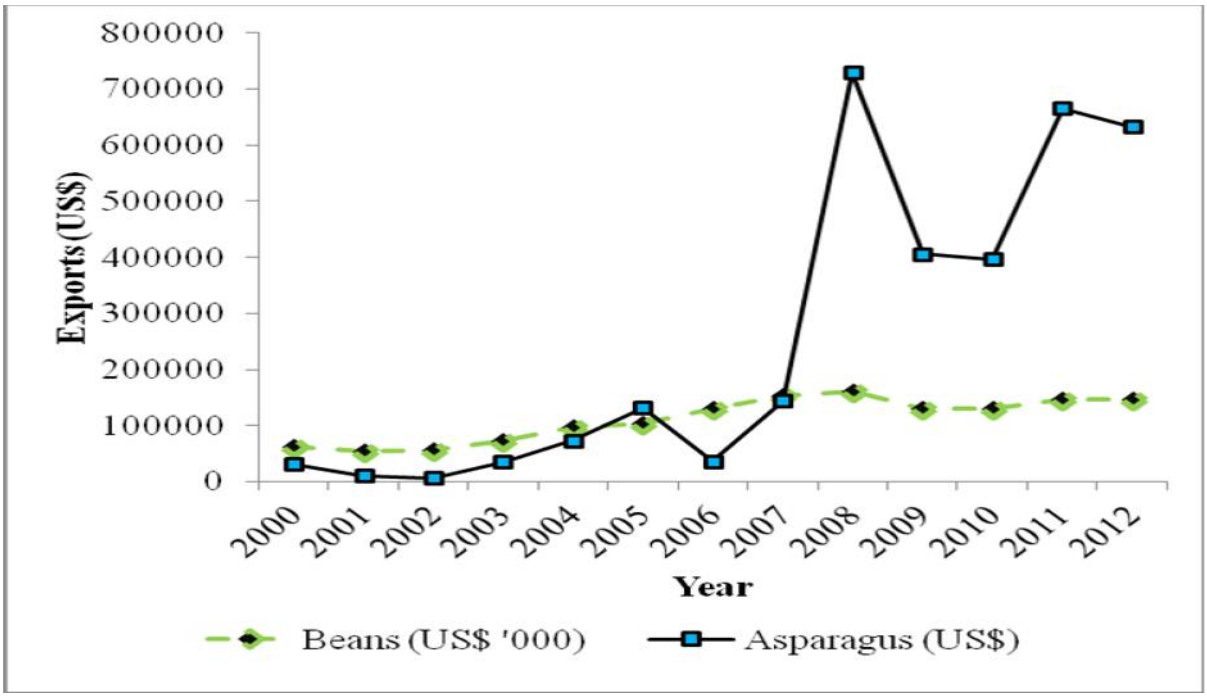

Figure 5: Kenya's top 2 competitive fruit and vegetable exports in the European Union

Source: COMTRADE database (2014), Lubinga (2014)

Similarly, bean exports from Tanzania outweighed other vegetables (070990) as illustrated in Figure 6. On average, bean exports accounted for more than US$ 2.4 billion while the value of vegetables was worth US$ 0.599 billion.

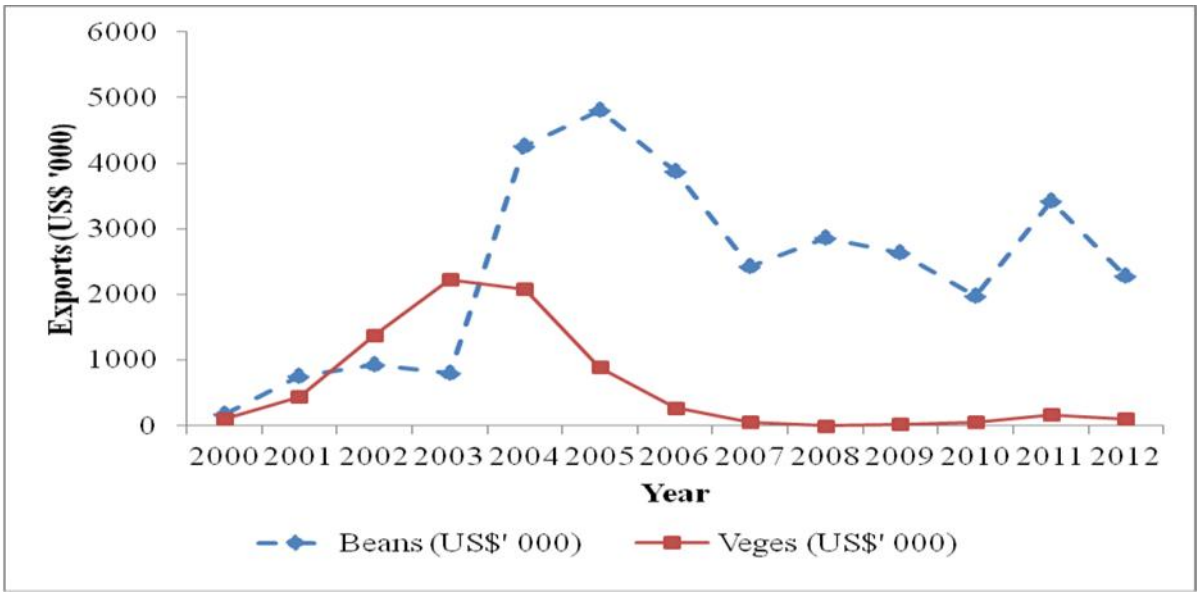

Figure 6: Tanzania's top 2 competitive fruit and vegetable exports in the European Union

Source: COMTRADE database (2014), Lubinga (2014)

For Uganda, an illustration of the trend of the three most competitive fruit and vegetable exports in the European Union is presented in Figure 7. The figure shows that Uganda exported more pepper, by value to the EU followed by bananas and then beans. During the ten years period (2002-2011), pepper exports were on average valued at US$ 2.4 billion while bananas were worth US$ 1.9 billion. Bean exports were valued at US$ 58.07 thousand over the same period.

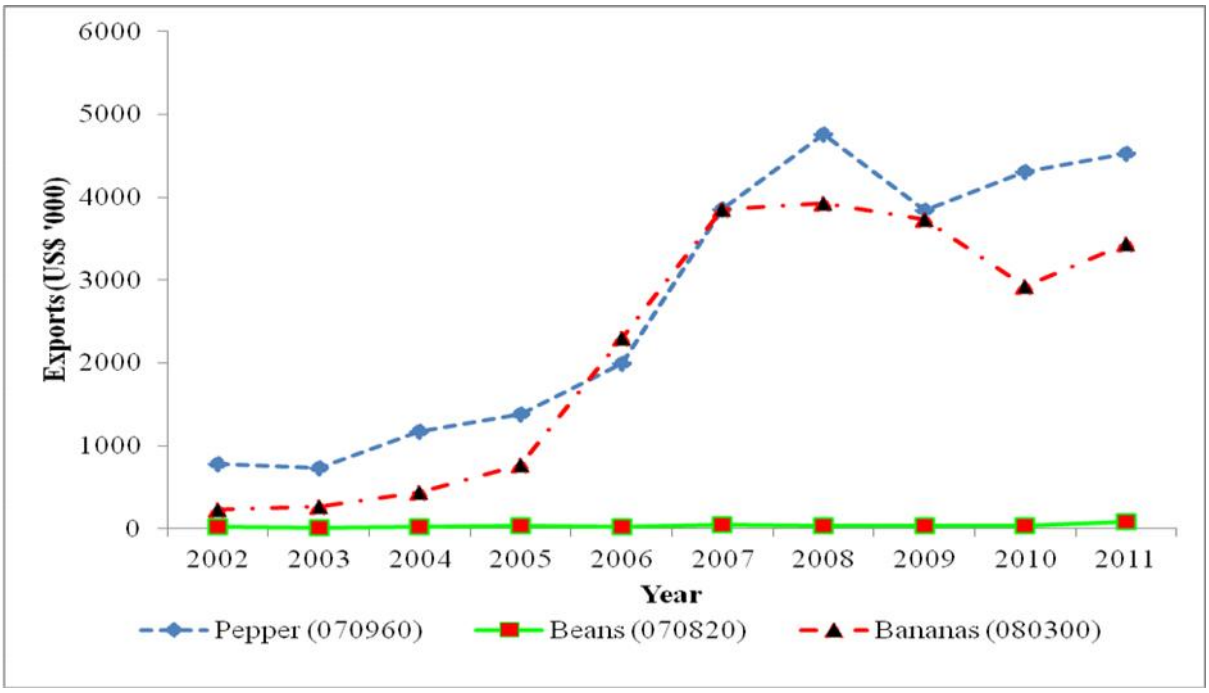

Figure 7: Uganda's top 3 competitive fruit and vegetable exports in the European Union
Source: COMTRADE database (2014), Lubinga (2014)

While the EU is the key market for fruit and vegetable exports all the East African state, there are other markets, namely; the Common Market Eastern and Southern Africa (COMESA), the Middle East, as well as the East Asia Community countries. Table 1 shows the main F&V export destinations, disaggregated by value of imports by the leading trade partners as by the end of 2011.

Table 1: Key export markets for fruits and vegetables from Kenya, Tanzania and Uganda (2011)

Export Market	Exporter	Top 2 partners in the market	Total value ('000 US$)
EU-27*	Kenya	United Kingdom	155,491
		Netherlands	38,311
	Tanzania	Netherlands	11,535
		United Kingdom	2,376
	Uganda	United Kingdom	3,765
		Netherlands	860
Middle East	Kenya	UAE	19,553
		Saudi Arabia	4,401
	Tanzania	United Arab Emirates	6,626
		Saudi Arabia	751
	Uganda	Oman	117
		Bahrain	59
COMESA	Kenya	Uganda	944
		Sudan	513
	Tanzania	Kenya	50,204
		Rwanda	1,294
	Uganda	Kenya	11,127
		Sudan	2,705

EU-27* denotes the 27 members of the European Union.
UAE denotes United Arab Emirates

Source: International Trade Center (ITC) database (2013)

3. Methodology

4.1 The specified model

In our study, the specified model was based the gravity flow model, pioneered by Tinbergen (1962) and Poyhonen (1963). Despite the fact that the model was initially criticised for lacking theoretical foundations (Cardamone, 2011), it has received a lot of attention coupled with enormous modifications (*see*; Linnemann, 1966; Anderson, 1979; Bergstrand, 1985; 1989; Oguledo & Macphee, 1994; Frankel *et al*., 1995; Le *et al.*, 1996; Deardorff, 1998; Anderson & van Wincoop, 2003). To date, it is recognised as the utmost authoritative tool in predicting trade flows (Anderson, 1979).

Therefore, our specified model, based on panel data for a period of seven years was expressed as;

$$Q_{ijlt} = Z + \sim PM_{ijlt} + \ll_{j} + a_{ijlt} \quad \text{.....(1)}$$

(i = Kenya, Tanzania & Uganda; j = 15 EU-member states; t = 2005-2011)

Where Q_{ijlt} is value of commodity l from country i within the East African Community (EAC) to country j within the EU in year t in thousand US Dollars. To take into consideration of zero trade flows, the dependent variable (Q) is expressed in a semi-log form since the natural logarithm of zero is undefined. β represents a vector of parameter estimates. With the exception of the dummy variables and the importer time-invariant effects, all the other covariates were transformed into natural logarithms. α represents parameter estimate for preferential margin (PM_{ijlt}) for a given horticultural commodity l.

Z denotes a vector of various independent variables and these include:- real Gross Domestic Product (GDP) for each country i and j in US Dollars; distance between the economic centres of EAC member states (Nairobi for Kenya, Dodoma for Tanzania and Kampala for Uganda) and their j^{th} trading partner's commercial centre in Miles; mean annual inflation rate; trade facilitation indicators; foreign direct investment in US Dollars; a dummy variable ($DLang_{ij}$) that captures similarity in speaking a common official language between any pair of trading partners between country i and EU-15 member state j. μ_j denotes importer time-invariant effects while λ_{ijlt} is the idiosyncratic error term.

Following Aiello and Demaria (2009), heterogeneity across countries was controlled by use of both a dummy variable ($DLang_{ij}$) and importer time-invariant effects (μ_{ij}). The dummy variable was used to overcome heterogeneity due to apparent factors while unobservable heterogeneity was controlled by augmenting the model with time-invariant effects variable (μ_{ij}). Endogeneity bias, associated with the use of a combined variable to capture the effect of the EU-GSP scheme was minimised by using highly disaggregated data (*See*: Cipollina & Salvatici, 2008a; Anderson & Neary, 2005; Cardamone, 2011).

To differ from the previous studies (Cipollina and Salvatici, 2010; Cardamone, 2011; Raimondi *et al.,* 2012; Cipollina *et al.,* 2013), the computation of the Preference Margin

(PM) for each horticultural commodity was based on a combination of trade-weighted applied MFN rates, ad valorem tariff rates, specific duties. The trade-weighted applied MFN rate takes into account of the global competitors at tariff line level and the weights were based on reference group imports. In this context Kenya's, Tanzania's and Uganda's reference group is the set of all countries categorised as the Least Developed Countries (LDCs). These countries are granted similar preferential treatment within the EU market; hence they compete at that same level. The use of a combination of these trade policy instruments embedded within the EU GSP scheme enhances the verification of advantages or disadvantages associated with the scheme (Fugazza & Nicita, 2010).

However, given that all these instruments cannot be directly compared or summed (Bouët *et al.*, 2004), it implies that they cannot be used in large-scale modelling exercises without being transformed in one way or the other. For the purpose of this study, Ad Valorem Equivalents (AVEs) computed by combining ad valorem tariffs and specific duties were used. An ad valorem equivalent (AVE) refers to a tariff presented as a proportion of the value of goods cleared through customs (Gibson *et al.*, 2001; Bouët *et al.*, 2004). Data for AVEs was obtained from TRAINS database. Thus, for each selected horticultural commodity, competition-adjusted Preferential Margin (PM) computed as the absolute difference between the trade weighted applied MFN rate and the Ad valorem Equivalents (AVEs) was expressed as:

$$\text{Preference Margin } (PM_{ijlt}) = \text{Trade-weighted applied MFN rate}_{jlt} - AVE_{ijlt} \quad \ldots\ldots\ldots\ldots\ldots (2)$$

Where, AVE denotes that Ad Valorem Equivalent of commodity *l* from country *i* to country *j* in year *t*.

4.2 Data and data sources

Panel data spanning a period of seven years (2005 - 2011) for Kenya, Tanzania, Uganda and 15 member states of the European Union (*See*: Appendix II) were used. In totality, seven horticultural commodities (*see* Table 2) were purposively selected from the three East African countries. According to Lubinga (2014), the selected commodities exhibit export competitiveness within the EU market.

Table 2: Selected horticultural exports with high competitiveness in the EU

Country	HS 6- Digit code	Commodity description	Mean RCA
Kenya	070920	Asparagus, fresh/chilled	8,504.32
	070820	Beans (Vigna spp., Phaseolus spp.)	3.70
Tanzania	070990	Vegetables, n.e.s. in 07.01-07.09 fresh/chilled	24.60
	070820	Beans (Vigna spp., Phaseolus spp.)	2.23
Uganda	070960	Fruits of the genus Capsicum/ Pimen	27,668.87
	080300	Bananas, including plantains, fresh/dried.	25.98
	070820	Beans (Vigna spp., Phaseolus spp.)	1.23

Adapted from Lubinga (2014)

The highly disaggregated trade flow data (*at HS-6 Digit level*) was obtained from Comtrade database while data used to compute the PM was obtained from the TRAINS database. Other data sources used include: the World Bank Development Indicators (WBDI) database (2013), and the world atlas.

4.3 Diagnostic tests

Highly disaggregated panel data is highly vulnerable to excessive zero values and over-dispersion (*see*: Linders & De Groot; 2006; Silva & Tenreyro; 2006; Helpman *et al*., 2008; Martin & Pham, 2008; Proenca *et al*., 2008; Burger *et al*., 2009; Martijn *et al.*, 2009; Siliverstovs & Schumacher, 2009). Thus, other than the commonly used diagnostic tests (unit root and collinearity tests) for analysis based on panel data, we also carried out the normality and over-dispersion tests so as to determine the properties of the series for the dependant variable before estimating the specified gravity model.

For the unit root and collinearity, the Levin–Lin–Chu (2002) and Pearson's correlation tests were used respectively. However, details about these test are not illustrated in this paper. The normality test and the over-dispersion test were used to examine if the series for the dependent variable (trade flows of a given commodity) defied the normal distribution and equi-dispersion assumptions, respectively. Following Stata FAQ (2013) a simple histogram was used to show the distribution pattern of the various series.

On the other hand, over-dispersion refers to a condition where the conditional variance by far deviates from the conditional mean (Burger *et al.*, 2009; Martijn *et al.*, 2009; Siliverstovs & Schumacher, 2009) and existence of such a discrepancy leads to consistent but inefficient estimates. According to Stata FAQ (2013), statistical theory under the Poisson distribution assumes that the mean and variance are the same. Thus, a large deviation between the mean and the variance implies supportive evidence for the existence of over-dispersion within the series. In order to ascertain if the data was overly dispersed, descriptive statistical analysis was carried out.

4.4 Estimation technique

The specified gravity model for the various horticultural commodities was estimated by means of the Zero Inflated Poisson estimator (ZIP). The ZIP is a modified form of the Poisson model, which derives it originality from the analysis of count data. In general, Poisson models can only be used on positive continuous variables (Wooldridge, 2002). It is further noted that ZIP is not susceptible to heteroskedasticity and can ably deal with excessive zero valued trade flows. The model's invulnerability against such major drawbacks associated with highly disaggregated trade data is attributable to the fact that it generates actual estimates of trade flows using the log-linear rather than the log-log function (Martijn *et al.*, 2009). The use of the log-linear prevents the under-prediction of large trade flows and total trade volumes, hence the predicted values estimated by this model are almost identical to the actual input data.

Anderson and Van Wincoop (2003) affirm that the ZIP estimator is grounded on two assumptions; (1) that the actual trade volume between countries *i* and *j* has a conditional mean (ϕ_{ijlt}), which is a function of the independent variables, and (2) that the conditional variance of the dependent variable equals to its conditional mean (equidispersion). Thus, given that trade flows of commodity *l* from country *i* to *j* (Q_{ijlt}) are assumed to have a non-negative integer value, the exponential of the independent variables can be taken, such that the conditional mean (ϕ_{ijlt}) between country *i* and *j* is zero or positive.

Within a population, the ZIP estimator accounts for two latent groups. That is, (*i*) a group with strictly zero counts, and (*ii*) a group with a non-zero probability of having counts other than zero (Martijn *et al.*, 2009). In that regard, the estimation process consists of two parts,

viz: (*i*) the logit or probit regression which indicates the probability of complete non-existence of trade flows, and (*ii*) a Poisson regression part, which shows the probability of each count for the group that has a non-zero probability or interaction intensity other than zero.

Based on our specified model in equation (1), the logit or probit regression is specified as;

$$\Pr\left[Q_{ijlt}\right] = \text{´}_{ij} + \left(1 - \text{´}_{ij}\right)\exp\left(-\text{¤}_{ijlt}\right) \quad \text{.....(3)}$$

while the Poisson regression is expressed in equation 4

$$\Pr\left[Q_{ijlt}\right] = \left(1 - \text{´}_{ij}\right)\exp\frac{\left(-\text{¤}_{ijlt}\right)\text{¤}_{ijlt}^{Q_{ijlt}}}{K_{ijlt}^{!}}, \quad \text{.....(4)}$$

where $\phi_{ijlt} = \exp\left(Z \text{~} PM_{ijlt} \text{«}_{ij} \text{a}_{ijlt}\right)$, K is the vector of all covariates, while ´_{ij} is the proportion of observations with a strictly zero count ($0 \leq \text{´}_{ij} \leq 1$).

4. Results and discussion

5.1. Diagnostic test results

Empirical results based on the normality test (*Appendix* 1) and over-dispersion test (Table 3) reveal that all series of the selected horticultural commodities defied the assumptions of normal distribution and equi-dispersion, respectively. In addition, the data sets exhibited a high level of zero valued trade flows. Thus, ordinary estimators like the OLS and the Poisson model were inapt estimators.

Table 3: Over-dispersion test results for the selected horticultural commodities

Country	HS 6-Digit code	Commodity description	Mean ('000 US$) (n=105)	Variance
Kenya	070820	Beans (Vigna spp., Phaseolus spp	9,488.14	4.68e+08
	070920	Asparagus, fresh/chilled	22.10	8,017.33
Tanzania	070820	Beans (Vigna spp., Phaseolus spp.)	210.14	353,270.4
	070990	Vegetables, n.e.s. in 07.01-07.09 fresh/chilled	13.88	8,393.40
Uganda	070820	Beans (Vigna spp., Phaseolus spp.)	2.67	64.85
	070960	Fruits of the genus Capsicum (Pepper)	257.82	422,124
	080300	Bananas, including plantains	200.11	373,606

***Source*:** Author's calculations

Series of all the other relevant covariates were found to be stationary. In addition, variables were found not to exhibit serial correlation for all the selected horticultural commodities. Stationarity and multi-collinearity test results are not presented in this paper but can be availed on request. Upon ascertaining that series for the dependent variable for each selected commodity abrogated the normality and equi-dispersion assumptions, coupled with the numerous zero valued trade flows the ZIP estimator was used to run the specified model.

Empirical results for the impact of the EU GSP scheme on the selected commodities are presented at country level. Results for Asparagus and Bean presented in Table 4 reveal that the EU GSP scheme does not boost exportation of these commodities from Kenya to the EU. At one percent level of significance, a unit fall in the preferential margin granted under the EU GSP scheme leads to a decline in the value of Kenya's asparagus and bean exports by US$ 2,460 ($p<0.01$) and US$ 280 ($p<0.01$), respectively. This observation may be attributed

to the stiff competition encountered from other exporters (*Colombia, Ecuador, Ethiopia, Morocco, Israel, and Egypt, among others*) with closely similar commodities to the EU (Government of Kenya, 2012). In addition, some of such countries also benefit from the preferential treatment.

Table 4: Effect of the EU-GSP scheme on Kenya's Asparagus and Bean exports

Dependent variable (M_{ijlt}) = Total value of commodity *l* from Kenya *i* to *j*th EU member state in year *t* in '000 US Dollars				
Variable	**Asparagus (070920)**		**Beans (070820)**	
	Coefficient	**p-value**	**Coefficient**	**p-value**
Constant	65.71		280.51***	
	(116.36)	0.572	(2.416)	0.000
Preference margin of a specific commodity, expressed as a share of the product value (lnPM$_{ijlt}$)	-2.46***		-0.28***	
	(0.186)	0.000	(0.019)	0.000
Exporter's Gross Domestic Product (GDP) in current US$ (lnY1$_{it}$)	6.15***		-0.07***	
	(0.312)	0.000	(0.010)	0.000
Importer's Gross Domestic Product (GDP) in current US$ (lnY2$_{jt}$)	1.56***		1.85***	
	(0.267)	0.000	(0.005)	0.000
Distance in miles between trading partners (lnD$_{ij}$)	-27.71*		-39.95***	
	(15.194)	0.068	(0.305)	0.000
Exporting country's mean annual inflation rate (ln$inflat_{it}$)	-0.17**		-0.05***	
	(0.068)	0.015	(0.003)	0.000
The cost of establishing a business, expressed as percentage of GNI per capita (lnCOSTBIZ$_{it}$)	-5.93***		-0.36***	
	(0.646)	0.000	(0.035)	0.000
Dummy variable for common language (=1, if share common language; = 0 otherwise) (Dlang$_{ij}$)	6.73***		15.51***	
	(1.863)	0.000	(0.078)	0.000
Vuong test (Z-value)	4.64***	0.000	3.25***	0.001
Fixed effects	Yes		Yes	
Number of observations (N)	105		105	
Nonzero observations (N_1)	30		77	
Zero observations (N_0)	75		28	
Log likelihood	-207.283		-22938.15	
Count data estimation technique used	ZIP		ZIP	

*******, ******, ***** denote significance at **1%**, **5%** and **10%** level respectively.

In addition, the negative results may be associated with the multiplicity of the high stringent standard requirements subjected to horticultural commodities entering Europe (e.g. GLOBALG.A.P and the British Retail Consortium (BRC) standard). Compliance to the continually changing standards comes along with exorbitantly high prohibitive investment costs, which directly delineate smallholder farmers from the international market (Aloui & Kenny, 2005; Augier *et al.*, 2005; Asfaw *et al.*, 2010; Kuwornu & Mustapha, 2013). The

negative results of the EU GSP scheme on Kenya's Asparagus and Bean exports concur with findings of (Asfaw *et al.*, 2010; Philippidis *et al,*, 2011). The coefficients of the other explanatory variables are found to be statistically significant and in tandem with the theoretical expectations of the gravity model.

For Tanzania, with the exception of the variable for distance (lnD_{ij}), parameter estimates of all the other covariates exhibit significant effects on vegetable exports to the EU and the variables were found to exhibit the expected signs (*See* Table 5).

Table 5: Effect of the EU-GSP scheme on Tanzania's Vegetables and Bean exports

Dependent variable (M_{ijlt}) = Total value of commodity *l* from Tanzania *i* to *j*th EU member state in year *t* in '000 US Dollars				
Variable	**Beans (070820)**		**Vegetables (070990)**	
	Coefficient	**p-value**	**Coefficient**	**p-value**
Constant	65.77***		141.73***	
	(4.590)	0.000	(46.579)	0.002
Preference margin of a specific commodity, expressed as a share of the product value ($lnPM_{ijlt}$)	1.01***		-0.09	
	(0.086)	0.000	(0.275)	0.739
Exporter's Gross Domestic Product (GDP) in current US$ ($lnY1_{it}$)	0.52***		-7.29***	
	(0.078)	0.000	(0.609)	0.000
Importer's Gross Domestic Product (GDP) in current US$ ($lnY2_{jt}$)	-0.23***		-2.43***	
	(0 .019)	0.000	(0.434)	0.000
Distance in miles between trading partners (lnD_{ij})	-7.92***		9.63***	
	(0.491)	0.000	(5.267)	0.000
Cost to exporting a 20-foot container in US$ per container ($lnCOSTEXP_{it}$)	-0.79***		-22.69***	
	(0.126)	0.000	(2.172)	0.000
The role of the public sector and government institutions, expressed as an index ($lnGOV_{it}$)	2.76***		8.05***	
	(0.132)	0.000	(0.823)	0.000
Dummy variable for common language ($Dlang_{ij}$)	3.01***	0.000	5.53***	0.000
	(0.041)		(0.910)	
Vuong test (Z-value)	6.51***	0.000	3.11***	0.001
Fixed effects	Yes		Yes	
Number of observations (N)	105		105	
Nonzero observations (N_1)	34		13	
Zero observations (N_0)	71		92	
Log likelihood	-4604.642		-86.123	
Count data estimation technique used	ZIP		ZIP	

***, **, * denote significance at **1%**, **5%** and **10%** level respectively.

Results for the variable of interest, preference margin (($\boldsymbol{ln}\mathbf{PM}_{ijlt}$) divulge that the EU GSP scheme significantly boosts the exportation of Tanzania's beans to the EU. A unit change in the preference margin granted under the scheme leads to a proportionate increase (US$ 1010, $p<0.01$) in the value of bean exports in the EU. Conversely, the effect of the EU GSP scheme on vegetable exports was indeterminate since the parameter estimate (-0.09) is insignificant. Tanzania's results relate with findings of Emlinger *et al.* (2008) and Cardamone (2009; 2011) who postulate that the influence of the EU GSP on horticultural exports to the EU varies depending on the type of commodity and where it originates from.

Uganda's analytical findings presented in Table 6 depict that the EU GSP significantly enhances exportation of bananas, beans and pepper to the EU. A one percent rise in the preferential margin granted under the EU GSP scheme leads to an increase in the value of Uganda's banana, bean and pepper exports by US$ 770 ($p<0.01$), US$ 3050 ($p<0.05$) and US$ 280 ($p<0.01$), respectively. This implies that the scheme plays a contributory role in promoting Uganda's exports of those particular commodities to the EU. Uganda's positive results closely relate with findings of Aiello and Demaria (2009), Cipollina and Salvatici (2009), Cirera *et al.* (2011) and Cipollina *et al.* (2013). These scholars consent that the EU GSP scheme promotes trade in an assortment of fruits and vegetables from developing countries.

Coefficients of all the other covariates used to model the effect of the EU-GSP scheme on Uganda's banana exports were found to be statistically significant, and exhibit the expected signs according to the gravity flow model framework. Similarly, with the exception of the dummy variable for common language **($\mathbf{Dlang}_{ij}$)**, the covariates used to evaluate the effect of scheme on bean exports were found to be in tandem with the theoretical expectations. The peculiar coefficient estimate (-3.14, $p<0.01$) for the common language dummy (**$\mathbf{Dlang}_{ij}$)** may be attributable to the fact that, among Uganda's major bean export destinations within the EU (*United Kingdom, Belgium, Netherlands and Denmark, in that order*), it is only the United Kingdom with whom Uganda shares a common official language (English).

Table 6: Effect of the EU-GSP scheme on Uganda's Banana, Bean and Pepper exports

Dependent variable (M_{ijlt}) = Total value of commodity *l* from Uganda *i* to *j*th EU member state in year *t* in '000 US Dollars						
Variable	Bananas (080300)		Beans (070820)		Pepper (070960)	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Constant	-7.77		1442.33***		-81.74***	
	(16.798)	0.644	(211.209)	0.000	(2.116)	0.000
Preference margin of a specific commodity, expressed as a share of the product value (lnPM$_{ijlt}$)	0.77***		3.05**		0.28***	
	(0.084)	0.000	(1.211)	0.012	(0.082)	0.001
Exporter's Gross Domestic Product (GDP) in current US$ (lnY1$_{it}$)	3.076***		-0.02		1.89***	
	(0.203)	0.000	(1.059)	0.986	(0.060)	0.000
Importer's Gross Domestic Product (GDP) in current US$ (lnY2$_{jt}$)	1.63***		6.64***		0.99***	
	(0.042)	0.000	(1.035)	0.000	(0.010)	0.000
Distance in miles between trading partners (lnD$_{ij}$)	-17.67***		-19.07***		1.99***	
	(1.857)	0.000	(27.662)	0.000	(0.194)	0.000
Exporting country's mean annual inflation rate (ln$inflat_{it}$)	-0.43***		0.15		-0.08***	
	(0.026)	0.000	(0.129)	0.256	(0.017)	0.000
Cost to exporting a 20-foot container in US$ per container (lnCOSTEXP$_{it}$)	-0.75***	0.000	-0.09	0.811		
	(0.070)		(0.365)		-	-
The role of the public sector and government institutions, expressed as an index (*from 1=low to 6= high*) (lnGOV$_{it}$)	1.57***		-5.05**		1.80***	
	(0.182)	0.000	(1.707)	0.003	(0.182)	0.000
Net inflow of foreign direct investment in current US$ (lnFDI$_{it}$)	2.08***	0.000				
	(0.086)		-	-	-	-
The cost of establishing a business, expressed as percentage of GNI per capita (lnCOSTBIZ$_{it}$)					-0.77***	
	-	-	-	-	(0.178)	0.000
Dummy variable for common language (=1, if share common language; = 0 otherwise) (Dlang$_{ij}$)	4.46***		-3.14***		1.98***	
	(0.110)	0.000	(1.017)	0.002	(0.022)	0.000
Vuong test (Z-value)	2.38***	0.009	9.65***	0.000	3.99***	0.000
Fixed effects	Yes		Yes		Yes	
Number of observations (N)	105		105		105	

Nonzero observations (N_1)	58	19	75
Zero observations (N_0)	47	86	30
Log likelihood	-803.596	-97.100	-8671.796
Count data estimation technique used	ZIP	ZIP	ZIP

*******, ******, ***** denote significance at **1%**, **5%** and **10%** level respectively.

The other countries which use English are Ireland and Luxerburg but existing data indicates that none of those countries ever imported beans from Uganda during the period (2005-2011) considered in this particular analysis.

In the case of Uganda's pepper exports, signs of all covariates were in concurrence with the theoretical expectations and statistically significant at all levels, except for the coefficient (1.99, $p<0.01$) on the distance variable **(lnD_{ij}).** This contradicting result may be explained by the argument postulated by Marimoutou *et al*. (2009), and André and Joel (2012) that distance seizes to matter if the trading partner's economic size (GDP) is very large relative to that of the exporting country. Furthermore, the positive sign may be explained based on Kuwornu and Mustapha (2013).

The authors argue that the variety of the crop produced greatly influences smallholder farmers' accessibility into the export market. In this regard, Uganda is renowned for producing highly favoured pepper (Scotch bonnet). This variety of pepper is characterized of an aromatic flavour and high pungency, which are great attributes for peppers. According to (Abdulla *et al.* 2008), the high pungency and aromatic flavor of the Scotch Bonnet presents a relative advantage over other varieties, given that these attributes are very desirable in a number of industries (*pharmaceuticals, foods and beverages*).

5. Conclusion and policy implications

Other than a dummy variable, we used a continuous count data variable (Preference margin)

based on the trade weighted applied Most Favoured Nation (MFN) rate and the Ad Valorem Equivalents (AVEs) to assess the role of the EU GSP scheme on selected horticultural exports from East African economies to the EU. By using the gravity model framework, our analysis was based on highly disaggregated data at HS-6 digit level spanning from 2005 to 2011.

Empirical results suggest that the EU GSP scheme selectively boosts exportation of certain horticultural commodities to the EU, depending on the country of origin. That is, the scheme promotes banana, bean and pepper exports from Uganda and beans from Tanzania. On the contrary, it does not enhance asparagus and bean exports from Kenya. The mixed results (positive and negative) are consistent with findings of other scholars.

Policy wise, evaluation of the influence of non-reciprocal preferential trade agreement(s) granted to developing countries, based on preferential margin should always take into account of all the various instruments (*MFN rate, tariff rates and specific duties*) embedded within the agreement, and competition from other suppliers that fall within the same category. Omission of any of the instruments may in most cases lead to over-estimation of the accruing benefits.

In our study, computation of the preference margin relied on all the policy instruments embedded within the EU GSP scheme. No considerations, whatsoever, of other proclaimed trade barriers like compliance to the stringent EU-market standards were taken care of. Furthermore, despite the fact that the EU grants other non-reciprocal preferential treatments (e.g. the Cotonou Agreement for the African, Caribbean and Pacific (ACP) countries; the Everything but Arms (EBA) initiative, etc) to developing countries to access the market, this study does not take into account of the overlapping nature of these trade preferential agreements. Thus, future research should disentangle facts relating to horticultural trade flows from East African economies into the EU and the above mentioned limitations of this study.

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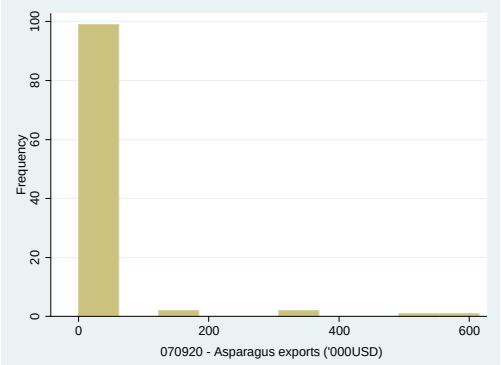
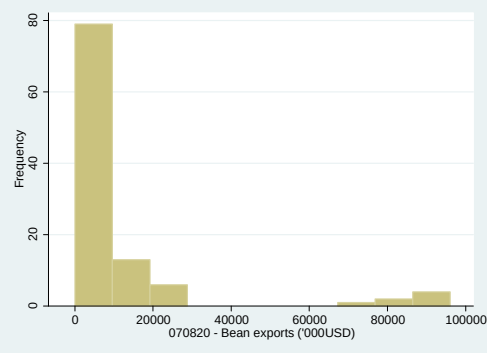
Appendix 1: Normality test results by country

Appendix 1a: Kenya's normality test results for Asparagus and Beans

Asparagus (Kenya)

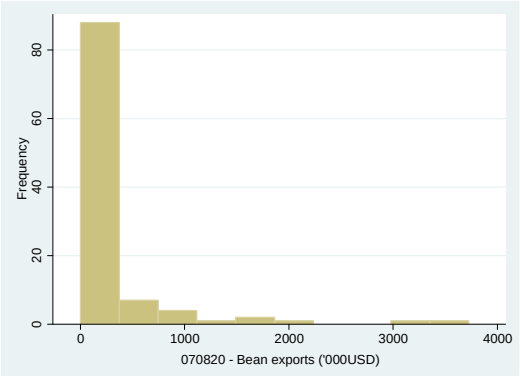


Beans (Kenya)

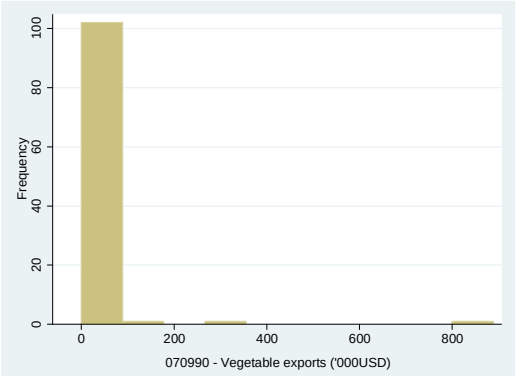


Appendix 1b: Tanzania's normality test results for Beans and Vegetables

Beans (Tanzania)

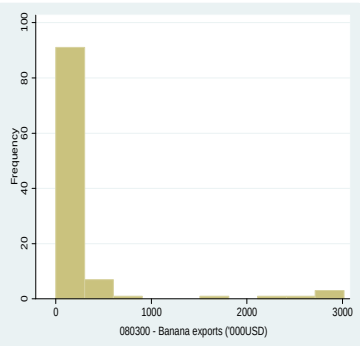


Vegetables (Tanzania)

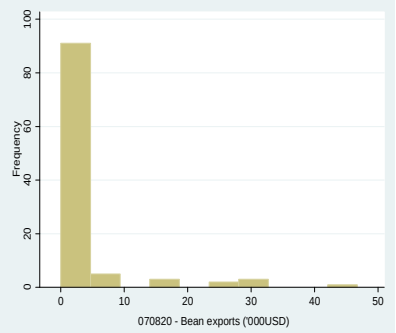


Appendix 1c: Uganda's normality test results for Pepper, Bananas and Beans

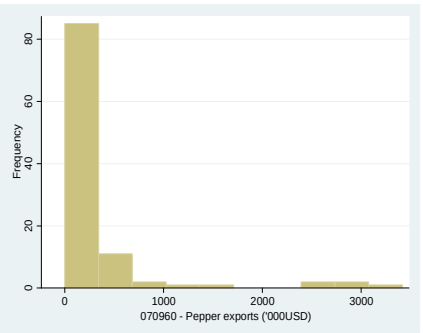
Bananas



Beans



Pepper



Appendix 2: The EU-15 member states considered in this study

No.	Country	Year joined EU
1	Belgium	1957
2	France	1957
3	Germany	1957
4	Italy	1957
5	Luxembourg	1957
6	Netherlands	1957
7	Denmark	1973
8	Ireland	1973
9	United Kingdom	1973
10	Greece	1981
11	Portugal	1986
12	Spain	1986
13	Austria	1995
14	Finland	1995
15	Sweden	1995