The effect of the GSP scheme on the European Union's horticultural imports from SADC member countries: A Triple-Difference Approach

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Abstract

This work evaluates the effect of the Generalised System of Preferences (GSP[1]) on EU's fruit imports from Southern African Development Community (SADC) member countries during 2005-2014, using a new and advanced micro-econometric tool known as the Triple-Difference estimator. The estimator is advantageous given that it is robust to policy endogeneity and it uses a very flexible benchmark to which the intensive margin and extensive margin of trade performance are compared. Two preference margin measures are used as proxies for the preferential treatment granted to SADC member countries by the EU. Furthermore, highly disaggregated data at HS 6-Digit level, for 12 SADC member countries and 27 EU member states are used for the analysis. The analysis employed takes into consideration of zero-trade flows. Empirical results suggest that the EU-GSP scheme generally has a significant positive impact on EU's fruit imports from SADC member countries. Notably, the Least Developed Countries (LDCs) benefited more from the scheme as compared to the non-LDCs.

Key words: Triple-Difference estimator, Generalised System of Preference, SADC, fruits

1.0 Introduction

Over the years, the European Union (EU) has remained the dominant market for a large proportion of agricultural commodities exported by many Sub-Saharan economies. This dominance has mainly been associated with preferential trade regimes that the EU grants to developing countries (Cardamone, 2011:1). Preferential trade regimes aim at promoting imports from the developing countries into the EU by providing their imports with a competitive advantage vis-a-vis imports from other non-benefiting countries, and thereby stimulating economic activity. The competitive environment availed to beneficiary countries entails either duty free or reduced tariff rates being subjected to imports into EU from those countries.

Thelle *et al*. (2015) argue that the extent to which developing countries benefit from such preferential treatment depends on both the value of the preference margin granted and the country's capacity to effectively exploit the accruing benefits. However, with the proliferation of both the multilateral systems and other regional or bilateral free trade agreements, it is claimed that the value of the preference margin granted under a given preferential trade regime reduces, and that fewer trade barriers are encountered with the EU. Given that the European Centre for Development Policy and Management (2001) emphasises that preferential trade regimes are meant to create a conducive environment for beneficiary countries to explore the preferential markets rather than compensating for factors that deter the competitiveness of their products within the market, the impact of such preferential trade regimes is questionable since they come along with stringent compliance measures, such as

[1] The GSP is a non-reciprocal preferential trade regime through which many countries have accessed the EU market for a number of years

the rules of origin. Therefore, there is need to evaluate the actual impact of EU's preferential trade regimes.

Consequently, this paper focuses on the evaluating the effect of the General System of Preferences (GSP) over a ten years' period (2005–2014) on EU's fruit imports from SADC member countries. Emphasis is put on the horticulture industry, particularly the fruits since it is one of the most important and highly protected sub-sector by the EU both in terms of production and trade (Cardamone, 2011:1). The EU remains one of the largest world importers of horticultural commodities, especially fruits and vegetables. Under the EU-GSP scheme, fruit imports are subjected to both ad valorem tariffs, specific duties as well an entry price.

Within SADC, fruits also play a contributory role towards overall economic growth through foreign exchange generation, job creation as well as food security issues. In South Africa, gross income from deciduous, citrus and subtropical fruits increased by 25.1%, 29.6% and 8.4% respectively between 2012/13 and 2013/14 financial years (DAFF, 2014). Moreover, 2014 export values reveal that citrus fruit (R11.58 million), apples, pears and quinces (R5.68 million) and grapes (R6.27 million) were among the top five most important agricultural exports.

Unlike much of the existing literature (e.g. Cipollina and Salvatici, 2010; Emlinger *et al*., 2008; Garcia Álvarez-Coque and Marti Selva, 2006; Lubinga *et al*, 2014) focusing on the impact of preferential trade regimes on horticultural imports into the EU which seems to be based on the gravity model analytical framework, this study uses a new and advanced micro-econometric tool known as the Triple-Difference estimator. There is very scanty literature about this approach, particularly in the domain of preferential arrangements in trade. Unlike Thelle *et al*. (2015), Hakobyana (2014) and Frazer and Van Biesebroeck (2010) who assess the general economic effects of preferential treatment on trade flows, the horticulture sector was considered in this study (fruits per se) to further complement the existing knowledge on the effects of EU's preferential treatment towards SADC member countries.

Just like Cardamone (2011), Cipollina and Salvatici (2010) and Thelle *et al*. (2015), a continuous measure of preferential treatment (preference margin) is used. Hakobyana (2014) and Frazer and Van Biesebroeck (2010) used a dummy variables to proxy for preferential treatment and both studies focussed non-reciprocal preferential treatments granted by the United States of America (US) to developing countries, *Viz*: Frazer and Van Biesebroeck (2010) focused on the African Growth Opportunity Act (AGOA) while Hakobyana (2014) assessed the US-GSP scheme. It is only Hoai *et al*. (2015) and Thelle *et al*. (2015) whose work relates to the EU preferential trade regime but work by Hoai *et al*. (2015) is of much less relevance to this particular study given that they focussed on footwear. Results by Thelle *et al*. (2015) reveal that the EU-GSP scheme boosts trade in goods from developing countries (especially LDCs) into the EU but for agricultural products the increase is relatively small

(only 2%). Moreover, no details are availed about the particular agricultural products that benefit from the scheme.

From the extensive margin perspective, results by Thelle *et al* (2015) on agricultural products are insignificant, hence inconclusive. However, they seem to depict that the EU-GSP scheme exhibits no significant impact on the likelihood of importing agricultural products into the EU. These mixed results are thus the basis of this study since they do not candidly spell out which agricultural products benefited (or do not benefit) from the EU-GSP scheme. Therefore, the overall aim of this study is to empirically assess the benefits of the EU-GSP scheme towards agricultural products from the SADC. Specifically, the effect of the scheme on the intensive and extensive margins of EU's fruit imports from SADC member countries is evaluated. Successful achievement of the aim complements earlier studies that assessed the impact of the EU-GSP scheme.

The paper is organised as follows: Section 2 provides the relevant literature review; section 3 consists of a descriptive analysis of EU's fruit imports from SADC for last 14 years (2001-2014). In section 4, a brief overview of the EU-GSP scheme is presented while section 5 provides the methodology used. Results and discussions are presented section 6 with section 7 presenting the conclusions and recommendations.

2.0 Relevant literature

There is scanty literature that evaluates the effect of preferential trade regimes on trade flows, using the Triple-Difference estimator. Only work by Frazer and Van Biesebroeck (2010), Hakobyan (2014), Hoai *et al*. (2015) and Thelle *et al*. (2015) has been seen (by authors) come across using this approach. Work by Hoai *et al*. (2015) focussed on the 2006 EU antidumping action on footwear from Vietnam. Despite the fact that the Triple-Difference estimator was used, their work was found irrelevant to this study, hence it is not used any further. Also, the existence of literature on the effect of the EU-GSP scheme based on the gravity model analytical framework is highly acknowledged but mainly not referenced in this study. Therefore, reviewed literature in this work is limited to that of Frazer & Van Biesebroeck (2010), Hakobyan (2014) and Thelle *et al*. (2015).

Thelle *et al.* (2015) assessed the economic benefits generated as a result of the EU-GSP scheme being granted to developing countries while Frazer and Van Biesebroeck (2010) analysed the effects of the African Growth and Opportunity Act (AGOA) on Africa's exports to the United States of America (US). Findings by Frazer and Van Biesebroeck (2010) suggest that AGOA had a large impact on developing countries' exports to the US. Hakobyan (2014) assessed the effect of the 2011 expiration of the GSP scheme for the US on exports from developing countries. Findings of the study suggest that the expiration of US-GSP led to a 3% decline (on average) in exports from developing countries while agricultural exports on average registered a larger decline of 5%.

Rather than using a dummy variable as a proxy for the EU-GSP scheme, Thelle *et al*. (2015) used two preference margin measures. A preference margin is continuous variable that quantifies the preferential treatment received by a given eligible product from any given beneficiary country at a given point in time. Results by Thelle *et al*. (2015) and Frazer and Van Biesebroeck (2010) reveal that preferential trade regimes (particularly, AGOA and GSP) boost imports from developing countries, most especially the Least Developed Countries (LDCs). Moreover, Thelle *et al*. (2015) note that the GSP scheme generally increased importation of eligible products by 5% while for the LDCs, the increase was two-folds higher than the average effect across all countries. However, their results also show that the scheme has a relatively small effect (2%) in boosting agricultural exports to the EU and no details are availed about the particular agricultural products.

With respect to extensive margin, Thelle *et al*. (2015) also show that the GSP scheme significantly increased the likelihood of beneficiary countries to begin exporting an eligible product, especially LDCs and low income countries. However, at product group level, the GSP scheme seems to have no significant impact on the likelihood of exporting agricultural products to the EU.

3.0 A descriptive analysis of the European Union's fruit imports from SADC

The EU is the largest world importer of fruits and vegetables (Cardamone, 2011:1). The good access to the European market is highly attributed to the bilateral agreements and the preferential trade regimes that are granted to developing countries (Sandrey, 2015). In order to provide an insight into how the above mentioned factors have influenced fruit trade flows from SADC, this section provides a mapping of fruit imports from 12 SADC member countries, i.e. Botswana, Democratic Republic of Congo (*hereafter referred to as DRC*), Lesotho, Malawi, Mauritius, Mozambique, Namibia, Tanzania, South Africa, Swaziland, Zambia and Zimbabwe. Seychelles is still in the process of ratifying the SADC treaty[2], hence omitted. Although much emphasis is put on fruit imports from SADC member countries into the EU, fruits imports by SADC member countries from the EU are also briefly assessed by looking at trade balances.

Over a 14 years' period (2001 – 2014), SADC was a net exporter of fruits to the EU with an average growth rate of 11.6%. Figure 1 reveals that SADC exhibits an increasing trend in exporting fruits to the EU but with year to year fluctuations in fruit export growth rates.

[2] http://www.nda.agric.za/doaDev/topMenu/interEngagements/SADC.htm

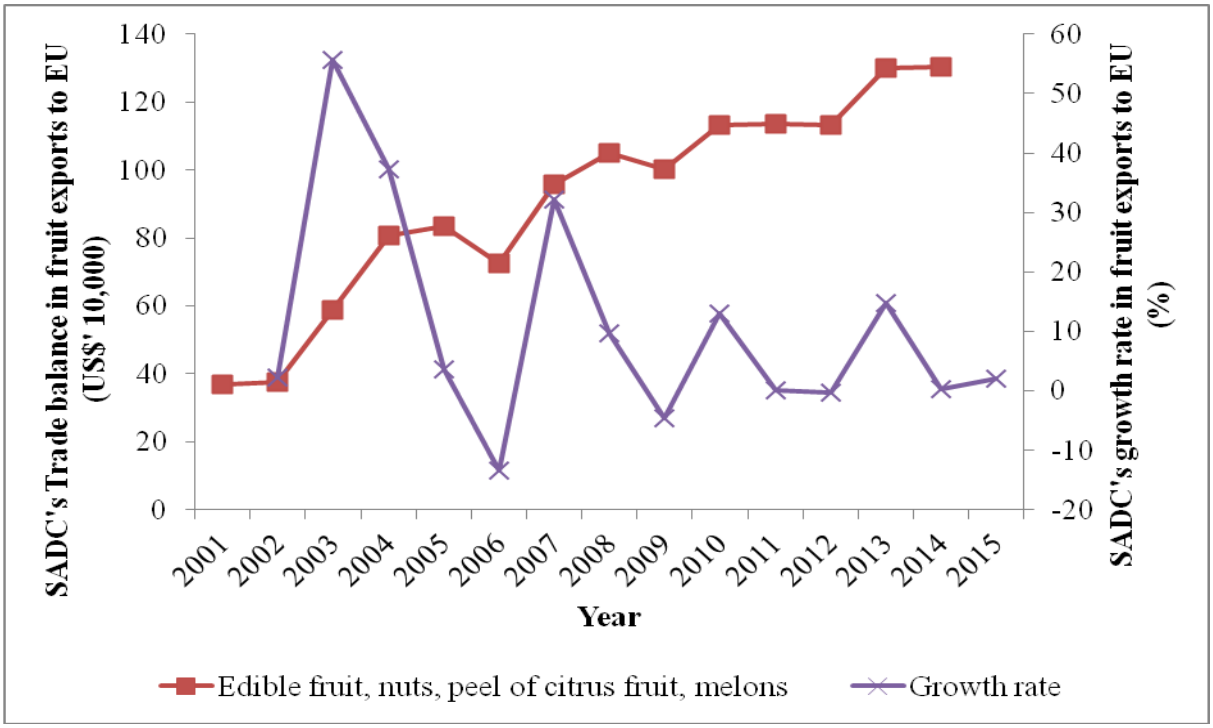


Figure 1: SADC's trade balance in fruits with the European Union
Source: ITC calculations based on UN COMTRADE statistics

The highest growth rate was observed in 2002 (55.7% from 2.2% in 2001) while the lowest was in 2006 (-13.3%). Negative growth rates were observed in 2006, 2009 (-6.6%) and 2012 (0.3%). The fluctuations in growth rates may be associated with non tariff barriers to trade, sanctions and supply side factors. A detailed analysis shows that Angola and Botswana are on average net importers of fruits from the EU. In 2014, grapes (HS 806) valued at US$ 426.7 million were the major imported type of fruits into the EU's from SADC, followed by citrus (HS 0805), apples (HS 0808) while citrus fruit and melon peel (HS 0814) were the least. Figure 2 show that there has been an increasing trend in EU's fruit imports from SADC.

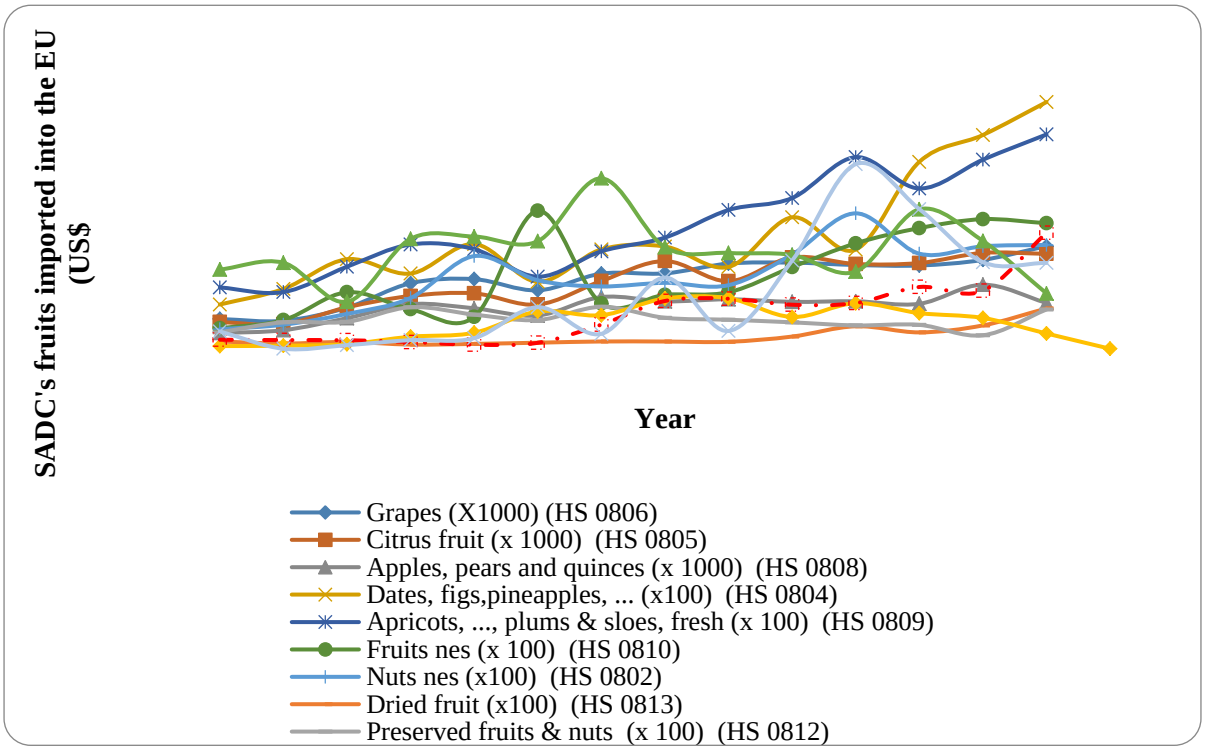


Figure 2: EU's fruit imports from SADC between 2001 and 2014
Source: ITC calculations based on UN COMTRADE statistics

Citrus fruit and melon peel (HS 0814) exhibited an exceptionally high value (US$ 18.5 million) in 2008, thus the trend of that tariff line was not plotted given it would distort the layout of the graph. Over a 14 years' period, SADC's share of total fruit imports into the EU has been stable, ranging between 2.01% in 2002 and 3.01% in 2010. Provisionally preserved fruits and nuts (unfit for immediate consumption) (HS 0812) contributed the largest mean share of over 16.5%, followed by grapes (8.5%) while bananas and plantains (HS 0803) only assume 0.004% of the total fruit imports into the EU (Figure 3).

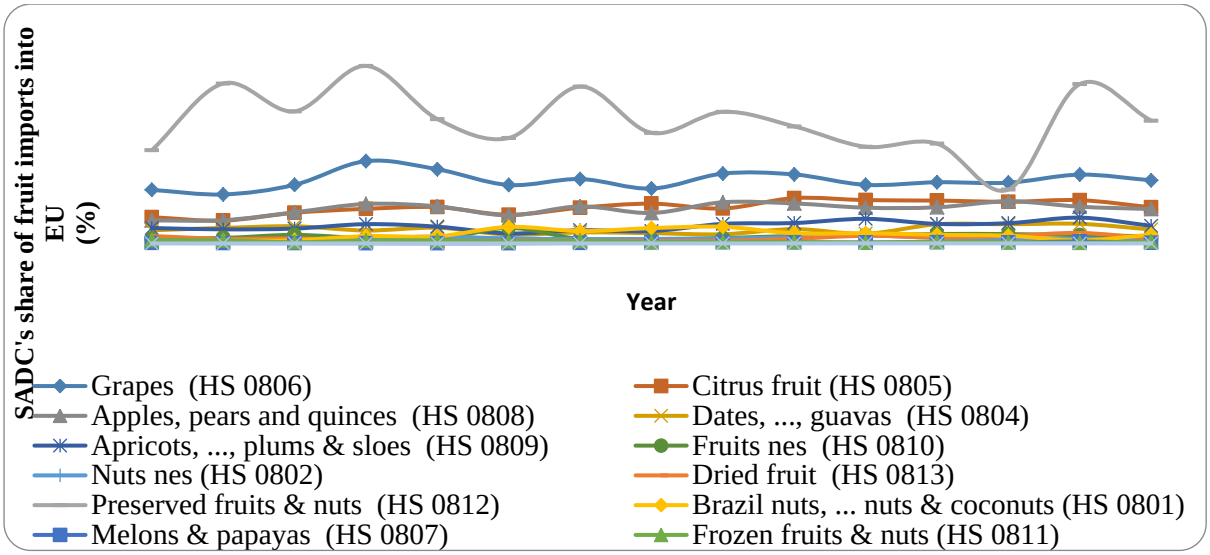


Figure 3: SADC's percentage share of total fruit imports into the EU (2001 – 2014)
Source: ITC calculations based on UN COMTRADE statistics

According to Figure 4, EU bound fruit exports from South Africa accounted for the largest proportion amongst SADC member countries in 2013 and 2014 while Botswana did not export any fruits to the EU in 2013 and 2014.

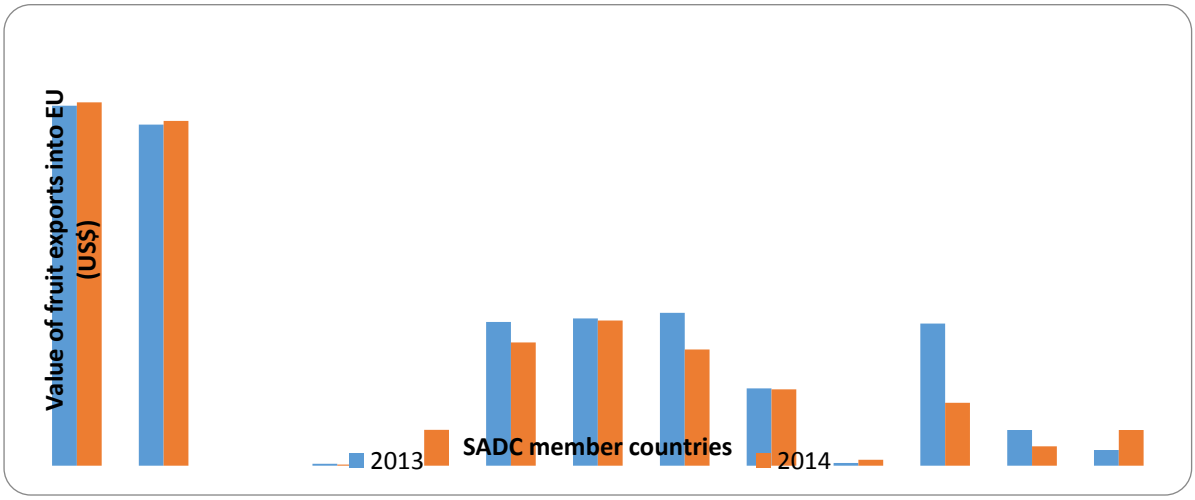


Figure 4: SADC's percentage share of total fruit imports into the EU (2001–2014)
Source: ITC calculations based on UN COMTRADE statistics

In a nutshell, the mapping of fruit trade flows destined for the EU from SADC member countries reveals that the EU remains a key market for fruits. Overall, SADC is a net exporter of fruits to the EU but the export growth rate exhibits a high fluctuation rate over the years. Most fruit imports into the EU are sourced from South Africa while grapes (HS 0806), citrus (HS 0805), apples...(HS 0808) and date,... & guavas (HS 0804) are the major fruit categories imported from SADC. SADC's bananas & plantains (HS 0803) and Citrus fruit & melon peel (0814) are the least imported fruit categories by the EU.

4.0 A brief overview of European Union's Generalised System of Preferences (EU-GSP)

The EU-GSP scheme is an autonomous trade arrangement through which the EU provides non-reciprocal preferential access to the EU market to developing countries, with an aim of increasing export earnings, promoting industrialization and accelerating the rates of economic growth among developing economies. The scheme was first introduced in 1971 by the European Community (EC) and it has evolved over time, with the EC making changes in product coverage, tariff treatment and differentiation among beneficiary countries. Originally, the 1971 GSP Scheme accorded different tariff treatments to agricultural and non-agricultural products. Although selective preferential treatment was provided for agricultural commodities, all industrial products were in principle eligible for tariff free treatment but each country and product had to abide by the agreed upon set tariff quotas. As the selective treatment of agricultural commodities progressed during the 1980s, it was a different case for industrial products. The tariff quota system was changed such that all beneficiary countries were not treated equally through the rigorous application of tariff quotas at country basis for specific products, more so in respect of highly competitive suppliers.

Less competitive beneficiaries were regulated through quotas. It is claimed that this approach of tariff quotas caused a lot of uncertainty given that exporters could not know whether there would be a balance of the provided quota at the destination market at the time of shipment of the consignment, hence availability of the GSP concession. In 1995, this tariff treatment regime was altered, such that all quotas were abolished and tariff reductions modulated according to product sensitivity. Very sensitive products were subjected to a preferential tariff 85 per cent of the MFN rate; sensitive products were accorded 70 per cent, while for semi-sensitive products, 35 per cent preferential tariff was granted. Non-sensitive products were subjected to duty free entry into the EU market, except where the MFN tariff had an agricultural component.

However, in the case of sensitive products with ad valorem duties, the duty was reduced by 3.5 percentage points, except for textile products (Chapter 50 to 63), in which the reduction was by 20 per cent. Generally, sensitive products with specific duties were subjected to a 30 per cent reduction while for sensitive products with mixed tariffs; the specific duty component was not reduced. The 2009-2011 GSP Scheme cycle was even made more complex by differentiating the beneficiaries into three categories. *Viz*: the general GSP beneficiaries, the 'GSP Plus' scheme specifically for vulnerable countries with special development needs, and the Everything but Arms (EBA) initiative, which gives the 49 least developed countries (LDCs) duty-free access to the EU market without any restrictions. The scheme also provides for graduation at either country or product level using a number of methods that are not necessarily discussed in this paper. The scheme also exhibits other salient features such as the rules of origin which are detailed in the Handbook on the scheme of the EU.

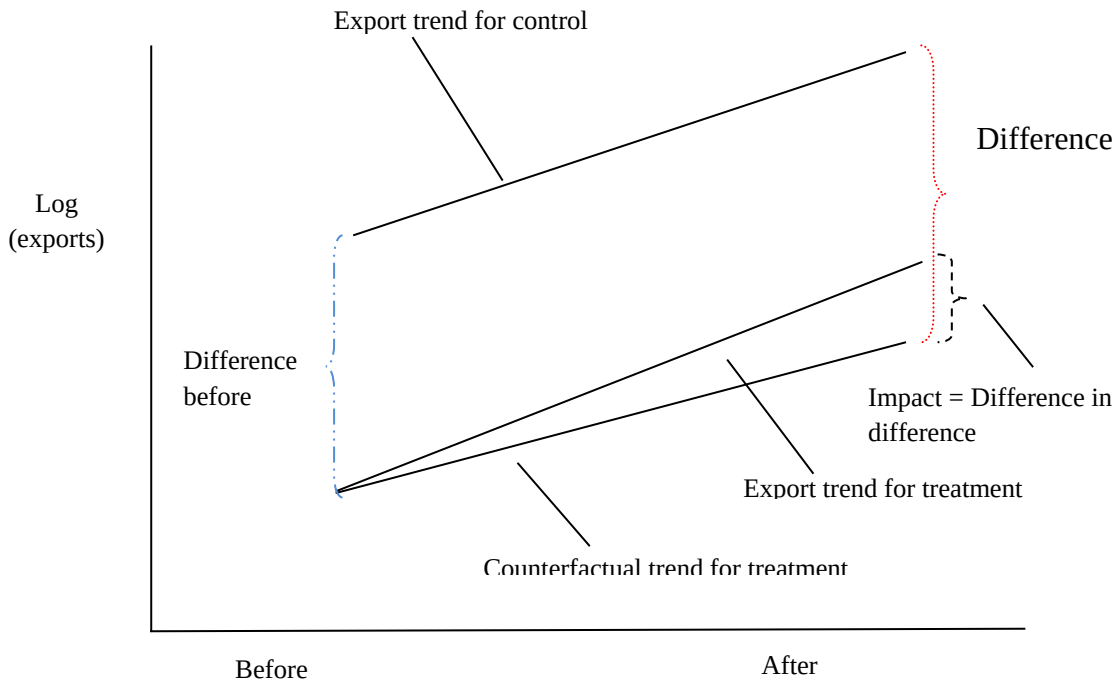
5.0 Methodology

In this section, a description of the Tripled-Difference model, data and the data sources used are provided. A Triple-Difference model was used to estimate the causal impact of EU-GSP scheme on the intensive and extensive margins of EU's fruit imports from SADC member countries.

5.1 Triple-Difference estimator

To evaluate the impact of the GSP scheme on EU's fruit imports from SADC member countries, the Triple-Difference estimator was used, a methodology that was proposed by Frazer and Van Biesebroeck (2010). This is an apt estimator given that it addresses the "endogeneity critique" associated with the standard Difference-in-Differences technique that arises when country or product level analysis is carried out separately. It is worth to note that the Difference-in-Difference estimator is among the most commonly used approaches to evaluate effects of policies but it leads to biased estimates due the non-random awarding of preferential trade regimes (Besley and Case, 2000).

Although the Triple-Difference estimator exhibits an advantage of isolating the effect of the EU-GSP scheme on EU's fruit imports from SADC, the analysis in this study may be limited by the fact that at present, it is only South Africa that is not a beneficiary of this preferential treatment, moreover with effect from January 2014. This may be an under-representation for non EU-GSP beneficiary countries. Graphically, the Triple-Difference estimator can be illustrated using the standard Difference-in-Difference benchmark as below.



Source: Adapted from Thelle *et al*. (2015)

The export trend for the control group (*the top line in the figure*) is subtracted from the observed export trend for the treatment group. The remaining growth in exports for the treatment group is the Difference-in-Differences estimate of the policy impact. However, in the case of the Triple-Difference estimator, impact assessment of a given policy takes into account of both country and product dimensions. Thus, the Triple-Difference estimator is only feasible in conditions where the trade policy in question and the dependent variable (in this case, EU's fruit imports from SADC) fluctuate along the three dimensions in the data set, i.e. over time, between countries, and across products.

In this context, the treatment group refers to a beneficiary country's difference in exports that qualify for the preferential trade regime and those that do not while the control group refers to the difference between exports from a non beneficiary country like South Africa (since January 2014). Therefore, the Triple-Difference estimator is advantageous given that it is robust to policy endogeneity and it uses a very flexible benchmark to which the intensive margin and extensive margin of trade performance is compared (Thelle *et al*., 2015).

5.2 Model specification for intensive and extensive margins

Intensive margin of EU's fruit imports from SADC was estimated as follows:

$$\Phi = \left(\Delta \ln X_{1t} - \Delta \ln X_{0t}\right)^{*} - \left(\Delta \ln X_{1t} - \Delta \ln X_{0t}\right)^{c} \quad \text{..... (1)}$$

Where Φ denotes the causal effect of the EU-GSP scheme on the fruit imports, $\Delta \ln X_{1t}$ represents a change in the natural logarithm of imports of an eligible fruit product (subscript 1) that qualifies to benefit from the EU-GSP scheme in year t, $\Delta \ln X_{0t}$ represents a change in the natural logarithm of fruit imports that do not qualify to benefit from the scheme in year t (subscript 0). The superscripts * and *c* denote a country that benefits from the EU-GSP scheme and a non beneficiary country, respectively. A close scrutiny of the above model reveals that the Triple-Difference estimate is actually the difference between two product-dimension Difference-in-Differences, one for the EU-GSP scheme eligibility and one for the non eligibility for preferential treatment.

By using a regression framework, equation (1) is practically estimated by pooling a set of countries and products over a given period of time. Taking actual differences for all products and countries under consideration is very laborious. Every country-product-time observation can be a beneficiary of the EU-GSP scheme, or not, and an appropriate set of fixed effects create the desired benchmark. According to Frazer and Van Biesebroeck (2010), Hoai *et al*. (2015) and Thelle *et al*. (2015), differencing along the three different dimensions can easily be achieved by including three sets of interacted fixed effects, namely: (*i*) Country-year fixed effect, which controls for the business cycle in each trading partner and in the EU, as well as time-invariant country-specific factors. Furthermore, it takes care of time-varying factors that affect a country's status to either qualify as a beneficiary of the preferential trade regime or

not; (*ii*) country-product fixed effect, controls for the comparative advantage of each country at a very detailed product level; and (*iii*) product-year fixed effect. This controls for demand variation in the import market (EU) for particular products as well as product specific supply changes. In addition, it control for product specific advancements that affect the existence or magnitude of preferential trade regimes.

Following Frazer and Van Biesebroeck (2010), the simplest and unrestrictive specification of the Tripled-Difference estimator in regression framework is generally expressed as:

$$\ln X_{cpt} = \beta . PM_{cpt} + \mu_{cp} + \mu_{ct} + \mu_{pt} + \varepsilon_{cpt} \quad \text{.....} \quad (2)$$

Where *ln* denotes the natural logarithm, X fruit imports of a given type (*subscript p*) from a beneficiary country c (*subscript c*) during year t (*subscript t*) into the EU, PM is the preference margin received by a beneficiary country's imports for a given fruit type in a given year. μ_{cp}, μ_{ct} and μ_{pt} denote country-product, country-year, product-year fixed effects respectively while ε_{cpt} denotes the error term. The fixed effects are only used to establish an apt benchmark for the important effect of interest. They allow for heterogeneity in the level of imports of any fruit product from any SADC member country in a given year when EU-GSP scheme is effective, the overall imports of any SADC member country into the EU in any year, and the overall imports of any fruit product into the EU in any year.

Product-time (pt) dummy is 1 if a product is exported by a given country during year *t* and zero otherwise. Country-Product (cp) dummy is 1 if product is categorised as nuts, 2 if product is categorised as deciduous, 3 if product is categorised as sub-tropical/tropical, 4 if product is does not fall under any of the above mentioned. South Africa's categorisation was used as the basis for categorising the various commodities. Country-time (ct) dummy is 1 if country is a net exporter of fruits (HS 08) in a given year t and zero otherwise (ITC-Trade map data was used). β is the interactive coefficient of interest and it captures the intensive margin effect of the scheme on fruit imports into the EU.

The specified model (equation 2) is based on highly disaggregated data (HS6 level) and given the fact that such data suffers a problem of large quantities of zero trade flows, and the fact that the natural logarithm of zero is undefined, an arbitrarily small number was added to the original value of EU's fruit imports before taking logs so as to control for selection bias (Helpman *et al*., 2008). This is a commonly used approach (*see*: Hakobyan, 2014; Thelle *et al.*, 2015). However, Santos Silva and Tenreyro (2006) argue that such arbitrarily small numbers create biased estimates. Although there are other advanced methods like Poisson model estimators that could have been used to address the issue of zero trade flows, Thelle *et al.* (2015) and Frazer and Van Biesebroeck (2010) argue that those methods limit the use of

flexible controls and are only feasible when the country-time variation being used relate to observable variables other than country-year fixed effects. Hence, to avoid dropping some of the fixed effects, I added an arbitrarily small number. In order to obtain the average effect of the EU-GSP scheme on the intensive margin of EU's fruit imports from SADC, the point estimates were simply multiplied with the average tariff reduction as done by Thelle *et al*. (2015).

To ascertain the extensive margin effect of the EU-GSP scheme on EU's fruit imports from SADC countries, the Triple-Difference estimator was also used. The same intuition and advantages still hold as discussed in the case of intensive margin. However, in this case, a dummy variable that assumes the value of one if the value of EU's fruit imports from SADC member countries were positive for a particular country *c*, product *p*, time period *t* and zero otherwise:

$$x_{cpt} = \begin{cases} 1 \text{ if } X_{cpt} > 0 \\ 0 \text{ if } X_{cpt} = 0 \end{cases} \quad \text{.....} \quad (3)$$

Thus, the dependent variable in the regression (equation 4) is not the (log) value of imports.

$$x_{cpt} = \beta . PM_{cpt} + \mu_{cp} + \mu_{ct} + \mu_{pt} + \varepsilon_{cpt} \quad \text{.....} \quad (4)$$

Although Probit specifications are the most commonly used while estimating models with a dummy dependent variable, in this case, a linear probability model was estimated. The linear probability model was used so as to retain the set of fixed effects used in the earlier case (intensive margin). Due to the inherent nonlinearity nature of Probit specifications, its use would limit the number of control variables that could be included. Therefore, the use of a linear probability model with other control variables minimises the usual disadvantage of linear probability models that the predicted value of the dummy dependent variable is not constrained to lie in the zero-one interval (Thelle *et al*., 2015).

By using the Ordinary Least Squares (OLS) regression, the dummy variable relates to the extent of the EU-GSP scheme, measured in terms of preference margins (PM). β is still the coefficient of interest. In this case however, it is interpreted as a percentage increase in the likelihood of importing fruits from SADC member countries due to a percentage point increase in the preference margin granted by the EU. Given the earlier mentioned likely limitation of this study (i.e. South Africa being the only non beneficiary of the EU-GSP scheme since January 2014), coupled with the fact that the analysis was based on the 12 SADC member countries without necessarily taking into consideration of the different levels

of development exhibited by each of the different countries, this may have an effect on the estimates.

Thus, checks for the consistency of the estimates were carried out. Firstly, a products Difference-in-Difference estimation was carried out. It was assumed that the South Africa's one year period since her graduation from being a beneficiary of the scheme may not affect the results; hence she was treated as a beneficiary of the scheme. The Difference-in-Differences method was implemented by assuming that variation only occurred across products while all SADC member countries benefited from the scheme. Secondly, SADC member countries were categorised into Least Developing countries (LDCs) and non LDCs (*See* Appendix 1) as by 2012 status.

5.3 Data and measures of preference margin

Highly disaggregated EU import data of fruits at HS 6 Digit level in combination with applied tariff rates for each product from the 12 SADC member countries was used. EU import data was used given that it is more consistent across countries than export data from SADC member countries. Annual import data for each fruit product for the time period under question was obtained from the United Nations' (UN) COMTRADE database for the 27 EU member states while applied tariff rates were extracted from the TARIC database. The TARIC database provides detailed information on applied tariff rates to a given tariff line from a given origin in a given time period under the various tariff regimes for all tariff measures.

However, since this study focuses on the EU-GSP scheme, preferential tariffs granted under this scheme were extracted together with the third country duty rate applied (*hereafter* referred to as MFN rate) to all countries. Other types of imposed tariffs, *Viz*: *i*) preferential tariff quota, and *ii*) the non-preferential tariff quota were not taken into consideration. In an event that a given product or country graduated from the GSP scheme (e.g. South Africa, effective January 2014), it implies that the product or country no longer qualifies for preferential treatment to access the EU market. Thus, it was simply assumed that to access the EU, such a country or product pays the applied MFN rate.

Given that the TARIC database defines tariff lines up to 10-digit level, a further breakdown of the 8-digit Combined Nomenclature (CN), it was indispensable to convert the product codes to 6-digit level in the tariff data so as to match with the HS nomenclature used for the import data. The entire procedure is not however discussed here but conversion tables from the WITS database were used [for the detailed procedure, *see*: Thelle *et al*., (2015)]. Simple averages of all tariffs were computed at the 6-digit level after converting product codes to HS nomenclature. Noteworthy, in this work only ad valorem tariffs were used. In instances where a product had both ad valorem and non-*ad valorem* tariffs, only the ad valorem component was considered. All in all, tariff lines considered in this study amounted to 6872 country/year/product observations.

To capture the magnitude of the preference margin granted to each of the eligible fruit products from a given origin in a given period, two different methods were used:

i) The percentage point difference between the applied preferential tariff and the MFN rate, expressed as ($T_{mfn} - T_{\tau}$). T_{τ} denotes preferential tariff while T_{mfn} represents the applied MFN rate (*hereafter referred to as* PM1).

ii) The ratio of applied preferential tariff to the MFN rate. This was computed as ($1-T_{\tau}/T_{mfn}$), (*hereafter referred to as* PM2).

Measured in percentage points, EU's fruit imports from SADC member countries were subjected to an average MFN rate of 7.67% between 2005 and 2014 across all tariff lines under fruits (HS 08). The average preference margin granted by the EU to SADC member countries was 3.42% and 99.63% for PM1 and PM2, respectively. Least developed countries (LDCs) exhibited slightly higher average preference margins relative to the non LDCs (Table 1). This may be attributed to the fact that LDCs are more often than not granted duty free entry on most of the agricultural products into EU market unlike the case for non-LDCs.

Table 1: Summary statistics for preference margins and export propensities of fruits (HS 08) enjoyed by SADC member countries

	MFN ad valorem tariff (%)	Tariff Difference (%)	Tariff Ratio (%)	SADC's mean propensity to export fruits to the EU (%)	Total number of observations
All SADC countries	7.67	3.42	99.63	9.56	6875
LDCs	7.71	3.73	99.65	3.71	3454
Non LDCs	7.63	3.10	99.60	15.46	3421

Note: Products subjected to tariff quotas, fixed or combined tariffs were excluded. Also, products with zero MFN were also excluded given that they were receiving no preferential treatment.

Source: Author's calculations based on data extracted from TARIC database.

SADC's mean propensity to export fruits to the EU was also computed. The mean export propensity across all SADC member countries was 9.56%. This implies that of all country-product combinations, SADC's propensity to export eligible fruits to the EU at a given point in time considered in this study was 9.56% of the all cases. Furthermore, it is revealed that there is a lower likelihood (on average) of the EU to import fruits from LDCs (3.71%) as compared to non-LDCs (15.46%). Other than the preferential treatment granted by the EU, the low propensity associated with the LDCs may be attributed to factors at the supply side, e.g. limited export capacity to comply with the costly and stringent EU food safety standards.

6.0 Results

6.1 Baseline results (Intensive margin)

Baseline results are based on pooled data from different country product pairs and the magnitude of the preference margin enjoyed by SADC member countries vary considerably, depending of method used to compute it. Thus, when measuring the preference margin in percentage points, it is implicitly assumed that a 1% reduction in tariffs causes a similar effect on trade flows. For instance, the effect of a reduction of tariffs from 26% to 25% equals the effect of lowering tariffs from 2% to 1%. This assumes a constant semi-elasticity of trade flow. Furthermore, a constant elasticity of trade flows is assumed. For example, the effect of reducing tariffs by half (say, from 26% to 13%) is assumed to cause the same effect on trade flows when tariffs are halved from 2% to 1%. For each of the estimator employed and the two different measures used to capture the causal effect of the EU-GSP scheme on the intensive margin of EU's fruit imports from SADC member countries, a separate regression was used (See Table 2). In each case, 12 SADC member countries were considered and the EU.

In general, the point estimates generated by both the Triple-Difference and the Difference-in-Difference estimators reveal that the EU-GSP scheme boosts SADC member countries' fruit imports into the EU. It is worthy to note that the point estimates of model 1 [PM1] are negative and insignificant for both estimators (-0.006 *for Triple-Difference and* -0.001 *for Difference-in-Difference*), thus the focus is drawn to the significant estimates of model 2 [PM2]. Given that this analysis was only based on ad valorem rates, the positive and significant point estimates of model 2 [PM2] reveal that a reduction in ad valorem rates enhance the intensive margin (volume) of EU's fruit imports from SADC member countries.

Table 2: Effect of the EU-GSP scheme on the intensive margin of EU's fruit imports from SADC

Dependent variable	**ln(X+1)**			
Estimator used	**Triple-Difference**		**Difference-in-Difference**	
	Model 1 [PM1]	**Model 2 [PM2]**	**Model 1 [PM1]**	**Model 2 [PM2]**
Explanatory variable	Tariff difference (T_{mfn} -T_{τ})	Tariff ratio (1-T_{τ}/T_{mfn})	Tariff difference (T_{mfn} -T_{τ})	Tariff ratio (1-T_{τ}/T_{mfn})
Effect of EU-GSP scheme	- 0.006 (0.009)	0.122** (0.054)	-0.001 (0.009)	0.150** (0.074)
Fixed effects	Yes	Yes	Yes	Yes
R-squared	0.128	0.129	0.090	0.090
No. Of observations	6872	6872	6872	6872

Note: Standard errors (in brackets).

***, **, * indicates significance at the 1, 5, and 10 percent level respectively
Source: Authors' own calculations based on data from UNCOM trade and TARIC database.

Basing on the assumption of constant response to a constant relative decline in tariffs made earlier, awarding preferential treatment that may lead to halving of the MFN rate is assumed to lead to a similar import growth irrespective of the initial tariff rates. Thus, the point estimate of 0.122 and 0.155 in model 2 [PM2] based on the Triple-Difference and Difference-in-Difference estimators, respectively mean that complete elimination of tariffs under the EU-GSP scheme is on average associated with 12.2% and 15.5% more eligible fruit imports into the EU from SADC member countries. By comparing the results obtained from the two estimators, there seems to be not much variation in the results probably due to the fact that it is only South Africa that no longer benefiting from the scheme since January 2014. This implies that South Africa's graduating from the scheme does not jeopardise the results of the Triple-Difference estimator.

Irrespective of the estimator used, the variation between the effects of model 1[PM1] and model [PM2] may attributable to; the general grouping of SADC member countries. Different SADC member countries exhibit different levels of development attained, the method used to compute the preference margin measure and the assumptions made. For instance, the absolute measure of preference in model 1 [PM1] exhibits much variation given that a large proportion (43.7%) of cases in the dataset in which a product that qualifies for preferential treatment from a given SADC member country was granted free access to the EU, thus preferential rate was zero. Noteworthy is that the estimated effects reveal the annual increase in SADC member countries' eligible fruit imports into the EU, for the years considered in this study. They are not year-on-year effects in import growth but average annual differences relative to a pre-preference level-of-imports benchmark that is estimated from the baseline export level for each country-product pair and controlling for changes in export levels experienced by observations from the same products or the same country that faced MFN tariffs.

The models employed identify a benchmark level of fruit imports from SADC member countries in the period prior to the GSP preferential treatment and a level of imports when the fruits qualify for the preferential treatment. On average, the estimated effects assessed at the mean tariff reduction, suggest that fruit imports from SADC member countries into the EU have reached that level when a country-product observation benefits from the EU-GSP scheme. Results for the consistence of the estimates are presented in Table 3.

Table 3: Results by SADC member countries' level of development

Dependent variable	**ln(X+1)**			
Estimator used	**Triple-Difference**		**Difference–in-Difference**	
	Model 1 [PM1]	**Model 2 [PM2]**	**Model 1 [PM1]**	**Model 2 [PM2]**
Explanatory	**Tariff**	**Tariff ratio**	**Tariff**	**Tariff ratio**

variable	difference (T_{mfn} - T_{τ})	($1-T_{\tau}/T_{mfn}$)	difference (T_{mfn} - T_{τ})	($1-T_{\tau}/T_{mfn}$)
Panel (a) – LDCs				
Effect of EU-GSP scheme	0.025*** (0.005)	0.381*** (0.033)	0.026*** (0.005)	0.528*** (0.044)
R-squared	0.056	0.084	0.040	0.071
No. of observations	3454	3454	3454	3454
Panel (b) – Non LDCs				
Effect of EU-GSP scheme	-0.018 (0.018)	-0.094 (0.094)	-0.004 (0.018)	-0.170 (0.136)
R-squared	0.216	0.216	0.155	0.155
No. of observations	3418	3418	3418	3454

Note: Standard errors (in brackets).
***, **, * indicates significance at the 1, 5, and 10 percent level respectively
Source: Authors' own calculations based on data from UNCOM trade and TARIC database.

In both models, the point estimates for LDCs (Panel a) from the Triple-Difference estimator are positive and statistically significant. This implies that a percentage point reduction in ad valorem rates led to 2.5% (Model 1) and 38.1% (model 2) higher import growth in fruits from the SADC region. Similarly, results based on the Difference-in-Difference estimator are comparable to those obtained from the Triple-Difference estimator and suggest that LDCs indeed benefit from the scheme. Irrespective of the estimator used, the large variation in point estimates between model 1 and 2 may be associated with the same reasons discussed earlier.

Since the Difference–in-Difference estimator was only used to check for the consistency of estimates, only results of the Triple-Difference estimator are discussed in detail. Therefore, an evaluation at the mean percentage point reduction in ad valorem rates (3.73% for model 1 and 99.65% for model 2) implies that the EU-GSP scheme increased fruit imports from SADC into the EU by 9.3 % (model 1) and 37.9% (model 2). Thus, despite the variations in results due to the method used to compute preference margins, findings indicate that the results obtained in the baseline model are consistent. Therefore, during the period in question, the GSP scheme boosted fruit imports from SADC member countries, particularly from LDCs. Results for non-LDC countries are insignificant, hence no informed inferences may be made.

6.2 Baseline results (Extensive margin)

In this subsection, results of the causal effect of the EU-GSP scheme on the extensive margin of EU's fruit imports from SADC member countries are presented. Point estimates indicate the average probability of SADC member countries' fruits being imported into the EU. The positive findings in Table 4 based on pooled data suggest that the granting of the EU-GSP scheme increased the probability of importing eligible fruits from SADC member countries into the EU. The point estimates based on the Triple-Difference estimator imply that

complete removal of tariffs from a given fruit product on average increased the likelihood of that product being imported into the EU by 0.2% (model 1) and 4.4% (model 2). Similarly, positive findings are obtained when the Difference-in-Difference estimator is employed.

However, given that the study focussed more on the Tripled-Difference estimator and that only point estimates of model 2 are statistically significant, emphasis is put on discussing only this result. A similar interpretation of the estimates applies for the findings based on the Difference-in-Difference estimator. The insignificant estimate for model 1 (Triple-difference) may be attributed to the earlier discussed reasons. For instance, it was assumed that there is a constant semi-elasticity of responses irrespective of the level of reductions in tariffs. Given that a high proportion of products enter the EU at duty free, there may be a less than proportional response to each additional percentage point reduction in tariffs for fruits where preferences entail a high percentage-point reduction.

Table 4: Effect of the EU-GSP scheme on the extensive margin of EU's fruit imports from SADC

Dependent variable	**Dummy = 1 for positive exports, = 0 if otherwise**			
Estimator used	**Triple-Difference**		**Difference-in-Difference**	
	Model 1 [PM1]	**Model 2 [PM2]**	**Model 1 [PM1]**	**Model 2 [PM2]**
Explanatory variable	Tariff difference (T_{mfn} - T_{τ})	Tariff ratio (1-T_{τ}/T_{mfn})	Tariff difference (T_{mfn} - T_{τ})	Tariff ratio (1-T_{τ}/T_{mfn})
Effect of EU-GSP scheme	0.002 (0.001)	0.044*** (0.008)	0.002* (0.001)	0.060*** (0.011)
Fixed effects	Yes	Yes	Yes	Yes
R-squared	0.142	0.146	0.108	0.112
No. of observations	6872	6872	6872	6872

Note: Standard errors (in brackets).
***, **, * indicates significance at the 1, 5, and 10 percent level respectively.
Source: Authors' own calculations based on data from UNCOM trade and TARIC database.

The point estimate of 0.044 (model 2) implies that a complete removal of ad valorem rates on a given fruit tariff line on average increased the possibility of that fruit tariff line being imported into the EU from SADC member countries by 4.4%. In relation to the mean reduction in ad valorem rates of 99.63% over the period under question, the 4.4% increase is equivalent to a 4.38% increase of the average likelihood of importing eligible fruits into the EU from the SADC region. Alternatively, in relation to the SADC's mean propensity to export fruits to the EU (about 10%), a 4.4 % increase in the likelihood of exporting eligible fruits to the EU implies that the likelihood increased by 2/5th of the average likelihood of importing into the EU a fruit product eligible for the GSP preferential trade regime from SADC member countries.

Following Thelle *et al.* (2015), the estimates obtained are simply annual average changes computed as the difference between the annual average level of exports in the years pre- and post a preference, after differencing out all other reasons. However, given that the EU may import fruits from SADC member countries due to other reasons than the GSP scheme, it is challenging to identify which fruit tariff lines belong to which category, thus it is not possible to compute the overall volume of fruit imports that are as a result of the EU-GSP scheme.

As in the case of the intensive margin, consistency of the extensive margin estimates was also checked basing on the level of development attained as by 2012 categorisation. Results presented in Table 5 reveal that the scheme had highly significant and positive effects on LDCs while non-LDCs exhibit mixed results (*positive and negative*). However, for non-LDCs, only the estimate for model 1 (-0.004; Triple-Difference estimator) is statistically significant at 10% level.

Table 5: Effects of GSP scheme fruit imports into EU based on the level of development attained by SADC member countries

Dependent variable	**Dummy = 1 for positive exports, = 0 if otherwise**			
Estimator used	**Triple-Difference**		**Difference-in-Difference**	
	Model 1 [PM1]	**Model 2 [PM2]**	**Model 1 [PM1]**	**Model 2 [PM2]**
Explanatory variable	Tariff difference (T_{mfn} - T_{τ})	Tariff ratio (1-T_{τ}/T_{mfn})	Tariff difference (T_{mfn} - T_{τ})	Tariff ratio (1-T_{τ}/T_{mfn})
Panel (a) – LDCs				
Effect of EU-GSP scheme	0.008*** (0.001)	0.091*** (0.008)	0.008*** (0.001)	0.120*** (0.011)
R-squared	0.071	0.101	0.058	0.094
No. of observations	3454	3454	3454	3454
Panel (b) – Non LDCs				
Effect of EU-GSP scheme	-0.004* (0.002)	0.004 (0.013)	-0.002 (0.002)	-0.001 (0.018)
R-squared	0.234	0.233	0.182	0.182
No. of observations	3418	3418	3418	3418

***, **, * indicates significance at the 1, 5, and 10 percent level respectively.
Source: Authors' own calculations based on data from UNCOM trade and TARIC database.

The significantly positive effect of the EU-GSP scheme on the likelihood of the EU importing fruits from SADC member countries is concentrated among LDCs, irrespective of the estimator and the approach used to compute the preference margin. Only results based on

the Triple-Difference are discussed further. In terms of the magnitudes, the point estimates obtained by the Triple-Difference estimator imply that there is a 0.8% (model 1) and 9.1% (model 2) increase in the likelihood of importing eligible fruits from SADC member countries should there be complete elimination of tariffs. Noteworthy, tariffs reduced by 3.73% (model 1) and 99.6% (model 2) on average.

Therefore, by assessing using these averages, the estimates for model 1 and 2 imply that the probability of exporting eligible fruits from SADC to the EU was 2.98% (model 1) and 9.06% of the average likelihood of exporting eligible fruits to the EU. Relative to the average export propensity of LDCs in the SADC region (3.71%), the EU-GSP scheme increased the likelihood of exporting an eligible fruit product to the EU from these LDCs by 22% (for model 1) and 245% (for model 2) of the average probability of exporting eligible fruits into the EU from LDCs within SADC. As earlier discussed, this big variation in the results is attributable to the methods used to compute the preference margin.

Results for non-LDCs seem to suggest mixed effects (i.e. both positive and negative) but only the point estimate for model 1 (-0.004) [for Triple-Difference estimator] is significant. The estimate suggests that a complete removal of tariffs presents the likelihood of reducing EU's fruit imports from non-LDCs within SADC by 0.4%. This observation may be associated with the existence of other preferential trade arrangements that may be more favourable to non-LDCs as compared to the GSP. Moreover, a number of fruit imports from SADC member countries into the EU do not actually make use of the GSP scheme e.g. South Africa, Zimbabwe. Presented differently, the 0.4% decrease in the likelihood of exporting eligible fruits from non-LDCs within SADC into the EU represents a 2.5% increase of the average export propensities of eligible fruits from non LDCs in the region.

7.0 Conclusion and recommendation(s)

The preferential trade regimes awarded by the EU have been noted to enhance importation of goods from developing into the EU. Existing literature suggests that such trade regimes have had mixed (*positive and negative*) results on imports into the EU, depending on methodological approach used. In this study, a new and advanced micro-econometric technique known as the Triple-Difference estimator was employed on highly disaggregated data to evaluate the effect of impact of the EU-GSP scheme on EU's fruit imports from SADC member countries over a 10 years' period (2005-2014). The estimator takes into consideration of the "endogeneity critique" associated with the standard Difference-in-Differences estimator. However, for comparison purposes the Difference-in-Differences estimator was also used. Although the Triple-Difference estimator has been employed before to generally assess the effect of the EU-GSP scheme on all trade flows into the EU, to the best of my knowledge, this is the first study to focus on agricultural commodities especially fruits.

The EU-GSP scheme generally boosted the importation of fruits from SADC member countries during the period in question. LDCs within the SADC region benefit more from the EU-GSP scheme by exporting legible fruits to the EU than non LDCs. Basing on the intensive margin results, it is prudent to conclude that the scheme did not boost EU's fruit imports from non-LDCs but it marginally boosted the importation of new eligible fruit products (*see*, extensive margin results) into the EU. LDCs should fully explore the preferential treatment granted the EU-GSP scheme while non-LDCs should look into making use of less restrictive preferential trade arrangements. Notably, the empirical results may not overly be emphasised, given that the study did not take into consideration of the special arrangements under the GSP scheme as well as other preferential trade agreements. Secondly, the scope of this work did not take into consideration of the competition encountered from other beneficiaries of the scheme within the EU market. Thirdly, the focused was drawn to ad valorem tariffs only. Other policy instruments like the entry price system, specific duties, tariff rate quotas as well as the non tariff trade barriers which influence full utilisation of need to be taken into account. Therefore, further analysis may be pursued in that regard.

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Appendix 1: SADC member countries categorized basing on the level of development either as LDC or non-LDC

LDC countries	Non LDC countries
Congo, Democratic Republic	Botswana
Lesotho	Mauritius
Malawi	Namibia
Mozambique	South Africa
Tanzania	Swaziland