The European Union-South African Free Trade Agreement and Export Trade margins

Marko Kwaramba[1], Prudence Kwenda-Magejo[2], Neil Rankin[3]

Abstract

This study investigates the impact of tariff liberalisation on South Africa's intensive and extensive export margins with the European Union over the period of the introduction of the South African Free Trade Agreement. Using different ways of measuring trade margins it estimates the impact of tariff reduction at the product, country and product-country level. The results shows that tariff reductions have had a consistently positive impact across products at the intensive rather than the extensive margin. For the extensive margin, consumer goods do not respond significantly to tariff reduction. This suggests that South Africa does not export much of these categories, as they are easily manufactured in the EU market. These results are further confirmed under the Rauch classification, as homogenous products show a weaker relationship with tariff reduction. This shows that similar products are not easily traded, even if there is a tariff reduction. The implication therefore is that South African exporters should differentiate their products to increase trade with the EU. For the intensive margin, the results largely show that tariff reduction is associated with more exports of similar products across time. Results at country and product-country level, for both the export intensive and extensive margins show that tariff changes lead largely to an increase in the number of varieties traded. This result is robust to different specifications. The impact of tariff liberalisation is further enhanced if the product was traded before the trade agreement. This suggests that trade agreements largely promote the diversification and intensity of product trade if there are pre-existing trade flows.

Key Words: Tariff liberalisation, extensive margin, intensive margins, exports, South Africa, European Union

JEL codes: F13, F14, F15

[1] Lecturer, Economics Department, University of The Free State, QwaQwa Campus, Phuthaditjhaba, 9866

[2] Senior Lecturer, Economics Department, University of Witwatersrand, Johannesburg, 2001

[3] Associate Professor, Economics Department, University of Stellenbosch, Stellenbosch,7602

1. Introduction

In October 1999 South Africa and its largest trade partner, the European Union (EU), signed the Trade, Development and Cooperation Agreement (TDCA). This agreement, implemented in 2000, aimed to establish a free trade area covering 90% of bilateral trade between the partners. The reduction in trade restrictions which is the core of the agreement was staggered – agricultural and industrial products gradually entered each market duty-free until 2012. The agreement is also asymmetric in terms of the time frame – South Africa had a period of twelve years to fully implement the agreement and the European Union had ten years. This agreement meant that the EU offered to liberalise 95% of its duties on South African-originating products by 2010, while South Africa offered to liberalise 86% of its duties by 2012 (see Department of Trade and Industry, 2014).

Existing empirical evidence on the impact of preferential trade agreements, particularly tariff impacts, on trade flows is mixed (Cipollina et al., 2013), showing positive (Bensassi et al., 2011; Caporale et al., 2009), negative (Francois et al., 2006; Martinez-Zarzoso and Gradeva, 2009) or inconclusive (Ghosh and Yamarik, 2004) effects of trade agreements on trade flows. Disaggregate analysis which examines the impact on the extensive margin (exports of new products to old destinations or old products to new destinations) and intensive margin (exports of old products to old destinations), also show mixed results (Bensassi et al., 2011; Gamberoni, 2007). Demaria and Aiello (2009) and Persson and Wilhelmsson (2013) find that some European Union (EU) preference regimes for developing countries have a positive effect on the developing countries' exports, while Martínez-Zarzoso and Gradeva (2009) find that some preference regimes, such as Everything But Arms (EBA), appear to have insignificant or even negative effects on developing countries' exports. McQueen (2007) also finds that preferences, especially unilateral preferences, have little or no trade-stimulating effect.

The analysis of South African trade at the extensive and intensive margins is relatively limited. Matthee et al., (2015)) examine the impact of the Global Financial Crisis on South African exports at the intensive and extensive margin and find that most of the contraction in aggregate exports was the result of a contraction at the intensive margin mostly by the 'super-exporters' which contribute a substantial amount to total exports. The World Bank (2014) finds similar results with larger super exporters losing dynamism and competitiveness, as smaller and more dynamic exporters are not yet large to make substantial contribution to aggregate exports. Neither of these studies consider the relationship between trade liberalisation and export responses at a disaggregated level in South Africa.

There are various existing studies for South Africa that focus on EU-SA FTA. Assarsson (2006) finds, using descriptive statistics, which the EU-SA FTA led to an increase in exports from 1999 to 2003. Their methodology is based on comparing trade statistics between the years 1999 and 2004. Using the gravity model, Jordaan and Kanda, (2011) show that the EU-SA preferential trade agreement led to a significant trade expansion effect using. Lewis et al., (1999) in their study before the implementation of the EU-SA FTA agreement, using computable general equilibrium simulations, find that the sectors that experience the largest gains are those that have been protected previously, such as fruits and vegetables (agriculture)

and food processing. This paper differs from the aforementioned studies in several ways. Firstly, it adds the dimension of trade margins, which is missing from existing studies. Secondly, it uses foreign tariffs that South African products face in the EU, rather than a dummy variable approach. Third, this paper is at the product level, whereas the majority of the others use aggregate trade flows.

2. The EU-South Africa FTA

The TDCA was the first reciprocal free trade agreement to be signed in Southern Africa (Tsolo et al., 2010). It was concluded after 24 rounds of negotiation and was provisionally implemented on 1 January 2000 and fully implemented in 2004. The liberalisation schedules were asymmetric across products, particularly between agricultural and industrial products. As Table 1 shows 99% of the tariff lines for industrial products were to be free from tariffs, compared to only 48% for agriculture over the period from six to nine years after implementation.

Table 1: EU tariff phase-down: 2000-2009

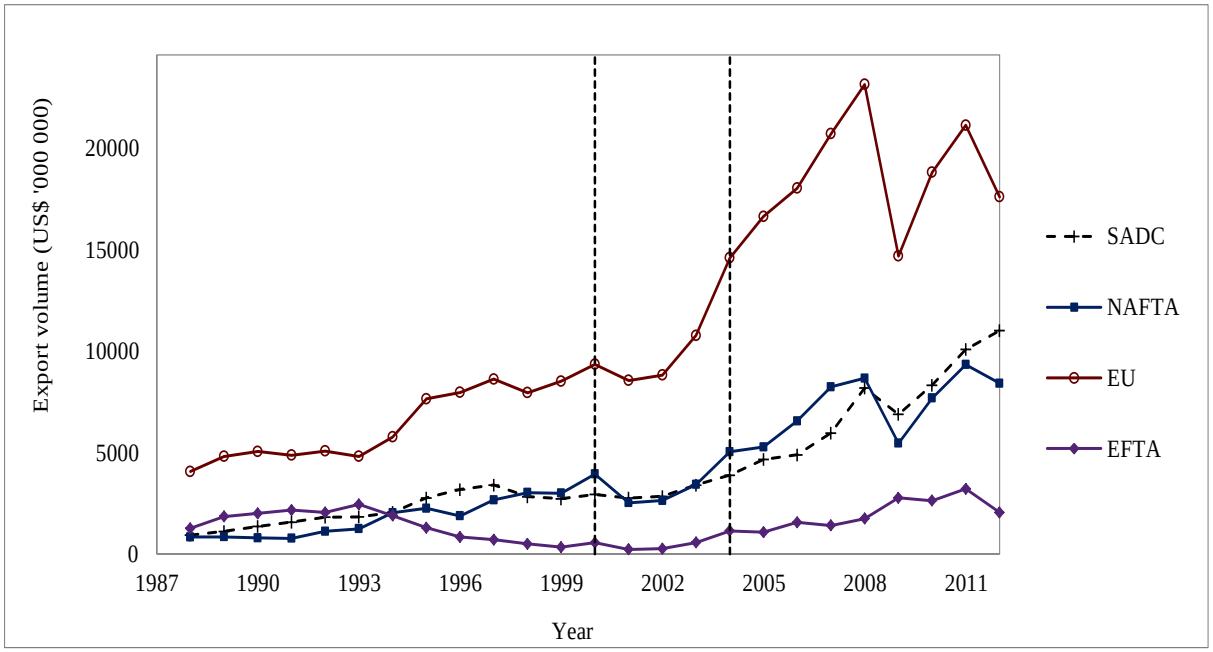
		Base rate	Year 0-2	Year 3-5	Year 6-9
All tariffs	Number of free tariffs	587	2 916	4 167	4 711
	Number of tariffs	5 113	5 113	5 113	5 113
	Share	11%	57%	81%	92%
Agriculture tariffs	Number of free tariffs	166	254	341	341
	Number of tariffs	704	704	704	704
	Share	24%	36%	48%	48%
Industrial tariffs	Number of free tariffs	421	2 662	3 826	4 370
	Number of tariffs	4 409	4 409	4 409	4 409
	Share	10%	60%	87%	99%

Source: Trade and Industrial Policy Strategies (TIPS), 2010

Some studies that evaluated the potential impacts of the trade agreement before its implementation showed potential positive impacts on South Africa (Lewis, Robinson & Thierfelder, 1999) whilst others suggested a potential negative impact (Eurostep, 2000).

At an aggregate level it does seem that the EU-SA FTA resulted in higher export volumes (Figure 1). Although export volumes did not begin to increase immediately upon implementation in 2000, they rose substantially in 2004 (dotted line shows implementation years) when the agreement was fully implemented and continued to increase at a faster rate than exports to South Africa's other major trade partners until the Global Financial Crisis of 2008.

Figure 1: Exports volume



Source: Author's compilation based on Quantec, 2013

KEY: SADC- South Africa Development Community, NAFTA-North American Free Trade Agreement, EU- European Union, EFTA-European Free Trade Association

3. Responses to trade liberalisation

The 'micro' trade theories such as Das et al., (2007); Eaton et al., (2004); Gamberoni(2007); Melitz (2003) provide a theoretical framework for understanding how trade liberalisation may impact on exporting at the intensive and extensive margins. Although the Melitz model uses firms as the unit of analysis similar mechanisms can be used to understand entry and exit at a product and country level. Bernard et al., (2011) and Arkolakis and Muendler, (2009) extend Melitz, (2003) to explain new product-level trade facts. In the multiproduct firm model of Bernard et al. (2011) varieties are reinterpreted as products rather than firms. The key components of these models are firm-level productivity, costs of entry into each market and 'iceberg' transport costs. The response to changes in trade cost depends on whether the exporter is high or low productivity exporter. A reduction is tariffs makes entry into the export market easier and makes domestic firms more competitive abroad since the per-unit cost in foreign markets fall. This would suggest that existing exporters expand – an increase at the intensive margin, and new exporters enter – an increase at extensive margin. Both low and high productivity exporters are able to intensify exporting of existing products (intensive margin) that witness tariff reduction. However, these Melitz-style models are focused only on

finished products and do not consider the impact on intermediate inputs that may be imported.

In the domestic market, the entry of more productive foreign firms may drive out low productivity firms producing for the domestic market through competition. Changes in foreign (in this case EU) tariffs may lead to increased competition in the South African market as more firms will be willing to export to the EU market. Also as SA tariffs falls, as part of the reciprocal agreement, this will lead to increased entry of EU firms into the SA market. Increased competition induces exporters to innovate in order to remain competitive on the foreign market. This is defensive exporting, where increased competition in the domestic market forces firms to export so as to maintain scale and remain competitive (Melitz, 2003).

The availability of lower cost imported intermediate inputs as a result of the FTA may also improve the productivity of local firms. This could increase existing exports, if these benefit from these lower cost inputs, and/or lead to the entry of new exporters. Edwards and Lawrence, (2008) argue that the reduction in anti-export bias as a result of the trade liberalisation in the 1990s was a key mechanism that stimulated South African export growth as well as the diversification of exports away from commodities. It shows that even some low-productivity exporters are able to export due to low tariffs (Bernard *et al*., 2011). In this way, trade liberalisation (declining trade cost) raises their productivity by causing low productivity firms to drop their least attractive products (see Bernard *et al*., 2011, for the firm explanation).

The other relevant model for this study is that of Chaney (2008) which is a gravity equation in the Melitz framework with many countries and asymmetric trade costs. This model builds on the firm heterogeneity model of Melitz (2003), also adding the fixed costs of exporting.. The implication of Chaney's model is that a reduction in variable trade barriers (such as tariffs) implies that each existing exporter exports more, a change at the intensive margin. At the same time, higher potential profits attract new entrants – the extensive margin. His results are strongly determined by the elasticity of substitution. From the model it is clear that when goods are highly differentiated (the elasticity of substitution is low), the demand for variety is relatively insensitive to changes in trade costs, and hence trade barriers will have little impact on the intensive margin of trade. Further, as trade barriers decrease, some relatively unproductive firms are able to enter and, if the elasticity of substitution is low, those new entrants are relatively large, hence the extensive margin is strongly affected by trade barriers when the elasticity of substitution is low.

There are a number of empirical studies that investigate the impact of tariffs on export trade margins. Disdier et al. (2013) examine the extent to which tariff reduction influences the extensive and intensive margin for a group of emerging markets (South Africa included) for the period 1996 to 2006. This period covers the full implementation of the Uruguay Round agreement, and the complete episodes of multilateral liberalisation and free trade areas. Using

highly disaggregated trade data (at the harmonised system (HS) 6 digit level), the authors find a limited impact of tariff cuts on emerging countries' extensive margins. However, at the intensive margin, tariff reduction had a significant impact only on exports of differentiated goods.

Buono and Lalanne, (2012) investigate the impact of the Uruguay round, which implemented a worldwide reduction in tariffs, on trade using firm-level data from France for the 1993 to 2002 period. They consider exports of French firms for 57 sectors to 147 destinations and find a positive effect of tariff reduction on the intensive margin, but find no evidence of an impact on the extensive margin when they considered the panel dimension. However, for the pooled OLS estimation, tariffs had a significant impact on both margins. The results of Buono and Lalanne (2012) indicate that the tariff cuts, partly due to the Uruguay round, are responsible for a growth rate of French manufacturing exports of 3%, which can be split into a growth rate of 2.5% for the intensive margin, and 0.5% for the extensive margin.

The impact of US tariff reduction due to NAFTA on exports to Mexico is investigated by Feenstra and Kee, (2007). Using OLS and instrumental variable estimation methods, they find statistical evidence linking US tariff liberalisation due to NAFTA to increased export variety from Mexico.

Cardamone (2009); Cipollina and Salvatici (2010); Dadush and Nielson, (2007) provide a comprehensive survey of the impact of preferential trade agreements (PTAs) on trade. Cipollina et al., (2013) estimated the trade preferences effect for developing countries' trade flows comparing EU and US trade preferences. Using cross-sectional trade data at the HS8 digit level for 2004 they find that the gains of trade preferences are stronger for the EU (25 countries) on the intensive margins than US preferences, while the effect is more stronger at the extensive margin for US schemes than for EU schemes. They also find that preferential schemes have a significant and positive impact on the intensive margin of trade, while the impact on the extensive margin varies across sectors, both in terms of the sign and the magnitude of the estimated coefficients. The positive impact on the extensive margin means that preferences help to reach product diversification, while a negative sign confirms the traditional criticism that preferences lead to excessive export specialisation.

There are several studies that investigate the determinants of South African exports (Edwards and Alves, 2006; Edwards and Lawrence, 2008; Naude et al., 2005; Rankin, 2001). However, these studies do not focus on trade margins per se, but on general trade volumes. Further those that focus specifically on the EU-SA FTA area either use descriptive statistics only (Assarsson, 2006) or focus on aggregate data level (see (Jordaan and Kanda, 2011).

4. Methodology and data

4.1 The Measurement of trade margins

In this paper we follow a number of approaches to measuring export margins. Firstly, we measure margins at a product level using the geographical extensive margins measure and a

dummy variable approach. The geographical extensive margins measure is a simple count measure that counts the number of countries which a certain HS product line is exported to. To measure the export extensive margin at the product level through the dummy variable approach we code the variable 0 or 1 depending on whether the product was exported in a certain year to a certain country The definition of a new product/good is as follows: a product *i*, exported to the EU, is considered new if exports in 2005 were positive and they were zero in 1995, the benchmark year before the implementation of SA-EU FTA. The year 2005 is chosen specifically since it represents the period of implementation of the FTA. A product *i*, exported to the EU, is considered to disappear if exports in 2005 were zero but were positive in 1995. To check for robustness, the study uses different years as the start and end period, for example considering 1995 and 2010 the conclusion derived from the results did not change. Only HS products lines that have been consistently defined from 1988 to 2012 are used.

The intensive margin (using the dummy variable approach) differs from the extensive margin in terms of the dependent variable. In this case the intensive margin is defined as products that are exported both in 1995 and 2005. The existing literature use the dependent variable as the change in the logarithm of the value of bilateral exports of good *i* from South Africa to the EU between 1995 and 2005. The focus is only on those trade flows that are strictly positive in both 1995 and 2005 (Disdier *et al*., 2013).

Secondly, at a country level we use the Hummels and Klenow, (2005) measure. The Hummels and Klenow extensive margin is defined as a weighted count of products that South Africa exports to a trading partner relative to the products exported by South Africa to the rest of the world. The extensive export margin between South Africa with its trading partner *j* in year *t* therefore is defined as:

$$EM_{jt} = \frac{\sum_{i \in I_{jt}} X_{mijt}}{\sum_{i \in I} X_{mijt}}$$

where X_{mijt} is South Africa's total world value of exports of good i to country *j*. I_{jt} is the set of observable categories in which SA has positive exports to country *j* in year *t*, that is $X_{ijt} \succ 0$. I is the set of all product categories exported by South Africa to the world. The export extensive margin is the ratio of the value of South Africa's exports to a trading partner to the total world value of South African exports. It is a weighted count of South Africa's exports to *j* relative to total world South Africa's categories. It is positive and is between 0 and 1.

The intensive margin measures the overall market share SA has within the set of categories in which it exports to country *j*. The intensive export margin of South Africa to country *j* in year t is as follows:

$$IM_{jt} = \frac{\sum_{i \in I_{jt}} X_{ijt}}{\sum_{i \in I_{jt}} X^{w}_{ijt}}$$

The numerator of EM_{jt} is the denominator of IM_{jt}. The intensive margin equals SA's nominal exports relative to the world's nominal exports in those categories in which SA exports to country *j*. Moreover, following Hummels and Klenow (2005), the overall share of total exports to country *j* in a given year is the product of the two margins.

Thirdly, we use a dummy variable approach at the product-country level. The definition of a new product (extensive margin) is as follows: a product *i*, exported to country *j*, is considered new if exports in 2005 were positive and in 1995 were zero. A product *i*, exported to country *j*, is considered disappearing if exports in 2005 were zero and in 1995 were positive. Similarly, the intensive margin is defined as products that are exported in both 1995 and 2005.

4.2. Data

To create the dataset we merge tariff and trade data at the HS6 level. The main source of tariff data is World Integrated Solution (WITS), the World Bank statistics portal.[4] The study uses tariff data from Trade Analysis and Information System (TRAINS) database. The advantage of this data is that it covers 165 countries, including the European Union as a trading block. At trading partner (country) level, the study uses the applied import tariff rate, which is the weighted mean of all products from the World Bank. This gives a tariff that is not disaggregated at product level. At the product-trading level the study used the TRAINS data, utilising the tariff imposed on South Africa exports by different trading partners. This is at the HS6 digit level. The trade data used to calculate the trade margin is from COMTRADE and SARS. The other control variables, for example Gross Domestic Product (GDP) per capita, foreign direct investment and the real effective exchange rate, are from the World Bank Development Indicators. Gravity model variables like distance, contiguity, common language and colony ties are from Centre d'études prospectives et d'informations internationals (CEPII), 2014. Appendix 1 shows the definition of the variables and where they are used in the regression. The study period is from 1988 to 2012. The data is thus set up as a panel.

[4] WITS comprise data from the WTO Integrated Database (IDB), the WTO Consolidated Tariff Schedules (CTS) and the Trade Analysis and Information System (TRAINS).

4.3 Econometric approach

4.3.1. Product level estimations

Estimating the intensive and extensive margin using the geographical count measure

OLS is used to estimate the following specification for the geographical extensive margin:

$$\ln(em_{it}) = \beta_0 + \beta_1 \ln(tariff_{it}^{eu}) + Z'_t\varsigma + \lambda_i + \theta_t + \varepsilon_{it} \quad (1)$$

where *i* represents the product, *t* time and ln is the natural logarithm; em_{it} is the export-extensive margin of product *i* with the EU at time t, and $\ln(tariff_{it}^{eu})$ is the natural log of the tariff that South African exporters face in the EU market. The dependent variable is the geographical extensive margin and is the number of South African export destinations (countries) by HS6 product line. The study considers the founding 15 EU countries, hence the dependent variable has an upper bound of 15. The tariff variable is treated as $1+tariff_{it}^{eu}$ to enable us to take the logs. Z_t is a vector of control variables that varies over time but not at the product level, for example real effective exchange rate, gross domestic product and foreign direct investment. λ_i is a product fixed effect and θ_t is a variable captures timetrend. In equation (1) the coefficient of interest is β_1. A priori, β_1 should be negative – as a tariff reduction leads to an increase in the number of countries exported to.

The corresponding measure of the geographical intensive margin uses the volume of exports for product *i* (see Baier and Bergstrand, 2001; Disdier et al., 2013 for same treatment). The econometric specification to estimate the intensive margin – tariff relationship is as follows:

$$\ln(im_{it}) = \alpha_0 + \alpha_1 \ln(tariff_{it}^{eu}) + Z'_t\varsigma + \lambda_i + \theta_t + \varepsilon_{it} \quad (2)$$

im_{it} is the export-intensive margin, - the value of the export of product *i*. In this specification the coefficient of interest is α_1 and a priori has a negative relationship with the volume of exports.

For both the estimates of the extensive and intensive margins the other control variables captured by *Z* are $\ln(sagdp_t)$ is the natural log of South African Gross Domestic Product (GDP) per capita at time *t*, $\ln(eugdp_t)$ is the natural log of EU GDP per capita at time *t*, $\ln(fdi)_t$ is the natural log of foreign direct investment into SA at time t, $\ln(reer_t)$ is the natural log of the real effective exchange rate of South Africa at time *t*. These variable are taken from World Bank Development Indicators.

If the dependent variables is count data for example geographical count the study estimates with Poisson (see Dennis and Shepherd, 2011; Persson and Wilhelmsson, 2013).

These specifications are also estimated using different HS standard product group classifications. These first classification is from the WITS data base and is the UNCTAD stages of processing (SoP) classification, which groups products along the production chain. Stage 1 has raw material products, stage 2 intermediate products, stage 3 has consumer products and stage 4 has capital products. The second classification is from Rauch (1999). This classification groups products into those traded on an organised exchange (homogeneous products), reference priced and differentiated products.

The dummy variable approach (change in status)

The dummy variable approach to measuring the export margins exploits the changes in exports between two periods, in this case 1995 and 2005. For the extensive margin estimate the indicator is a dummy variable that takes a value of 1 if South Africa exported product i to the EU in 2005 and 0 otherwise. The specification to be estimated takes the form:

$$x_{it} = 1[x_{it}^{*} > 0]$$

$$x^{*}_{it} = \psi_0 + \psi_1 \Delta \ln(1 + tariff_{it}^{eu}) + \psi_2 status95_{it} + \psi_3 \Delta \ln(1 + tariff_{it}^{sa}) + \phi_i + \theta_t + \varepsilon_{it} \quad (3)$$

where x^{*}_{it} is a latent variable whose values determine whether or not a product will be exported in 2005. This dependent variable is the probability of recording a new trade flow in 2005. ln is the natural logarithm, and $\Delta \ln(1 + tariff_{it}^{eu})$ is the change in natural log of the tariff imposed by the EU on South African product *i*. The coefficient of interest is ψ_1 and is expected to have a negative sign. $status95_{it}$ is a dummy variable that is 1 if product *i* was exported by South Africa to the EU in 1995. $tariff_{it}^{sa}$ is South Africa's average import tariff of product *i* – this may affect SA's ability and competitiveness to acquire intermediate goods. ϕ_i is the product-specific fixed effects (that capture product characteristics that are constant over time and not observable) and θ_t is time-fixed effects

The dependent variable for the corresponding intensive margin estimation is not a dummy variable but rather the change in the logarithm of the value of bilateral exports of good *i* from South Africa to the EU between 1995 and 2005 ($\Delta \ln(X_{it})$). The focus is only on those trade flows that are strictly positive in both 1995 and 2005 (Disdier *et al.*, 2013). The same independent variables are used for the extensive and intensive margin:

$$\Delta \ln(X_{it}) = \gamma_0 + \gamma_1 \Delta \ln(1 + tariff_{it}^{eu}) + \gamma_2 status95_{it} + \gamma_3 \Delta \ln(1 + tariff_{it}^{sa}) + \varepsilon_{it} \quad (4)$$

The intensive margin equation (4) is estimated using OLS. The coefficient of interest is γ_1, which is expected to be negative a priori. For a robustness check on both the extensive and intensive margin we change the base year, for example from 1995 to 1990, and the reference year from 2005 to 2010.

4.3.2 Country-level estimation

The Hummels and Klenow measure (2005) is used to calculate the extensive and intensive margins at the country-level. The relationship between tariffs and the extensive margin of exports is estimated using the following specification:

$$\ln(em_{jt}) = \vartheta_0 + \vartheta_1 \ln(wtariff_{jt}) + \vartheta_2 fta_{jt} + \vartheta_3 Z_{jt} + \lambda_j + \theta_t + \varepsilon_{jt} \quad (5)$$

The relationship for the intensive margin is as follows:

$$\ln(im_{jt}) = \varpi_0 + \varpi_1 \ln(wtariff_{jt}) + \varpi_2 fta_{jt} + \varpi_3 Z_{jt} + \lambda_j + \theta_t + \varepsilon_{jt} \quad (6)$$

where $\ln$ is the natural logarithm, em_{jt} is the export-extensive margin of South Africa with trading partner *j* at time *t*, as calculated from (Hummels and Klenow, 2002) method. ϑ_1 and ϖ_1 are the coefficient of interest and are expected to be negative; fta_{jt} is the dummy variable equal to 1 for countries in the EU and 0 if not in the EU bloc, and $wtariff_{jt}$ is the weighted average tariff on all products of trading partner *j* (overall tariff faced by South African exporters in trading partner j). Z_{jt} is a vector of control variables like distance, common language, border, colonial relationship and GDP per capita of other countries. λ_j is the country fixed effects and θ_t is the time-fixed effects. Using a dummy variable captures all other aspects related to FTA, such as fixed cost and variable cost. The study also interacts dummy variables and tariffs to capture the effect of tariff on trade margins during the trade liberalisation period.

4.3.3 Product-country-level estimation

A probit estimation approach, following Debaere and Mostashari, (2010) and Moncarz, (2010) is used to investigate the relationship between tariffs and the extensive margin at the product-country-level. Let x_{ijt} be an indicator variable that is 1 when South Africa export product *i* to trading partner *j* in 2005, and 0 otherwise. This is stated as

$$x_{ijt} = 1[x_{ijt}^{*} > 0] \quad (7)$$

$$x^{*}_{ijt} = \kappa_0 + \kappa_1 status95_{ijt} + \kappa_2 \Delta \ln(1 + tariff_{ijt}^{tp}) + \kappa_3 \Delta \ln(1 + tariff_{ijt}^{sa}) + Z_{ijt}\kappa_z + \gamma_j + \phi_i + \theta_t + \varepsilon_{ijt}$$

where x^{*}_{ijt} is the latent variable whose values determine whether or not a product will be exported to country *j* in a selected year, for example 2005. $\Delta \ln(1+tariff_{ijt}^{tp})$ is the change in natural log of the tariff imposed by trading partner *j* on South African exports of product i. $tariff_{ijt}^{tp}$ is the tariff of product *i* faced by South African exporters when exporting to a trading partner j (foreign tariff). The tariff at the HS6 digit level is different from the one used in the country regression in Equations 5 and 6, but similar to the one used under product-level estimation, as in Equations 1 to 4. The only difference is that, unlike the one used in Equation 1, the focus now is on individual trading partners, including EU countries. $status95_{ijt}$ is a dummy variable that is equal to 1 if product *i* was exported by South Africa to a trading partner in 1995. Z_{ijt} is the vector of country-specific explanatory variables. For example, the change in natural log of GDP per capita between the selected period, $tariff_{ijt}^{sa}$, is South Africa's import average tariff of product *i* – this may affect SA's ability and competitiveness to acquire intermediate goods. γ_j is country-specific effects, ϕ_i is product-specific effects, and θ_t is time-fixed effects.

The coefficient of interest in Equation 10 is κ_2 and it is expected to have a negative relationship with the extensive margin.

5. Results: Descriptive statistics

Figure 2 shows the graphical representation of the average extensive margin at both a product and trading partner level and average tariff rates over years.

Figure 2: Extensive margin and tariffs

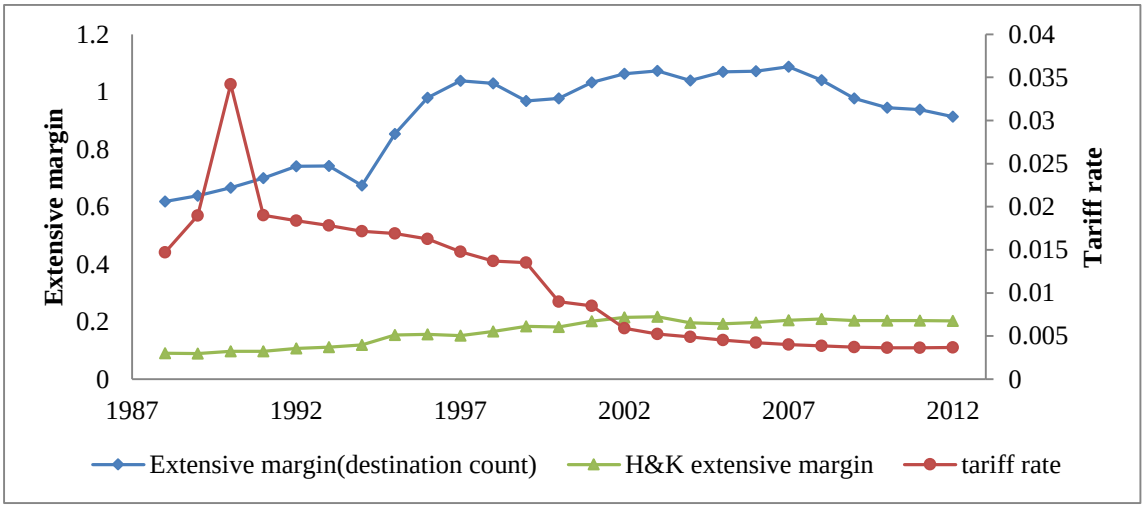
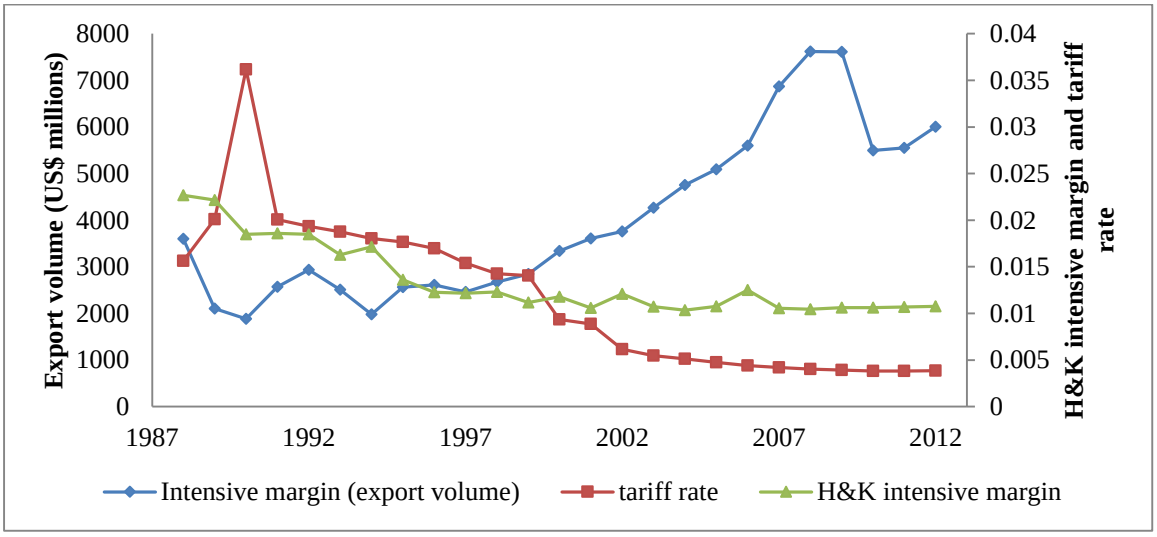


Figure 2 shows that tariff rates has been decreasing over years while the extensive margin as measured by destination count has been increasing although the beginning of this increase

predates the FTA. This trend is similarly observed for the extensive margins at trading partner calculated when using the Hummels and Klenow (2005) measure. The trend is also present when using the average tariff from trading partner (not reported here)

For the intensive margin Figure 3 shows the relationship between the Hummels and Klenow extensive margin measure, trade volume (intensive margin) and tariff.

Figure 3: intensive margin



There is negative correlation between trade volume and tariff, for example the increase in tariff in 1990 is observed as a drop in trade volume. This pattern is not observed for the intensive margin calculated using Hummels and Klenow method. Rather the intensive margin has been decreasing until around 1997, then fluctuates thereafter. This trend is the same when we use the average tariff from trading partners (graph not shown here)

6. Econometric results

6.1. Product level- Base results

Table 2 shows baseline results at both the extensive, using Poisson and OLS estimators, and intensive margins. The way in which the extensive margins is measured, by counting the number of destinations, means that it is not easy to obtain the corresponding intensive margins measure. Instead, the study presents the intensive margins results using trade volumes, as in the existing literature (Baier and Bergstrand, 2001; Disdier et al., 2013; Dutt et al., 2013). Since the dependent variable is not bounded, the study uses only the OLS estimation for the intensive margin. The table also shows results obtained when using dummy variable as dependent variable; the coefficients are interpreted from given independent variables in the fifth column.

Table 2: Product Level Base line results

	Extensive margin		Intensive margin	Dummy variable Results- marginal effects		
	Poisson	OLS	OLS		Extensive-Probit	Intensive-OLS
ln(tariff)	-0.59***	-0.60***	-0.24***	Δ ln(tariff)	-0.46***	-2.73
	(0.100)	(0.074)	(0.022)		(0.041)	(2.396)
ln(real effective exchange rate)	-1.03***	-0.71***	-0.56***	ln(South Africa tariff	0.15***	-2.36**
	(0.018)	(0.014)	(0.111)		(0.013)	(1.085)
Foreign direct investment	0.017***	0.015***	0.021**	status_95	0.13***	0.94***
	(0.002)	(0.001)	(0.009)		(0.003)	(0.228)
EU Gross Domestic Product	0.010***	0.0065***	0.00043			
	(0.001)	(0.001)	(0.008)			
SA Gross Domestic Product	0.43***	0.059***	-1.38***			
	(0.025)	(0.018)	(0.171)			
Constant		3.68***	17.3***			4.90***
		(0.183)	(1.685)			(0.221)
N	96150	97 250	18140		41 513	1 223
R^2		0.065	0.020			0.022

Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2 shows that a reduction in tariffs is associated with an increase in the number of destinations to which South Africa exports. The impact of tariff is negative for both the extensive and intensive margin using both destination count and dummy variable as a dependent variables. However it is not significant for the intensive margin when using the dummy variable. This is similar to Feenstra and Kee, (2007) which finds that tariff reduction associated with NAFTA led to an increase in Mexican export variety. For the dummy variable results, the marginal effects on tariff variable shows that it is negative, as expected. It shows that a 1% change in tariff ($\Delta \ln(tariff)$) is associated with a 0.46% increase in exports for all products at the extensive margin. However this is insignificant for the intensive margin. The variable that controls for whether good i was or was not exported in 1995 is always positive and statistically significant, as expected. The coefficients for the marginal effects imply that, on average, the fact that good *i* was exported in 1995 increases the probability of it being exported in 2005, for example, by 0.13% for extensive margin. These results are in line with what Debaere and Mostashari (2010) find, namely that already traded goods would have succeeded in overcoming fixed costs, hence their ability to continue being traded after tariff changes. The import tariff coefficient is positive for the extensive margin, it shows that a reduction in import tariff by South Africa led to less exports both at the extensive margin. This however, is the opposite for intensive margin.

6.2. Products level results- Different Product classification

To investigate the effects across products with different characteristics Table 3 shows the results using two different product classifications; the UNCTAD SoP (for Panel A) and the conservative Rauch, (1999) classification (for panel B). The smaller number of observations shown under the Rauch classification is because some products do not appear in Rauch's classification.

Panel A shows that a reduction in tariff is associated with an increase in the number of destinations to which South Africa exports across all products groups of the UNCTAD classification. The results show consistency of significance on coefficients for different products on the intensive margin than extensive margin. For example, under extensive margin the impact of changes in tariff on consumer products is insignificant. These results suggest that consumer products did not benefit much from the tariff cuts that came about as a result of the SA-EU FTA. These results are in line with Cipollina *et al*. (2013), who find that preference schemes have differentiated impacts on different products. The products in which South Africa has a high comparative advantage (abundance in) are significant, for the effect on capital goods is 1.73 and on raw material is 0.96 all under extensive margin. The other control variables, has the expected sign. For example, the exchange rate has the expected negative sign, as expected from the theory. As the exchange rate appreciates, exports trade margins decrease. Largely, the study finds that tariff reduction is associated with an increase in both the extensive and intensive margin of export. This is in contrast to the findings of Disdier *et al*. (2013), who find that most of the coefficients were not significant across the respective products groups.

The results from using the Rauch classification (Panel B) confirm the negative effect of tariffs on the two export margins. This is in line with the findings obtained using the UNCTAD SoP classification. It shows that tariff cuts are associated with an increase in the number of countries to which South Africa exports and the volume of already traded goods.. However, for the extensive margin the impact is not uniform across products. It is significant for differentiated commodities, but not for homogenous and reference priced products. The results support (Van Biesebroeck and Yi, 2012) findings, which show that differentiated goods have the most sensitive tariff-extensive margin elasticity, followed by reference-priced goods and then homogenous goods. Further, this finding, which shows different tariff responsiveness between homogeneous and differentiated goods, is consistent with a variety of models, ranging from the "new" trade theory of Krugman (1979) to the "new new" trade theory of Melitz (2003). These models show that consumers and firms react more to trade incentives for differentiated goods than for homogenous goods.

Table 3: Different Product Level results

Panel A: Extensive margin (Destination count measure) and Intensive (Volume of Exports) – UNCTAD SoP classification

	Extensive margin- Poisson coefficient				Intensive margin-OLS			
	Capital	Consumer	Intermediate	Raw material	Capital	Consumer	Intermediate	Raw material
In(tariff)	-1.73***	-0.15	-0.58**	-0.96***	-0.61***	-0.14***	-0.17***	-0.25***
	(0.407)	(0.127)	(0.251)	(0.269)	(0.070)	(0.035)	(0.038)	(0.055)
In(real effective exchange rate)	-0.86***	-1.22***	-1.07***	-0.57***	-2.15***	-0.79***	0.064	-0.75***
	(0.035)	(0.028)	(0.038)	(0.060)	(0.442)	(0.187)	(0.165)	(0.252)
Foreign direct investment	0.021***	0.016***	0.013***	0.019***	0.059*	0.020	0.0045	0.0080
	(0.003)	(0.003)	(0.004)	(0.005)	(0.031)	(0.015)	(0.015)	(0.023)
EU Gross Domestic Product	0.0063***	0.0079***	0.019***	0.019***	0.030	-0.020	-0.00043	0.045***
	(0.002)	(0.002)	(0.003)	(0.004)	(0.035)	(0.014)	(0.011)	(0.017)
SA Gross Domestic Product	0.33***	0.87***	0.11**	0.44***	-4.86***	-1.86***	-0.57**	-0.84**
	(0.048)	(0.039)	(0.053)	(0.085)	(0.874)	(0.335)	(0.242)	(0.350)
Constant					52.9***	22.9***	2.73***	14.0***
					(8.013)	(3.167)	(0.812)	(3.481)
N	19625	31200	36425	8900	2202	6990	6712	2236
R^2					0.171	0.016	0.004	0.028

Panel A: Extensive margin (Destination count measure) and Intensive (Volume of Exports) – Rauch (1999) classification

	Extensive margin- Poisson coefficient			Intensive margin- OLS		
	Differentiated	Reference	Homogenous	Differentiated	Reference	Homogenous
In(tariff)	-0.91***	-0.41	-1.15	-0.35***	-0.16***	-0.28*
	(0.254)	(0.268)	(1.462)	(0.066)	(0.057)	(0.156)
In(real effective exchange rate)	-1.09***	-0.81***	-0.52***	-1.49***	-0.93***	-0.26
	(0.041)	(0.080)	(0.158)	(0.380)	(0.229)	(0.670)
Foreign direct investment	0.015***	0.019***	0.020	0.051*	-0.011	0.12*
	(0.004)	(0.007)	(0.015)	(0.030)	(0.021)	(0.063)
EU Gross Domestic Product	0.010***	0.012**	0.025**	0.030	0.0051	0.071*
	(0.003)	(0.006)	(0.011)	(0.028)	(0.015)	(0.041)
SA Gross Domestic Product	0.88***	0.11	0.41*	-3.09***	0.21	2.32***
	(0.056)	(0.113)	(0.210)	(0.609)	(0.307)	(0.865)
Constant				36.1***	6.21**	-15.5*
				(5.864)	(3.103)	(8.979)
N	13100	6125	1475	2102	2173	273
R^2				0.065	0.023	0.092

Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

6.3. Trading partner (country) level results

Table 4 shows the OLS results from estimating Equation 5 and 6 at trading partner level Column 1 shows the regression with tariff and other controls variables as independent variables, Column 2 introduce the free trade area dummy variable. The exclusion of tariffs under Column 2 is to observe the effect of the FTA dummy on its own. Column 3 introduces the interaction between the FTA dummy and the tariff. This is the same for both extensive and intensive margin. This estimation uses a different tariff dataset, since it exploits the average import tariff of each trading partner of South Africa from the World Bank, rather than from the TRAINS, dataset.

Table 4: OLS regression: Trading partner level

	Extensive margin			Intensive margin		
	1	2	3	1	2	3
In(wtariff)	-0.12**		-0.26***	-0.23***		-0.38***
	(0.055)		(0.033)	(0.054)		(0.036)
In(distance)	-1.32***	-1.94***	-1.67***	-0.69***	-0.86***	-0.69***
	(0.108)	(0.057)	(0.086)	(0.087)	(0.070)	(0.082)
Language	0.28***	-0.11*	0.15*	0.072	-0.074	-0.063
	(0.089)	(0.054)	(0.081)	(0.086)	(0.048)	(0.093)
Colony	1.19***	1.22***	1.38***	2.01***	2.05***	2.23***
	(0.057)	(0.077)	(0.061)	(0.082)	(0.060)	(0.086)
In(GDP)	0.42***	0.67***	0.48***	0.32***	0.53***	0.37***
	(0.045)	(0.025)	(0.050)	(0.032)	(0.019)	(0.034)
Free trade area dummy		-0.0029			-0.20***	
		(0.042)			(0.049)	
In(real eff. exchange rate)		-0.044			0.072	
		(0.272)			(0.201)	
Contiguity		-9.57***	-1.96***		-2.20**	0.68
		(0.585)	(0.617)		(0.844)	(0.538)
fta*In(tariff)			0.16***			0.16***
			(0.033)			(0.028)
Constant	5.86***	9.69***	8.29***	-2.38***	-1.98	-2.93***
	(0.851)	(1.395)	(0.668)	(0.711)	(1.214)	(0.751)
N	1 530	1 588	1 530	1 530	1 588	1 530
R^2	0.278	0.387	0.301	0.213	0.239	0.231
Year Fixed Effects	yes	yes	yes	yes	yes	yes
Country Fixed Effects	yes	yes	yes	yes	yes	yes

Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The results in Table 4 shows that a reduction in tariff – lwtariff (weighted mean tariff) – is associated with an increase in varieties traded and is robust to different econometric specifications. This shows that a tariff reduction in South Africa's EU trading partner countries results in increases in the varieties exported by South Africa. For example, Column 3 shows that a 1% decline in tariff results in a 0.26% increase in exported varieties while it

lead to 0.38% for already traded varieties (intensive margin). This is similar to existing empirical evidence (see Buono and Lalanne, 2012 results under OLS) The FTA dummy is not significant for the extensive margin. This finding contradicts what Foster *et al*. (2011) found, namely that PTAs are trade-creating, especially for the extensive margin.

6.4. Product- Country results

Table 5 shows the results obtained from estimating Equation 7. The three broad columns show estimations firstly for the full sample period, while the second column considers only products traded in 1995. This tested persistence in trade. The third column estimated for those goods not traded in 1995.

Table 5: Extensive margin – marginal effects: Product-trading partner level

	Full sample			**Traded in 1995**			**Not traded in 1995**		
	Poisson	Probit	OLS	Poisson	Probit	OLS	Poisson	Probit	OLS
Δ In(tariff)	-0.059***	-0.079***	-0.094***	-0.084*	-0.091*	-0.088*	-0.077***	-0.083***	-0.10***
	-0.015	-0.018	-0.021	-0.048	-0.054	-0.051	-0.015	-0.018	-0.023
status_95	0.34***	0.36***	0.52***	-	-	-	-	-	-
	-0.008	-0.007	-0.013	-	-	-	-	-	-
In(distance)	-0.055***	-0.056***	-0.060***	-0.042*	-0.040*	-0.041*	-0.063***	-0.060***	-0.065***
	-0.009	-0.008	-0.009	-0.025	-0.024	-0.024	-0.009	-0.009	-0.009
N	9 615	9 615	9 615	1 548	1 548	1 548	8 067	8 067	8 067

Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The results show that a change in tariff and status of products in 1995 (status_95) has the expected sign and is significant. The coefficient for change in tariff variable (Δ In(tariff)) has the expected negative sign, as confirmed from the product-level analysis. The coefficient of the 1995 status is positive. This shows that the probability that the product that was initially traded before the trade agreement will continue being exported after the trade agreement is high. The distance coefficient carries the expected sign and is significant. Further, the estimation only for products traded in 1995 shows the expected sign, but is significant at the 10% level. It shows persistence in trade. The last column, which shows products not traded in 1995, also displays the expected sign for tariff coefficient across the estimation methods. It shows that there were new products that were largely traded. The results of this section are robust to different estimation techniques.

7. Conclusion

This paper investigates the impact of tariff reduction due to the SA-EU FTA on the extensive and intensive export margins, exploiting different ways of measuring trade margins. The

paper estimates the impact of tariff reduction at the product, country-level and product-country level. The results largely show that foreign tariff reduction leads to an increase in both the extensive and the intensive margin.

The results at the product level are disaggregated into various product groups according to the UNCTAD SoP, and Rauch (1999) classifications. The results show that a decrease in tariff is not associated with an increase in the number of countries exported for all product types. However for intensive margin it shows that reduction in tariff led to increase in volume of all traded products. This shows that South African exporters have been expanding exports of already traded (intensive margins) as compared to extensive margin.

The results disaggregated according to capital, consumer, intermediate and raw materials show the importance of tariff reductions in driving trade among these product categories. The results show that it is only consumer goods that do not respond significantly to tariff reduction. This suggests that South Africa does not export much of these categories, as they may be easily manufactured in the EU market. These results are confirmed under the Rauch classification, since homogenous products show a weaker relationship with tariff reduction. This shows that similar products are less responsive to a tariff reduction.

The importance of tariff reduction is also shown on the results at country level, for both the intensive and extensive margins. These results show that tariff changes lead largely to an increase in the number of varieties traded and volumes of already traded goods and are robust to different specifications. The importance of tariff reduction is also observed at the product-country level. The results are robust to the use of different estimators. Also, the impact of tariff liberalisation is enhanced if the commodity was traded before the trade agreement. This implies that the SA-EU FTA was largely beneficial where there were pre-existing trade flows.

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Appendix 1: Definitions of variables

Variable	Definition	Regression level
Tariff (at HS6)	Tariff at HS6 digit code. The study use effective applied rate. The same dataset also contains preferential rates	Product level and Product-trading partner level
Extensive margin (em) – geographic	Number of destinations to which South Africa exports	Product level
Intensive margin (im)	Change in value (US$ millions) of HS6 products exported by South Africa from 1995 to 2005	Product level
Dummy variable	1 if product was traded in 2005	Product &-trading partner level
Tariff-(wtariff)	Simple mean applied tariff is unweighted average of effectively applied rates for all products subject to tariffs calculated for all traded goods	Trading partner
Extensive margin (em) – H&K	This is as calculated using the Hummels and Klenow approach	Trading partner
Intensive margin (im) –H&K	This is as calculated using the Hummels and Klenow approach	Trading partner
Real exchange rate (reer)	This is the nominal effective exchange rate divided by a price deflator or index of costs	Trading partner and product level
GDP per capita (US$)	The gross domestic product (final value of all goods and services produced in the country) divided by midyear	Trading partner and product level

	population	
Foreign direct investment (FDI)	Net inflows of investment to acquire a lasting management interest in an enterprise operating in an economy other than that of the investor	Trading partner and product level
Distance	Distance between major capital cities between countries – calculated following the great circle formula, which uses latitudes and longitudes of the most important cities	Product-trading partner level
Free trade area (fta)	Dummy variable equal to one after EU-SA trade agreement	Trading partner and product level
Contiguity	Dummy variables indicating whether the two countries are contiguous (neighbours)	Trading partner