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Potential effects of the United Kingdom's departure from the European Union on South African citrus exports: a case of non-tariff measures

by

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Submitted in partial fulfilment of the requirements for the degree

MSc. (Agric) Agricultural Economics

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DECLARATION

I, Mailness Scelo Mshengu, declare that this dissertation, which I hereby submit for the degree MSc. (Agric) Agricultural Economics at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other institution.

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M.S. Mshengu

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ABSTRACT

Potential effects of the United Kingdom's departure from the European Union on South African citrus exports: a case of non-tariff measures

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The European Union (EU) market is important for South African citrus exporters; however, the increase in non-tariff measures (NTMs), such as SPS requirements by the EU, to some extent may have an impact on South African citrus export to the EU. For an instance, the EU adopted stricter regulations in 2013 on the number of Citrus Black Spot (CBS) interceptions, setting them at a maximum number of five, as opposed to thirty-six that were found in South African citrus exports in 2012. The adoption of such NTMs constitutes a greater challenge for South African exporters, who are required incur greater cost in complying with higher standards. South Africa has normally associated some of the NTMs imposed by the EU on citrus from South Africa, such as CBS regulations, with the internal interests of some citrus-producing European countries. The United Kingdom (UK), after Brexit and being outside the EU, may no longer be constrained by such EU interests. Accordingly, the main objective of this study is to evaluate the potential impact of NTMs imposed by the EU on South African citrus exports to the UK.

To evaluate the impact of EU NTMs on South Africa citrus, a database of NTMs was developed. Citrus products classified at HS 6-digit level exported by South Africa to the EU were included in the database. The descriptive analysis has shown evidence that, overall, the number of NTMs applied on citrus exports from South African by the EU escalated from 25 in 1988 to 1 829 in 2018. This increase in the number of NTMs coincided with a decline in the tariffs.

Inventory analysis results revealed that, because the UK is a member of the EU, and even though the UK does not have citrus production, South African citrus exports to the UK faced 3.9%–16% more SPS measures than they would have if the UK was not part of the EU. Furthermore, South Africa would have faced 10%–20% more TBT measures than they would have if UK was not part of the EU. It was also found that South Africa would have faced 33%–390% more of other types of NTMs than they would have if the UK was not part of the EU.

The econometric analysis revealed that South African oranges and mandarins exports are mostly affected by SPS measures, rather than any other NTM category, and their impact is higher in the rest of the EU than in the UK. The difference of -0.001 and -0.009, which is obtained by subtracting the value of the NTM (SPS) coefficient for exports to the rest of the EU and that of the UK for oranges and mandarins, respectively, represents the margin by which South African exports to the UK unnecessarily suffer for SPS measures. The results also revealed that TBT measures only affected South African oranges and mandarins exports to the rest of the EU and not to the UK. The other NTMs had no significant impact on both exports to the rest of the EU and the UK. Furthermore, tariffs had no significant impact on all citrus categories exported to the rest of the EU and the UK, across all NTM categories.

One of the important findings of the study is that the impact of SPS measures is the highest in the rest of the EU as compared with UK and that TBT measures had no negative effect on citrus exports to the UK. This implies that because there are no commercial citrus orchards in the UK, citrus exporters that were likely excluded to UK when it was still under EU will likely benefit if regulations related to pests, plant health (including CBS), plant protection and territory protection are eliminated or reduced. Therefore, this study recommend that South African trade policy makers should prioritise negotiations for the reduction or removal of some of these measures that do not apply to the UK due to the absence of commercial orchards in the UK. Furthermore, the study recommends that South African citrus producers should focus on exporting more amounts of citrus to the UK, and export less to the rest of the EU since exports to UK are not affected by TBT measures.

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Brexit	Britain’s exit from the European Union
CBS	Citrus Black Spot
CGA	Citrus Growers Association
Codex	Codex Alimentarius Commission
CR	Coverage Ratio
EFSA	European Food Safety Authority
EPA	Economic Partnership Agreement
EU	European Union
FAO	Food and Agriculture Organization
FI	Frequency index
FTA	Free Trade Area
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
IPPC	International Plant Protection Convention
ITC	International Trade Centre
I-TIP	WTO Integrated Trade Intelligence Portal
MAST	Multi-Agency Support Team
MRLs	Maximum Residue Limits
NTBs	Non-Tariff Barriers
NTMs	Non-Tariff Measures

OLS	Ordinary Least Squares
PCM	Price Control Measures
QC	Quantity Control
RASFF	Rapid Alert System for Food and Feed.
RTA	Regional Trade Agreements
SADC	Southern African Development Community
SARB	South African Reserve Bank
SPS	Sanitary and Phytosanitary measures
TBT	Technical Barriers to Trade
TDCA	Trade, Development and Cooperation Agreement
TPRM	Trade Policy Review Mechanism
TTBD	World Temporary trade barriers database
UK	The United Kingdom
UNCTAD	United Nations Conference on Trade and Development
USDA	United States Department of Agriculture
WHO	World Health Organization
WITS	World Integrated Trade Solution
WTO	World Trade Organization
STC	Specific Trade Concerns

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

Substantial global reductions of tariffs among trading partners have been brought about over the years by the success of the World Trade Organization (WTO) in negotiating the General Agreement on Tariff and Trade (GATT). The Uruguay Round of negotiations, which started in 1986, brought about the largest reform in the world trading system since GATT was formed post the Second World War. The main aim of tariff elimination and barriers was to ensure that global markets for exports and imports remained attractive and acceptable to traders. Consequently, South Africa joined other countries in liberalising its trade policy in its commitment to contribute to GATT. South African policy reform was aimed at improving global market access for South African traders. The country has experienced declines in tariffs as well as subsidies as a result of the country's WTO commitments and has since entered into regional and bilateral trade arrangements (Cassim and van Seventer, 2004). South Africa has Regional Trade Agreements (RTAs) with the Southern African Development Community (SADC) as well the European Union (EU).

The Trade, Development and Cooperation Agreement (TDCA) is one of the RTAs, which has demonstrated a remarkable success, via the reduction of tariffs, in ensuring progress in trade liberalisation. This agreement provisionally came into force in January 2004 and was implemented fully in May 2004, and has governed trade relations between the European Union and South Africa. The TDCA has since been replaced by the SADC–EU Economic Partnership Agreement (SADC–EU EPA) that came into force from 01 November 2016. It is important to note that the UK has since voted to leave the EU. South Africa now trades with the UK under Southern African Customs Union, Mozambique and UK (SACU-M UK EPA) trade agreement, which is a rollover of the EPA (DTI, 2019). The EU and South Africa trade agreement has played a significant role in improving market access for South African agricultural products to the EU.

The trade agreement between the EU and South Africa has since increased South Africa's agricultural trade to the EU market (Assarson, 2005). Amongst other agricultural products, citrus has been the primary fruit commodity exported to the EU market.

The EU citrus market is critical to the South African citrus industry. The citrus industry in South Africa generates an average of 42% of its total citrus export revenue from the EU (Citrus Growers Association (CGA), 2019). Citrus exports to the EU contribute immensely to the export revenue of above R6.2 billion per annum generated through citrus exports. This further translates to employment. According to Meyer *et al*. (2012), 85 200 people are employed by the industry, comprising 10 200 people who are permanently and a total of 75 000 people who are employed as seasonal labour. This does not take into account the number of people who are employed in support services, for instance port management, transport and associated services (Kapuya *et al.,* 2014).

Despite the significance of the EU citrus market to South Africa, the increase in NTMs such as SPS requirements imposed by the EU may, to some extent, have an impact on South African citrus export to the EU. These NTMs imposed by the EU have a range of objectives that are legitimate, but may perhaps have less to do with international trade, and nonetheless have trade restricting and aid protectionist intentions. These public policy objectives consist of provisions that aim to correct market imperfections, for instance information asymmetry, public and environment health externalities and consumer protection, and aim to improve domestic security and other commitments.

Recently the EU Citrus Black Spot (CBS) regulations have been a major challenge for South Africa to deal with. CBS affects the quality and quantity of the crop and since it has no cure, it can only be managed through preventative measures like fungicides. Navels, valencia, lemons and grapefruits are the fruits most sensitive to CBS. CBS is classified as a quarantine pest in the EU due to concerns about the likelihood of its spreading to Europe; however, there has been extensive research that supports the view that it is unlikely that CBS could establish in Europe. Amongst the studies, Paula (2005) pointed out that climate is a barrier to the establishment of CBS because its potential distribution is inhibited by cold conditions. Nevertheless, during 2013, the EU adopted a regulation on limiting the number of interceptions to a maximum of five on citrus exports from South

Africa and required that South Africa adhere to strict CBS regulations. (National Plant Protection Organization of SA (NPPOSA), 2013). However, regulations such as CBS may not apply in the UK market post Brexit due to absence of commercial citrus orchards in the UK.

The UK is an essential market for South African citrus exports. It is amongst the largest importers of citrus fruit originating from South Africa, accounting for 32% of the export market for citrus fruit in 2018. While 42% of all South African citrus was exported to the EU in 2018, the UK was the second largest importer within the EU, making up 21% (CGA, 2019). Changes in regulations such as CBS requirements in future trade dealing between the UK and South Africa may likely benefit the citrus industry through the negotiation of less stringent UK citrus import regulations. This would likely open markets to citrus exporters who are currently excluded from the EU market by stringent requirements such as CBS regulations.

1.2 RESEARCH PROBLEM AND MOTIVATION

One of the most important objectives of the establishment of the GATT and its successor, the World Trade Organization (WTO), was to reduce trade impediments such as tariffs and NTMs. The intention was to ensure secure and free market access for member countries that would result in international trade expansion by means of economic globalisation (Kennedy and Koo, 2005). In spite of this, as multilateral and bilateral trade agreements all over the globe seek to reduce tariff utilisation as a form of trade barrier, other types of barriers to trade have surfaced. Additionally, and parallel with this episode of trade liberalisation, NTMs that aim to protect domestic industries have surged. As a result, several countries regulate imports by these means, together with the use of tariffs.

According to Gebrehiwet *et al.* (2007), the increase in NTMs is an international occurrence that signifies a crucial impediment to South Africa's agricultural exports. For instance, Chadwick (2013) indicated that the EU adopted stricter regulations in 2013 on the number of CBS interceptions, limiting them to five (5), as opposed to thirty-six (36) interceptions that occurred in 2012 in citrus exports from South Africa. This regulation meant that CBS interceptions beyond five would result in additional restrictions on South African citrus exports to the EU, i.e. by banning citrus exports from South Africa (van de

Geer, 2013). The application of such regulations contributes to a greater challenge for citrus exporters in South Africa, who are required to incur greater costs in complying with higher standards.

South Africa has normally associated some of the NTMs imposed by the EU on citrus that originate from South Africa, such as CBS regulations, with the interests of certain citrus-producing European countries, which the UK after Brexit may no longer be constrained by, when it falls outside the EU. However, this will highly depend on whether the UK decides to continue to apply existing NTM regulations or it set its own regulations. There will likely be implications for market access in a scenario where the UK sets its own regulations, depending on whether they are less or more stringent.

Post-Brexit bilateral trade negotiations between South Africa and the UK may provide prospects for considering market access conditions for citrus in the UK. Furthermore, concerns regarding NTMs applicable to citrus that create trade frictions and serve protectionist motives may be negotiated. Because the UK does not have a domestic citrus industry to protect (USDA, 2020), South Africa might be able to negotiate lower tariffs, or even the elimination of tariffs. The UK, being one of the biggest importers of citrus fruit originating from South Africa, accounted for 42% of all South African citrus fruit that was exported to the EU in 2018 (CGA, 2019). Therefore, bilateral negotiations between the UK and South Africa that encompass changes in regulations could have immense implications for the South African citrus fruit industry. Less stringent regulations could allow the South African citrus fruit industry to increase exports. This would likely result in increased profit margins as the regulatory compliance costs would be reduced. This study accordingly seeks to evaluate the potential impact of reduced NTMs on citrus exports from South Africa to the UK after Brexit.

1.3 STUDY OBJECTIVES

The main objective of this study is to assess the potential impact of EU NTMs on South African citrus exports to the UK. However, to evaluate such impact, the initial task is to develop a single-source database of EU NTMs that affect South African citrus exports to the UK so that the NTMs are quantifiable, and then evaluate their effects on citrus exports

volumes originating from South Africa to the UK. The specific objectives of the study are as follows:

- To develop a single-source database of NTMs imposed by the EU that affect South African citrus exports.
- To determine the effects of NTMs on citrus exports from South Africa to the UK (post Brexit) and the rest of the EU (excluding UK) by using the inventory approach.
- To estimate the effects of NTMs on South Africa's citrus exports to the UK and the rest of the EU.
- To estimate the effects of tariffs on South African citrus exports to the UK and the rest of the EU.

In short, this study sets out to establish a database of NTMs imposed by the EU on citrus exports originating from South Africa. This database will be used to evaluate the effect of NTMs imposed by the EU on citrus exports from South Africa. To start with, the study will attempt to ascertain if NTMs imposed by the EU on citrus from South Africa have grown, declined or stayed the same during the period from 1988 to 2018. Secondly, the inventory approach will be used to determine how these NTMs have affected citrus exports from South Africa to the UK, compared with the rest of EU. Third, the impact of NTMs on South African citrus export volumes to rest of the EU countries and the UK will be estimated. Fourthly, a determination will be made whether tariffs are still important barriers to citrus trade.

1.4 HYPOTHESES OF THE STUDY

Citrus export volumes from South Africa to EU countries, particularly in the UK, have not increased although the volume of citrus produced in South Africa has been increasing over the years. While this may be explained by various reasons, there is evidence that NTMs imposed by the EU on citrus from South Africa have been rising over the years, consequently affecting South African export volumes to the UK. Recently, the most cited NTMs used by the EU that affect the citrus volumes from South Africa to the EU are CBS regulations. The study by Kapuya (2015) shows that the EU technical barriers or NTMs have basically resulted in the diversion of South Africa's orange exports to other markets,

away from the EU markets, regardless of South Africa receiving preferential market access. Therefore, this researcher is of the view that NTMs imposed by the EU that aim to protect plant health and support EU producer competitiveness may not be imposed by the UK after Brexit because the UK does not have a citrus industry to protect.. It is against this background that the study evaluates the potential impact of NTMs on South African citrus exports to the UK after Brexit. This study will, therefore, test the following hypotheses, in line with the specific objectives:

- The developing of an EU NTM database will enable the evaluation of the effect of NTMs on South African citrus exports to the EU and the UK.
- There is an increase in the use of NTMs by the EU on citrus imports from South Africa.
- NTMs have negative impacts on South Africa's citrus exports to the rest of the EU and the UK.
- The effects of NTMs on South African citrus exports to the UK will be lower compared with exports to the rest of the EU after Brexit.
- The importance of tariffs as barriers to citrus trade is low.

1.5 METHODOLOGY

The study will use two methodologies: the inventory method and the gravity model. An inventory approach provides two important indices: the frequency index (FI) and the coverage ratio (CR). The FI will be used to determine the percentage of South African citrus product categories that are subject to at least one or more NTMs. The CR will be used to capture the percentage of South African citrus exports that are subject to one or more NTMs. This analysis will be done for both the rest of the EU and the UK, and they will be compared. The gravity model will be used to measure the impact of NTMs on South African citrus exports to the rest of the EU and the UK, across four major citrus categories. Many trade researchers use a gravity model as a preferred model because of its outstanding accomplishments in analysing trade flows (Kareem, 2013). Gravity trade models can be easily adjusted in order to examine how NTMs affect international trade; therefore, they fit exactly into the framework to meet the third and the fourth objectives of

this study. Gravity model standard variables comprise importing and exporting countries' GDPs, distance, common border, colonial legacy and language.

In order to measure the impact of NTMs on South African citrus exports to the EU and the UK, the current study estimates the following augmented gravity equation:

$$LnEx_{ijt} = \beta_0 + \beta_1 lnGDPPCSA_{it} + \beta_2 lnGDPPC_{jt} + \beta_4 ln\ (1+Tar_{it}) + \beta_5 lnER_{ijt} + \beta_6 NTM_{ijt} + \varepsilon_t \quad \text{..... (1.1)}$$

where:

Ex_{ijt} is citrus export volumes from country *i* to country *j* in year *t* (tons);

$GDPPCSA_{it}$ is the GDP per capita in the exporting country *i* at time *t* (USD);

$GDPPC_{jt}$ is the GDP per capita in the importing country *j* at time *t* (USD);

Tar_{it} represents the tariffs imposed by country *i* on imports from country *j* and time *t*;

ER_{ijt} is the exchange rate between country *i* and country *j* in year *t*;

NTM_{ijt} represents trade weighted NTM measure; and

ε_t represents the error term.

The main factor of key interest in this study, as indicated in the above subsection, is the NTMs variable that is captured, as a trade weighted NTM measure from 1988 to 2018. In assessing the impact of EU NTMs on South African citrus exports to the rest of the EU and the UK, this study will mainly focus on the NTM variable coefficients. If the signs of the coefficients are significant and positive, it would suggest that NTMs have a positive relationship with South African citrus exports to the rest of the EU and the UK. Consequently, the null hypothesis that states that NTMs have a negative impact on South Africa's citrus exports to the rest of the EU and the UK will be rejected. In a case where the coefficient is negative and statistically significant, then the null hypothesis will not be rejected and a conclusion will be supported that NTMs indeed have a negative impact on South Africa's citrus exports to the rest of the EU and the UK.

This study focuses on citrus exports from South Africa to the rest of the EU and the UK over the period from 1988 to 2018. The study period was chosen to track South African citrus export performances and the impact of NTMs over a longer period. Data for the dependent variable, South African citrus fruit exports to the rest of the EU and the UK (Ex_{ijt}), was extracted from the International Trade Centre (ITC) trade map. It was augmented by data from Quantec (2020). In relation to the Harmonized Classification (HS) Code, citrus is classifiable under Chapter 8 and the collection of data was done at heading HS6 digit level.

1.6 ORGANISATION OF THE STUDY

The rest of this dissertation is organised as follows: Chapter 2 presents South African exports performance and trade relations between South Africa and the EU and the UK; Chapter 3 presents a review NTMs and their impact on trade; Chapter 4 presents a discussion of the construction of the database of the EU NTMs that affects South African citrus exports and the inventory analysis; Chapter 5 discusses the approach used to achieve the third and fourth objectives of the study; and the estimated results are presented in Chapter 6. Lastly, Chapter 7 provide a summary of the study, conclusions and recommendations.

CHAPTER 2: SOUTH AFRICAN EXPORTS PERFORMANCE AND TRADE RELATIONS BETWEEN SOUTH AFRICA AND EU/UK

2.1 INTRODUCTION

As stated in Chapter 1, the primary objective of this study is to evaluate the potential impact of NTMs on citrus exports to the UK after Brexit. This chapter therefore presents an overview of South African exports performance and trade among South Africa, the EU, and the UK. The first part of this chapter provides a brief review of South African global export performance, followed by a brief background of Free Trade Agreements (FTA), coupled with EU Free Trade Agreements (FTA) and SA–EU trade. This is followed by a discussion of South African agricultural trade with the rest of the EU and the UK. The last section presents a summary and conclusions drawn from this chapter.

2.2 SOUTH AFRICAN GLOBAL EXPORT PERFORMANCE REVIEW

Exports constitute an essential part of the South African economy through their contribution to the growth of the economy, employment and to the current account. This section therefore focuses on South African global export performance over the period from 2009 to 2018. It also focuses on the top 10 citrus exporting countries, as well as on the top 10 importing countries in the world. Figure 2.1 illustrates that South Africa's total exports are characterised by fluctuations over time. The figure also clearly shows that agricultural exports follow a similar trend.

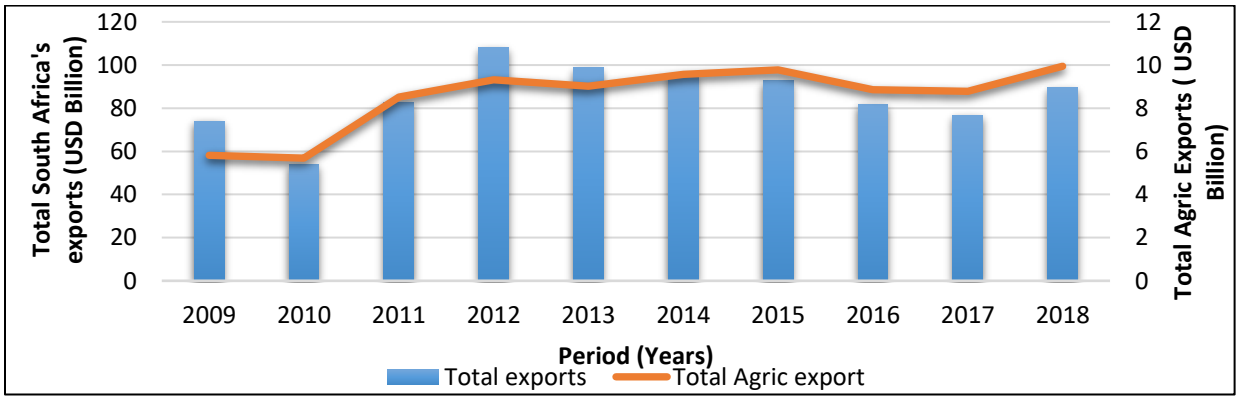

Figure 2.1: South African export growth between 2009 and 2018

Source: ITC Trade Map, (2020)

The trends noticed from the above figure demonstrate that South Africa has struggled to increase both its overall exports and agricultural exports over the past decade. On average, South African exports grew by only 0.9% per annum between 2009 and 2018. According to the World Bank (2019), South Africa's export growth has been low relative to comparable countries. This clearly suggest that sectors which contribute to exports growth are important for South Africa to realise overall growth in exports and amongst such sectors is the Horticulture sector. Horticulture is an important sector due to its immense contribution to generation of agricultural GDP, employment and South African agricultural exports over the years. The horticulture industry is a particularly key category for South Africa's agricultural exports. Fruit is a lucrative export crop and South Africa exports mainly citrus fruits and deciduous fruits, whereas the market for vegetables is mainly driven by local demand.

The South African horticulture export value has increased steadily over the past two decades and South Africa's fresh fruit industry currently contributes about 52% of the value of South Africa's agriculture export basket (ITC Trade Map, 2020). This is not a surprise since South Africa is second biggest citrus exporter, globally.

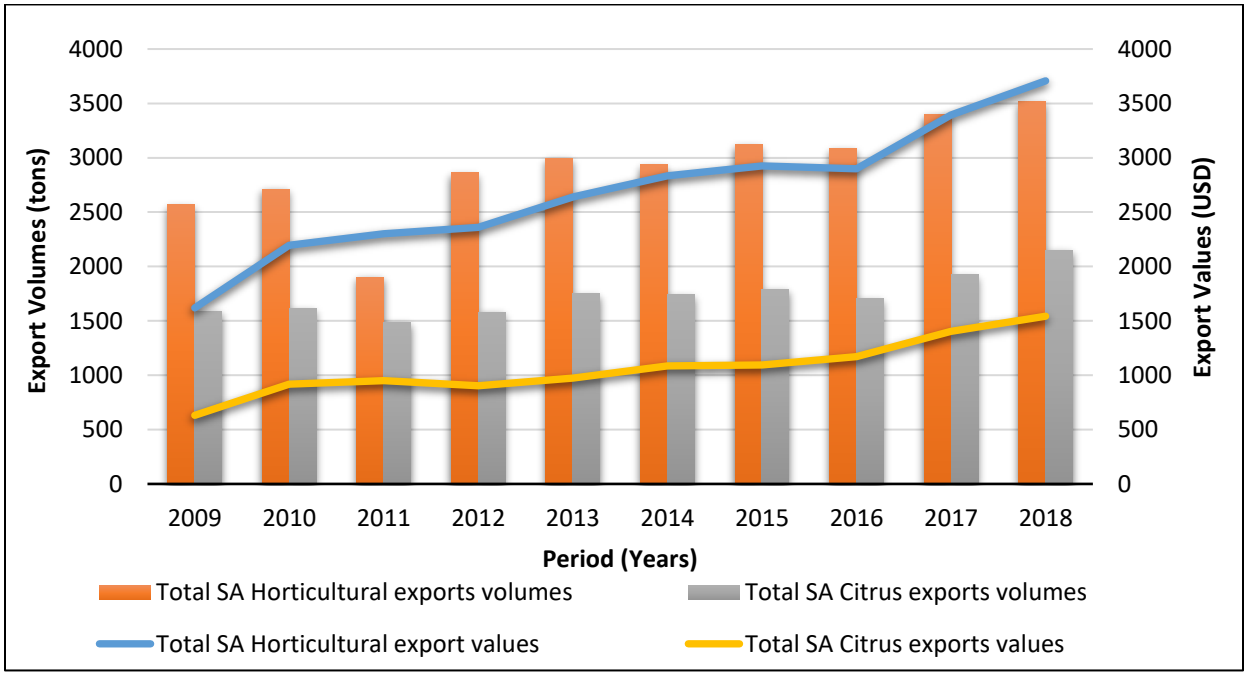

Figure 2.2: Total South African horticultural products and citrus products exports

Source: ITC Trade Map, (2020)

Figure 2.2 illustrates the point that the country's total horticultural exports and citrus exports have been increasing over the years, although in some other years they decreased. The figures also shows that 50% of all horticultural exports are citrus exports. This indicates the extent of how important the citrus industry is in the South African agricultural industry, which is among the top 10 citrus exporting countries in the world.

Table 2.1 below shows the top ten citrus exporting countries in the world and their market shares. The countries that rank in the first 10 provide more than 80% of the total global citrus exports. Spain, which the only EU member country in the top 10, is the leading exporter of citrus fruit in the world, with an export share of above 24% in 2018. Although South Africa is the twelfth largest producer of citrus in the world, it is the second largest citrus exporter in the world rankings, recording an export share of 10.25%, with China in third place, at an 8.3% export market share. The South African citrus export share grew from 6.2% in 2009 to 10.2% in 2018, while that of Spain declined from 33.6% in 2009 to 24.6% in 2018. South Africa is an established player in global citrus fruit exports. South African citrus exports grew about 144% between 2009 and 2018. This positive growth can be attributed to factors such as exchange rate and the increase in land under cultivation.

Table 2.1: Top 10 citrus fruit exporting countries in the world and their shares

Exporters	Export Value (USD'000)		Export Share (%)		Rank	Growth Rate %
	2009	2018	2009	2018	2018	2009-2018
Spain	3 449 744	3 716 088	33.6	24.6	1	7.7
South Africa	631 099	1 542 719	6.2	10.2	2	144
China	592 245	1 261 170	5.8	8.3	3	113
Netherlands	546 979	1 055 090	5.3	7	4	93
United States of America	772 137	989 513	7.5	6.5	5	28
Turkey	788 610	889 970	7.7	5.9	6	13
Egypt	532 078	769 853	5.2	5.1	7	45
Mexico	208 010	591 311	2	3.9	8	184
Morocco	312 881	445 097	3	2.9	9	42
Australia	150 720	345 617	1.5	2.3	10	129

Source: ITC Trade Map, (2020)

Although South African exports have grown over the past decade and have been competitive globally, this does not completely reflect the extent to which citrus exports from South Africa are subject to NTMs in a market like the EU which is South Africa's largest citrus export market, which exporters need to comply with. The EU has instituted various forms of NTMs over the years to control diseases in plants, as well as fruits, amongst other measures. Notably, the EU imposed measures in 2016 to control for CBS on exports of citrus originating from South Africa. However, South Africa regards such NTMs as measures aimed at protecting citrus-producing countries within the Union that compete with South Africa in the world citrus exports markets, as well as within the EU market. These countries include Spain, which is the number one citrus-exporting country in the world. The EU, however, is still a vital export market for South Africa citrus and is one of the biggest importers of citrus in the world.

Table 2.2 below show the top ten citrus-importing countries, globally. The United States of America is ranked as the number one importer of citrus fruit, globally, with an import share of above 9% in 2018. Germany and the Netherlands are second and third in the world rankings, each with a citrus import share of 8.1%. It is worth noting that five countries that are in the top ten citrus-importing countries, globally, are within the EU. This clearly points to the importance of the EU and the UK citrus markets for South Africa, as well as for other citrus-exporting countries.

Table 2.2: Top 10 citrus fruit importing countries in the world

Importers	Import Value (USD)		Import Share (%)		Rank	Growth Rate %
	2009	2018	2009	2018	2018	2009-2018
United States of America	515 308	1 466 505	4.7	9	1	185
Germany	1 158 993	1 321 919	10.5	8.1	2	14
Netherlands	863 990	1 316 691	7.8	8.1	3	52
France	1 019 481	1 236 038	9.2	7.6	4	21
Russian Federation	1 018 463	1 231 478	9.2	7.5	5	21
United Kingdom	655 420	839 802	5.9	5.1	6	28
China	74 087	633 749	0.7	3.9	7	755
Canada	404 073	612 071	3.7	3.8	8	51
Hong Kong, China	193 528	504 261	1.8	3.1	9	161
Italy	380 200	440 440	3.4	2.7	10	16

Source: ITC Trade Map, (2020)

In summary, although South African citrus face such NTMs and competition from countries such as Spain in global exports, the rest of the EU and the UK markets still comprise a vital market for South African citrus exports. This is primarily due to the facts that they are amongst top citrus importing countries in world, and that South Africa and the EU have a trade agreement which, over the past two decades, has contributed to increased citrus exports to the EU. The following section discusses the role of the free trade agreement on South African agricultural trade with the EU.

2.3 FREE TRADE AGREEMENTS AND SA–EU TRADE

In today's world, the use of Free Trade Agreement (FTA) customs unions between countries is common. The FTA is an agreement between at least two countries which agree to do away with tariffs, eradicate import quotas, and reduce the extent of other forms of trade-limiting factors for trade in goods and services, with the purpose of enhancing trade between participating countries. However, they have no common trade policy toward non-members (European Commission, 2020). The principal aim of concluding such agreements is mainly to enhance the strength of the national economy and to generate employment opportunities because of increased trade flows among participating countries (European Commission, 2020).

The EU has concluded FTAs with various countries all over the world and is continuously negotiating with many others (European Commission, 2020). The EU trade agreements consist of chapters providing for preferential tariff treatment and facilitation of trade and rulemaking in areas such as government procurement, intellectual property, investment, sanitary, phytosanitary and technical standards issues. Furthermore, the Origin Protocol is attached to specific individual agreements that the EU signs with its partners.

Overall, market access for third countries to the EU has increased over a wide range of sectors and products because of the free trade agreements. The EU has the lowest level of average tariffs, worldwide (WTO, 2019). After the Tokyo Round negotiations, the EU tariff reduction went down as far as 2%. However, the use of non-tariff barriers and NTMs rose because of the quantitative restrictions on imports allowed by Clause 115 in the Treaty of Rome.

South African signed an FTA with the EU in 2000, “the European Union and South Africa Free Trade Agreement” (EU–SA FTA) (Akinkugbe, 2000). The principal objective of the EU–SA FTA is to ensure better market access to the EU for South Africa exports and increased access to the South African market for EU exports. This FTA encompasses free trade between both parties where agricultural products as well as industrial products progressively gain access to the market, duty-free (Lee, 2002). The following sections provide details on the background of SA–EU trade agreement, as well as South Africa agricultural trade with the rest of the EU and the UK.

2.3.1 South Africa–European Union Trade Agreement

During 1996, the EU and South Africa began with trade negotiations and discussed how a free market between them could be beneficial for both parties. The parties agreed to create a new trade and development partnership, and the main objective was to ensure improved trading conditions between both parties (European Commission, 2020a). The two parties signed the EU–SA TDCA, which also includes an FTA (European Commission, 2020a). The TDCA was negotiated under Article 24 of the GATT, which enables WTO members to have preferential trade agreements amongst each other, as long as the agreement covers “substantially all” trade (European Commission, 2020a).

The EU–SA TDCA was the first reciprocal FTA in Southern Africa (Tsolo *et al.,* 2010). The agreement entailed a liberalisation of tariffs on 95% of EU imports originating from South Africa over a ten-year period, and on 86% of tariffs on South Africa's imports originating from the EU over a twelve-year period (Cassim *et al.*, 2004). Overall, the agreement covered about 83% of South African agriculture and 86.5% of South Africa's industrial sectors. The main aim of the EU–SA TDCA was to ensure enhanced access to the EU market for South Africa, and for the EU to the South African market.

Following the signing of the EU–SA TDCA, South Africa gradually consolidated its status as the EU's main trade partner in the world. South African exports to the EU between 2005 and 2018 make up about 25% of its total imports (ITC Trade Map, 2020). The reduction of tariffs in several products has meant that South Africa has extensive access to the European markets.

The study done by Kwentua (2006) found evidence that the TDCA resulted in trade creation and increased trade between the two parties, as well as with the rest of the world. In support of this finding, the study done by Holden and McMillan (2006) also found that the TDCA resulted in increases in both exports and imports between the two parties. Assarson (2005) assessed the impact of the TDCA on trade between South Africa and countries in Southern Africa, as well as the rest of the world, and found that South Africa's exports to, and imports from, almost all countries increased.

The trade agreement between South Africa and the EU was anticipated to play a significant role in trade in agricultural products due to the fact that the agreement covered about 83% of South African agriculture. Numerous studies have evaluated the effect of this agreement on agricultural trade between the two parties. Some of these studies have found that both party's agricultural exports for the period between 2000 and 2009 have done well, and concluded that the EU–SA TDCA has been a factor towards achieving this success (Sandrey and Gill, 2013)

The TDCA was then replaced by the SADC–EU EPA that governed trade relations between the EU and South Africa as from June 2016 (European Commission, 2020). The

SADC EPA group comprises South Africa, Lesotho, Mozambique, Namibia, Botswana and Eswatini (previously known as Swaziland) (EU Commission, 2020). The EPA offered South Africa an improved opportunity for trade in goods, as compared with the TDCA.

Compared with the TDCA, the EPA has substantial improvements in provisions on trade and trade-related matters between partners. The EPA also has significant changes on dispute settlement provisions (European Commission, 2020a). Furthermore, the SADC–EU EPA granted South Africa additional tariff liberalisation benefits on certain agricultural products as well as on tariff rate quotas (TRQs). South African goods, such as flowers, some dairy products, fruit and fruit products, are granted an improved tariff liberalisation and they account for about 2.2% of total exports from South Africa to the EU (European Commission, 2016).

In terms of the SADC–EU EPA provisions that affect citrus exports originating from South Africa, the market access conditions for oranges and lemons have improved (Trade Law Centre (Tralac), 2017). Compared with the TDCA, South Africa is allowed to export sweet oranges to the EU, duty free, between 1 June and 15 October (European Commission, 2020b). One of the other provisions in the agreement provides for the elimination of a seasonal duty that applies between 16 October and 30 November, progressively by 9% per year, until the duty is fully removed by the year 2027.

South African lemon exports to the EU are now allowed entry into the EU, duty free, between 1 May and 30 October, while outside these dates, the application of the entry system applies. The market access conditions for citrus products, other than sweet oranges and lemons, remained the same as under the TDCA: they are still imported subject to seasonal duties, while the indicative price system also applies on mandarins from South Africa.

Additional and significant provisions offered by the EPA consist of measures on sustainable development and trade facilitation. Of note is the dispute settlement process which has evolved considerably. With reference to NTMs, Article 39 of the agreement explicitly states that partner countries are permitted to use quantitative restrictions, although only when they are in accordance with the WTO agreement. Furthermore, Article 40 clearly stipulates that taxation and regulations should be used on the basis of domestic

treatment and must never be used to unfairly protect local producers from foreign competition (European Commission, 2020).

Additionally under the SADC–EU EPA are detailed provisions about cooperation on measures to eliminate needless trade barriers and the increase of transparency as well as technical capacity. The agreement also has detailed provisions about collaboration on SPS-related matters and enhancing the capacity of SADC–EPA states on SPS-related matters (European Commission, 2020b).

The UK was until recently part of the EU and has traded with South Africa under the SADC–EU EPA (DTI, 2019). The UK has since voted to leave the EU and will now trade with SACU countries and Mozambique under a separate trade agreement, SACUM–UK EPA, which is a roll-over of the EPA (DTI, 2019). This has been done to avoid disruption. The SACUM–UK EPA has similar conditions to the SADC–EU EPA in terms of rules for trade in goods, health technical standards, agricultural and industrial safety, trade remedies, preferential tariff rates applicable on all sides, and a dispute settlement mechanism. The SACUM–UK agreement is expected to take effect from 1 January 2021. According to DTI (2019), one of the issues that is still outstanding are issues relating to SPS Measures.

2.4 THE REST OF THE EU AND UK AGRICULTURAL TRADE WITH SOUTH AFRICA

The EU and the UK are important trading partners for South Africa. According to ITC Trade Map (2020), the EU accounts for 24% of South Africa's exports. About 20% of all South Africa's exports destined for the EU was received by the UK, representing about 4% of South Africa's world exports (ITC, 2020). In 2018, the EU was South Africa's main export market for agriculture. Within the EU, the UK is South Africa's second major agricultural export partner in the EU region, after Germany. The UK alone absorbs, on average, about 30% of South Africa's total exports of agricultural products to the EU (ITC, 2020). It is evident that high-value agricultural exports to the UK are essential for South Africa. This section focuses on agricultural exports by South Africa to the rest of the EU (excluding UK) and the UK market.

Figure 2.3 below shows South Africa's disaggregated total exports of agricultural products to both the rest of the EU and the UK in 2018. The key observation from Figure 2.3 is that the rest of the EU and the UK consumes a larger share of fresh fruit from South Africa, particularly citrus fruits. In the rest of the EU, 21% of total agricultural imports from South Africa comprise citrus, while in the UK it 17%. Fresh grapes constitute 15% of total agricultural imports originating from South Africa, whereas in the UK it only constitutes 17%. Apples, pears and quinces constitute 5% of total agricultural imports originating from South Africa, whereas in the UK it only constitutes 11 % of total agricultural imports originating from South Africa.

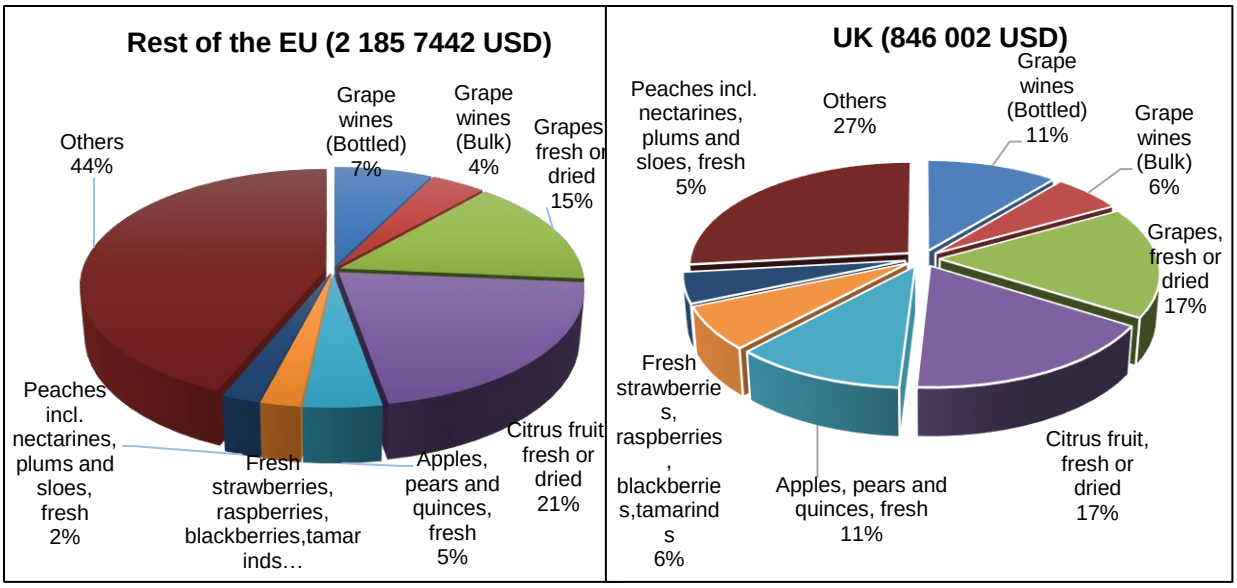

Figure 2.3: South Africa's disaggregated total agricultural exports to rest of the EU and UK in 2018

Source: ITC Trade Map, (2020)

The UK predominantly relies heavily on South Africa to supply a variety of citrus fruits products. When considering the EU citrus imports from South Africa, 22% of South African citrus exports go directly into the UK market. South Africa has over the years held a strong position among southern hemisphere suppliers to the UK. Over the past hundred-plus years, the UK has been the biggest importer of South African citrus (taking on average about 10% of total citrus exports). The figure below shows the citrus export trends to both the EU and the UK over the past 10 years.

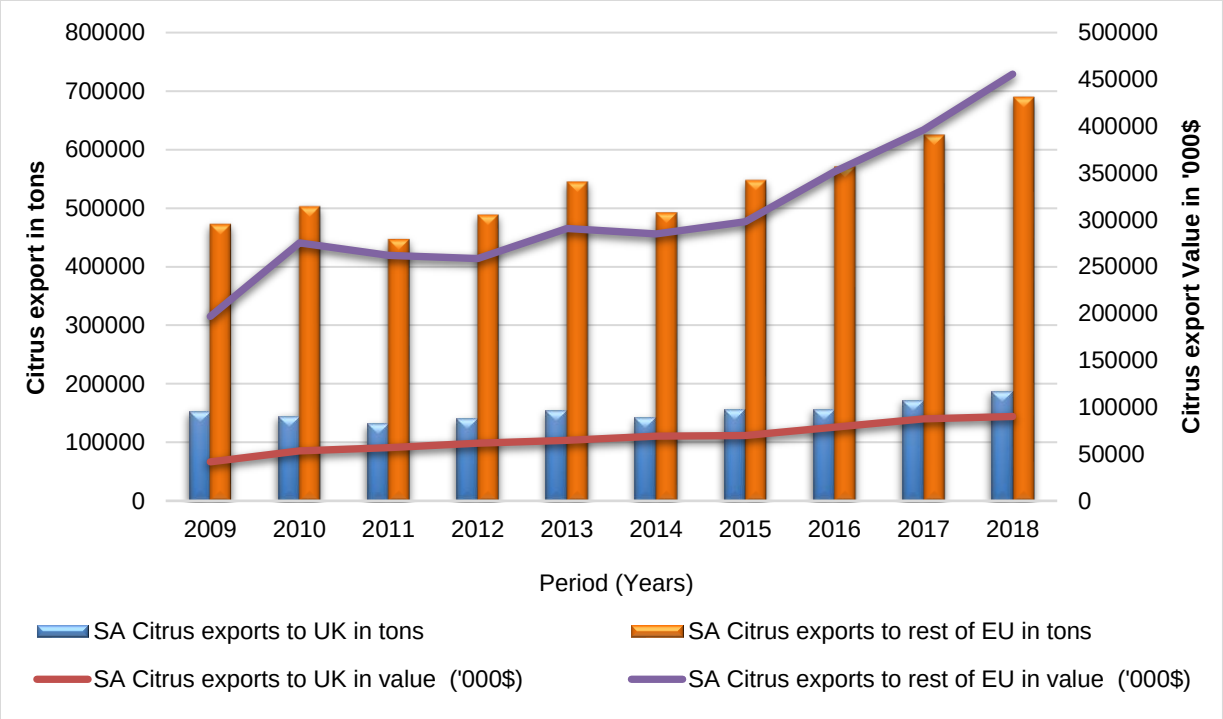

Figure 2.4: South Africa's total citrus exports to rest of the EU and UK in tons, 2009 to 2018

Source: ITC Trade Map, (2020)

In terms of South African citrus exports to the rest of the EU and the UK, Figure 2.4 above demonstrates that South Africa exported citrus throughout the period from 2009 to 2018. South Africa exports more citrus to the rest of the EU, as compared with the UK, in terms of quantity and value. In 2009, South Africa exported around 472 281 tons of citrus to the rest of the EU, compared with 152 699 tons exported to the UK. During 2018, South Africa exported around 688 950 tons of citrus to the rest of the EU, compared with 187 449 tons exported to the UK. In terms of growth, exports to the rest of the EU grew by 45.9% from 2009 to 2018, while exports to the UK only grew by 22.7%. This market growth is mainly driven by consumer's requirements for citrus fruit in their daily diets. It is also worth noting that from 2016 when the SADC-EU EPA was introduced, total South African citrus exports to the rest of the EU and UK drastically increased. This may be explained by the fact that EU seasonal duties that are applicable on sweet oranges between October and 30 November were reduced gradually by 1.8% per year and also that the lemons are now allowed to entry in the EU duty free between 1 May and 30 October under SADC-EU EPA (Tralac, 2016).

As indicated in the section above, South Africa entered into a trade agreement with the EU in the year 2000. It will therefore be interesting to see the contribution of the trade agreements to citrus trade between South Africa and the rest of the EU, as well as the UK. To do this, the South African citrus exports shares and growth are calculated. Figure 2.5 shows the citrus exports originating from South Africa to the rest of the EU and the UK in terms of average market shares and growth over three periods, 1988 to 1999, 2000 to 2008, and 2009 to 2018. The first period represents a period that occurred before the TDCA (1988–1999). The second period represents the start of the TDCA (2000–2008). The last period represents the period when the TDCA was fully implemented (2009–2018). The average citrus export market share of South Africa is calculated by dividing the South African total values of citrus exports to the EU/UK by the total value of citrus exports of the world, and is expressed as a percentage. It measures the degree of importance of South Africa within the total citrus exports to the rest of the EU and the UK over the relevant years. Furthermore, Table 2.3 shows the growth over the three periods.

Table 2.3 South African citrus exports shares and growth

Country	Pre-TDCA Average Shares	Start of TDCA Average Shares	Full TDCA implementation Average shares	Growth (1988-99)	Growth (2000-08)	Growth (2009-18)
Rest of the EU	2%	3%	5%	328%	189%	106%
UK	15%	9%	14%	-24%	151%	105%

Source: TRAINS and own calculations

During the pre-TDCA period, the average share of South African citrus exports to the rest of the EU, globally, only increased by 2% while South Africa had the highest export share of 15% in the UK market. The average share of South African exports to the rest of the EU only increased only by 1% during the start of the TDCA, while South Africa's citrus average export share to the UK declined to 9%. During TDCA full implementation, the South African citrus exports average share further increased to 5% in the rest of the EU, while the South African average export share for the UK was 14%. South Africa has always commanded a significant share of total citrus exports to UK over the years; however, according to the table above, over the years, the share of South African citrus

exports in the UK has not grown, even after the trade agreement between the EU and South Africa was put in place.

In terms of the growth of South African exports, from 1988 to 1999, exports to the rest of the EU increased by 328%, whereas citrus exports to the UK declined by 24%. During the 2000 to 2008 period, citrus exports to the rest of the EU grew by a staggering 189%, while citrus exports to the UK grew by 151%. This can be explained by the fact that during this period, South Africa and the EU signed a trade agreement that resulted in a decline in tariffs imposed on citrus imports from South Africa. From 2009 to 2018, South African citrus exports only grew by 106%, and exports to the UK grew by 105%. To further explore South African citrus export trends between South Africa and the rest of the EU, as well as the UK, citrus export trends by citrus category are analysed. Figure 2.5 below shows the disaggregated citrus statistics of four major citrus categories – oranges, mandarins, grapefruits and lemons – exported to the rest of the EU from 2015 to 2018.

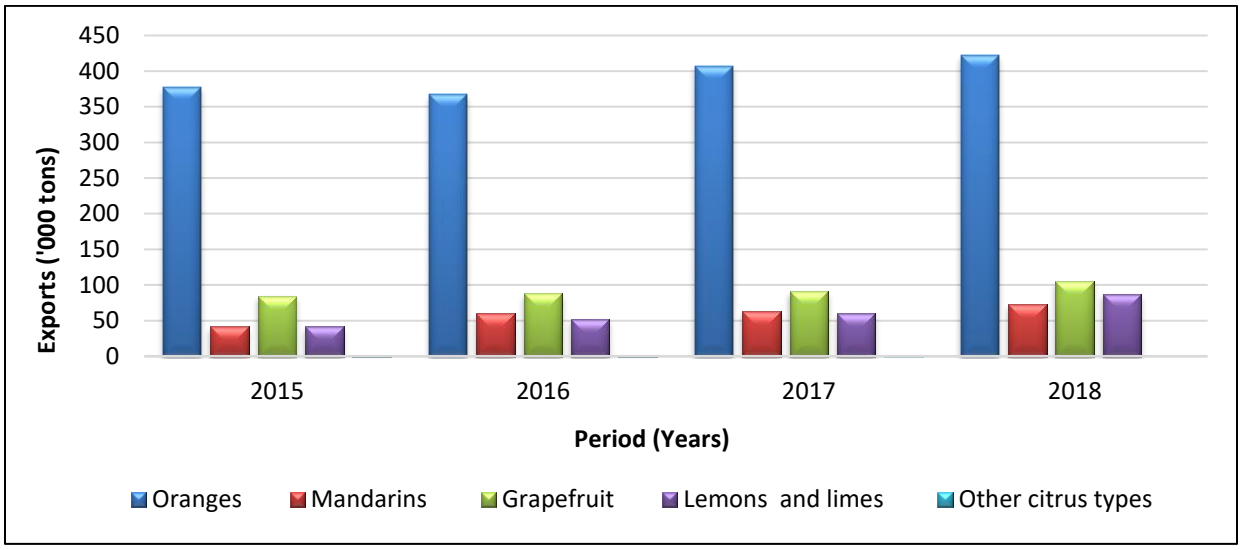

Figure 2.5: South Africa's citrus exports to rest of the EU by categories (tons)

Source: ITC Trade Map, (2020)

Figure 2.5 demonstrates that the citrus category that is exported the most by South Africa to the rest of the EU is oranges. They constitute approximately 60% of the total South African citrus exports to the rest of the EU. This is not a surprise since oranges is the largest produced citrus category in South Africa. Around 377 000 tons of oranges were exported to the rest of the EU by South Africa in 2015. The highest amount of oranges

exported by South Africa to the rest of the EU occurred in 2018, when around 421 871 tons were exported. South Africa an export share of 10% in the EU oranges market in 2018. On average, South African orange exports to the rest of the EU grew by 11.7% from 2015 to 2018. The second largest citrus category exported by South Africa to the rest of the EU is grapefruits, followed by lemons and lime. Other citrus types were the least exported citrus category to the rest of the EU by South Africa. Figure 2.6 below shows citrus exports to the UK, by category, from 2015 to 2018.

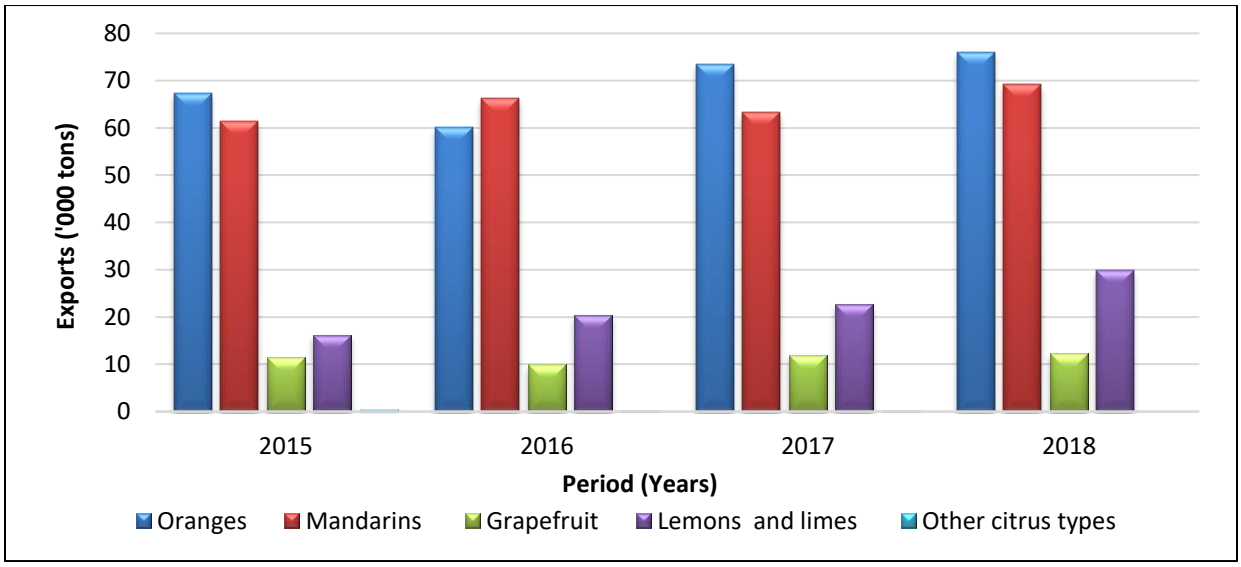

Figure 2.6: South Africa's citrus exports to UK by categories (tons)

Source: ITC Trade Map, (2020)

Similarly to the rest of the EU, the citrus category that is exported the most by South Africa to the UK is oranges, except only in 2016 when mandarins were the largest exported citrus category. Around 67 296 tons of oranges were exported to the UK by South Africa in 2015. The highest amount of oranges exported to UK by South Africa occurred in 2018, when around 75 948 tons were exported. On average, South African orange exports to UK grew by 12.9% from 2015 to 2018. The second largest citrus category exported to the UK by South Africa is mandarins. During 2015, South Africa exported 61 307 tons of mandarins to UK, and 69 285 tons in 2018. The third largest citrus category exported to UK by South Africa is lemons and limes, followed by grapefruits. Figure 2.6 below shows the percentage shares of different citrus varieties exported by South Africa to the rest of the EU and the UK during 2018.

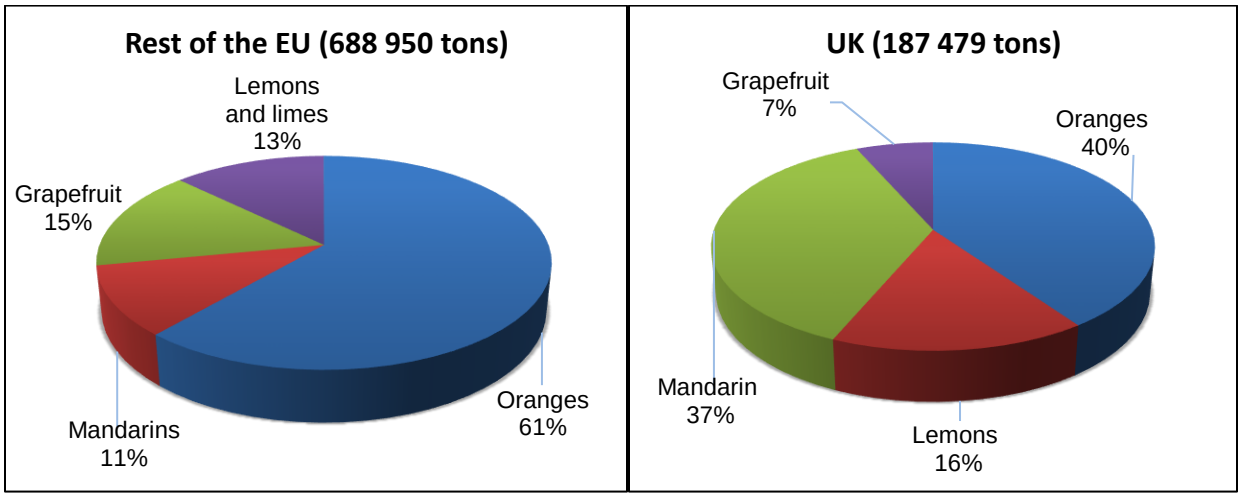

Figure 2.7: South Africa's disaggregated citrus exports to rest of the EU and UK in percentages, 2018

Source: ITC Trade Map (2020)

Figure 2.7 also shows that oranges were the most exported citrus category by South Africa to both the rest of the EU and the UK. Oranges had shares of 40% and 61% of total citrus exports by South Africa to the UK and the rest of the EU, respectively. This suggest that oranges is the most important citrus category exported by South African to both the rest of the EU and the UK. Mandarin are the second most important exports for South Africa, they had a share of 37% to the UK and 11% to the rest of the EU. The share of grapefruit exports in South African citrus overall exports to the rest of the EU was 15%, while it was 7% for the UK. Lemons and limes exports had a share of 16% in the UK and 13% in the rest of the EU. Other types of citrus had a share of 0% in both the rest of the EU and the UK suggesting that they are least important citrus category in these markets.

2.5 SUMMARY

In this chapter, it was highlighted that the growth of South African exports has been poor, relative to comparable countries. On average, total South African exports grew by only 0.9% per annum between 2009 and 2018. This suggests that sectors such as citrus industry which contribute to export growth are important for South Africa to realise overall

growth in exports.. Citrus exports have been the main agricultural export and they have been increasing over the years. South Africa is an established player in global citrus fruit exports and is ranked as the second biggest exporter of citrus, globally, behind Spain, with an export share of 10.25%. Over the years, South African citrus exports have shown growth, particularly in the EU market. However, these trends do not totally reflect the extent to which citrus is subject to NTMs in the EU market that exporters need to comply with.

The EU remains a critical market for South African citrus, even though it imposes NTMs on citrus originating from South Africa. This due to the fact that the two parties have a trade agreement that has contributed to the growth of South African citrus exports over the periods of years examined. During the pre-TDCA period, the average share of South African citrus exports to the rest of the EU, globally, only increased by 2% and it grew to 5% during the full implementation period of the TDCA. Furthermore, South African citrus exports to the EU only grew by 106% from 2009 to 2018. It was further revealed that South Africa exports oranges more than any other citrus category, signifying it importance amongst other citrus categories. On average, South African orange exports to the rest of the EU grew by 11.7% from 2015 to 2018.

CHAPTER 3: NON-TARIFF MEASURES AND THEIR IMPACT ON TRADE

3.1 INTRODUCTION

NTMs have turned out to be a main factor that influences international trade, and they have repercussions for economic measures. This chapter focuses mainly on presenting a discussion on NTMs, as well as their effect on trade. The first subsection provides a definition of an NTM, as well the classification of NTMs, followed by a discussion on regulations of NTMs in the world. The third subsection investigates NTMs and endeavours to identify the numerous NTMs implemented by the EU that may have a major effect on citrus exports from South Africa. The focus will be specifically on SPS measures and TBT due to the fact that they are the NTM categories which have the most influence in the agricultural products and food trade, predominantly trade in plants and plant products. The last section discusses the empirical research studies that have assessed the NTMs impact on trade.

3.2 NTM DEFINITION AND CLASSIFICATION

There are several robust definitions that have been proposed for the term ‘NTM’, in a wide spectrum of literature. Generally, NTMs are defined as policies implemented by governments that have an impact on international trade. These policy measures not only serve as tools for health and consumer protection, but are also often used for various political, social or environmental protection objectives. The WTO (2012) indicates that there are two purposes that motivate governments to use NTMs. First, governments may target NTMs to align their trade policy with their development objectives and economic policies. In that sense, these policy measures adopted by governments are intended to have an impact on trade, by way of altering the traded quantities and affecting prices with the aim of shielding their local industries at the expense of competition from foreign countries, relative to imports and/or exports. Another aim of these policies is to pursue public policy objectives, such as those of safety and health standards for products.

Often, the NTMs are inaccurately cited to be as non-tariff barriers (NTBs), whereas there is a distinction between the two. NTBs form a part of a large pool of policy measures that

affect trade. These large pool of policy measures are referred to as ‘NTMs’ and the effect that they have on trade is justifiable for some of them, while for others it is not. NTBs are a part of those NTMs that cannot be justified (Jenson and Yu, 2012).

According to Okumu and Nyankori (2010), the definition of NTMs should encompass all measures that have an impact on international trade flows, including regulations and policies that affect trade negatively and positively. NTMs can affect trade in various ways, even when they are not applied with a protectionist intent. This suggests that NTMs consist of a broader set of measures, as compared with NTBs that are typically used explicitly as a discriminatory NTM by governments to give local producers an advantage over foreign suppliers.

The United Nations Conference on Trade and Development (UNCTAD) (2013) defines NTMs as any policy measures, interventions or prevailing conditions, other than ordinary customs tariffs, that could potentially have an economic effect on international trade in goods, changing quantities traded or prices, or both. These measures are comprised of all measures that are policy related, and it does not matter if the objective is of protectionist or not, so long as they are likely to have an impact on international trade.

According to UNCTAD (2013), a detailed classification of NTMs is important for better identifying and distinguishing between the different forms of NTMs. It is also vital to have a classification that is recognised internationally for the harmonisation of data collection across countries and for international comparability of NTMs data.

Table 3.1 NTMs classification

Imports measures	Technical measures	A	Sanitary and Phytosanitary (SPS) measures
		B	Technical Barriers To Trade (TBT)
		C	Pre-shipment inspection and other formalities
	Non-technical measures	D	Contingent trade-protective measures
		E	Non- automatic licensing, quotas, prohibitions and quantity-control measures other than for SPS or TBT reasons
		F	Price-control measures, including additional taxes and charges
		G	Finance measures
		H	Measures affecting competition
		I	Trade-related investment measures
		J	Distribution restrictions
		K	Restrictions on post-sales services
		L	Subsidies (excluding export subsidies under in P)
		M	Government procurement restrictions
		N	Intellectual property
		O	Rules of origin
Exports measures		P	Export-related measures

Source: UNCTAD (2013)

Table 3.1 demonstrates the hierarchical structure outlined by UNCTAD (2013) that shows the NTM classifications accordingly. This classification comprises 16 aggregated chapters of different categories, labelled in alphabetical order (Chapters A to P). Import-related NTMs are covered under Chapters A to O, while Chapter P includes measures that nations enforce on exports of their own. The other significant difference is that technical measures are reflected in Chapters A to C, while non-technical measures are reflected in Chapters D to O.

3.3 NTMS ACROSS THE WORLD

While ordinary customs tariffs progressively declined due to multilateral negotiations under GATT, the adoption of NTMs by countries increased over the same period. Countries use these measures primarily to service public policy objectives, but then again also as potentially feasible substitutes for domestic market protection (Heal and Palmioli, 2015). The use of these measures has been more prevalent in the agriculture sector than in other sectors over the years. Hence, NTMs under WTO are increasingly becoming an important part of trade negotiations, thereby having an effect on the policy space that nations work with, towards achieving their development objectives.

The rise in NTM use by countries has fuelled a demand for increased transparency among WTO-member countries. The uncertainty that is caused by the unavailability of NTM information tends to support the perception of their harmful effects on trade. Limited information on areas such as regulations and rules of market access mostly affect developing countries negatively. Recently, the increase in the demand for regulation transparency has been met through the work done both by the WTO through notification mechanisms and by UNCTAD through collecting data on NTMs. Despite these efforts, de Melo and Nicita (2018) indicate that, although NTMs data quality and availability is improving, there are still limitations, especially in those instances where NTMs have their origins in national regulations. This continues to hinder the ability to estimate the effects of NTMs on trade and subsequently on economic and socioeconomic outcomes.

In an endeavour to curb the escalating use of NTMs in trade, WTO agreements were developed in the course of the Uruguay Round of trade negotiation as a commitment to deepen and widen trade liberalisation (WTO, 2020e). The WTO Agreement covers agreements on SPS measures, TBT measures, safeguards, countervailing measures and subsidies, import licencing, pre-shipment inspection, procedures for rules of origin, anti-dumping, customs valuation, and so on (WTO, 2020e).

3.3.1 Sanitary and Phytosanitary regulation under WTO

According to the WTO (2019b), measures to ensure safety and health protection of agricultural produce are acceptable. However, certain members of the WTO use these measures for the purposes of restricting trade among member partners. Hence, the WTO realised a need to have harmonised and transparent SPS measures to ensure the predictability of trade (WTO, 2019b). The WTO introduced the WTO SPS Agreement, which directly deals with all the SPS measures that have the potential to influence trade (WTO, 2019b). The Agreement on the application of SPS measures allows member states to apply these measures only when the objective is to provide for the protection of health of human, animal, or plant life. Article 5 of this agreement stipulates that the application of these measures must be supported by strong scientific evidence, as well as with the evidence as to when they should no longer be maintained (WTO, 2020b).

The WTO SPS agreement entails that member countries shall ensure that they adopt justified SPS measures that are not discriminatory against partner countries, predominantly in spheres where conditions that exist are similar. This provision is also applicable in cases where conditions exist that are similar among the countries implementing the measures and among their trading partners. Additionally, the SPS agreement prohibits members from applying SPS measures that unnecessarily restrict international trade when they are imposed (WTO, 2019b).

The principle of harmonisation, as stated in the SPS agreement's principle, permits WTO countries to establish their own SPS measures in pursuit of legitimate national policy objectives. These, therefore, must be entrenched according to recognised international standards, guidelines and recommendations. Furthermore, if there is concern, scientific proof or justification that necessitates such a level of SPS protection, countries are entitled to adopt more stringent measures than those provided for in the SPS agreement (WTO, 2019b).

The principle of transparency requires that WTO members should inform other members of changes in their SPS measures or of new measures, and make the information

available to other members. The principle of transparency benefits exporters who are mostly affected by changes in the SPS regulations. SPS measures can in many instances be complicated due to their complexity and are usually subject to change, thereby resulting in uncertainty for exporters. It is usually costly for exporters to search for the SPS measures that they need to comply with, and this creates a burden for exporters. Furthermore, this principle helps in finding out those SPS measures that are unjustifiable and are subject to change under the SPS agreement, and details concerning these measures are essential. Notifications to the WTO constitute an important source of NTM information and these will be utilised in this study to identify EU NTMs that affect citrus exports from South Africa. WTO members are asked to notify their regulations as an important means of transparency and predictability of policies (WTO, 2020d).

Additional to the requirements outlined above under the SPS Agreement, Van Tongeren (2004) states that trade in food internationally is also regulated under the WTO agreement on TBTs. The Agreement (TBT) aims to make sure that unnecessary food trade obstacles, which can be caused by regulations, standards, testing and certification procedures, are avoided. Issues such as labelling, nutritional requirements, packaging and many other relevant issues are also regulated under the agreement on TBT. The WTO TBT agreement is discussed below.

3.3.2 Technical barriers to trade as regulated under WTO

The decision to address the challenge presented by NTBs to trade, in the form of technical regulations, was taken during the Tokyo Round trade negotiations. During this round of negotiations, the Agreement on TBT, usually referred to as Standards Code, was concluded. However, the Agreement on TBTs was deemed ineffective, and as a result, it was replaced by the new WTO Agreement on TBT at the Uruguay Round of negotiations.

The WTO TBT agreement is widely applicable to technical standards and regulations, including those that intended at ensuring that the health or safety of human, animal or plant life, or the environment are protected (WTO, 2020c). This agreement clearly specifies that WTO members should not adopt or apply technical regulations with an aim

of restricting international trade unnecessarily. Applied technical regulations must not restrict trade unnecessarily, unless they aim to fulfil a legitimate objective (WTO, 2020c). Additionally, the WTO TBT agreement stipulates that those regulations must not be maintained in circumstances where the objectives giving rise to the adopted technical regulations no longer exist, or in cases were the objectives can be achieved in a manner that is a less restrictive to trade.

All members of the WTO are required to make sure that their national standards are aligned with international standards as stated in the WTO TBT agreement. Under this agreement, WTO member countries are encouraged to ensure that their adopted regulations are published immediately, in a way that also enables other members to become familiar with those regulations in a timeous manner. The agreement also stipulates that trade laws and regulations may be enforced only after the official publication, and their administration should be done in a uniform, unbiased and reasonable fashion (WTO, 2020c).

In cases where the prevailing international standards are shown to be less or not effective in the effort to achieve genuine domestic objectives, the WTO TBT agreement acknowledges a member's right to implement technical and standards regulations that they deem suitable, i.e. for safeguarding the health of humans, animals or plants; environment protection; or any other interest of consumers. These regulations should, however, not be used to discriminate against other member countries. Furthermore, member countries are allowed to impose measures that are needed to ensure that their standards are satisfied, although the agreement encourages member countries to apply international standards regulations in ways that should not discriminate (WTO, 2020c).

Furthermore, the agreement obliges member states to acknowledge each other's technical regulations as equivalents, even if they have different regulations, subject to the proviso that a member is content that such different regulations are useful in accomplishing the objectives of its own regulations (WTO, 2020c). Under this agreement, it is also expected that domestic enquiry points be established by member states and that

member states continue to inform each other of new or changed regulations through the WTO.

In summary, this subsection has discussed the regulation of NTMs, primarily SPS and TBT measures, at the global level. The provisions of these measures are well articulated under WTO TBT and SPS measures agreements. However, countries that have bilateral trade agreements are not prohibited from also including provisions that aim to limit the use of NTMs. Consequently, the next subsection will discuss the provisions on the application of NTMs under trade agreements between South Africa and the EU.

3.3.3 The role of a free trade agreement between South Africa and the EU on NTMs

This subsection discusses the role of the free trade agreement between South Africa and the EU in regulating the use of NTMs. As indicated in the previous chapter, South Africa and the EU entered into a trade agreement in 2000, known as the TDCA. The main objective of the agreement was to ensure better access for South Africa to the EU market, and for the EU to access the South African market through the elimination of tariffs and customs duties, and also by appropriately applying rules of origin, NTMs, SPS and TBT standards. This FTA encompasses free trade between the two parties where agricultural as well as industrial products progressively gain market access, duty-free (Lee, 2002).

In terms of quantitative restrictions, Article 39 of the SADC–EU EPA encourages member countries to apply quantitative restrictions only in accordance with the WTO Agreement. In term of addressing the SPS measure, Article 59 of the SADC–EU EPA calls for commitment to the rights and responsibilities as given in the WTO Agreement on the Application of SPS Measures, the Codex Alimentarius Commission, the International Plant Protection Convention (‘IPPC’), and the World Organization for Animal Health (‘OIE’). Article 60 requires member states to facilitate trade among one another, while also ensuring that the adopted measures that they apply are only essential to protect human, plant or animal life or health, as stated in the WTO SPS Agreement. This article further calls for member states to work together when it comes to acknowledging the

levels of protection that are appropriate in SPS measures and to use internationally recognised standards in other issues that are related to SPS measures. Furthermore, Article 63 emphasizes the application of the principle of transparency as articulated in the WTO SPS agreement (European Commission, 2016).

In relation to TBT measures, SADC–EU member countries commit to the obligations and rights provided for in the WTO Agreement on TBT under Article 17 of SADC–EU EPA. Article 55 calls for member states to be transparent when applying technical regulations and standards among each other by way of notifying each other and exchanging information with regard to technical regulations, as well as standards in line with the WTO TBT Agreement. Moreover, the article also encourages member states to promote the harmonisation of standards (European Commission, 2016).

In summary, details of regulations on NTMs were discussed, at both the WTO level and at the level of the FTA between South Africa and the EU under the SADC–EU EPA. The main NTM categories that were referenced were SPS and TBT measures. WTO SPS and TBT agreements both aim to make sure that the utilisation of SPS and TBT measures are justified and must not be used to restrict trade unnecessarily. Furthermore, there are provisions in the SADC–EU EPA that deal with how the measures that affect trade must be applied in regulating trade between the EU and South Africa. The provisions under the SADC–EU EPA clearly articulate the point that the TBT and SPS measures established must be aligned with the WTO TBT and SPS agreements. In addition, the agreement has mechanisms that aim to ensure that all member states comply with these SPS and TBT provisions. Although both the WTO and SADC–EU EPA provide for the regulation of NTMs in order to avoid unnecessary trade barriers, failures to comply with these regulations are likely to occur, from time to time. This is because these provisions permit members at the domestic level to establish their own regulations with the aim of ensuring improved protection of their territories, which sometimes may be stricter than is necessary. Therefore, in cases were provisions are not properly managed, certain member countries have imposed NTMs to restrict market access for specific products. The EU has various forms of fruit regulations and these are discussed in the next section.

3.4 EU FRUIT REGULATIONS

In general, fruits, together with products such as dairy, vegetable and meat, are typically subjected in the EU market to more numerous NTMs and tariff quotas than other products are. The EU has a standard set of health regulation for most agricultural products. According to Wiener and Rogers (2002), the use of these regulations by the EU reflects its adoption of a precautionary principle (for instance, the EU takes a proactive stance on the management of risk and uncertainty, instead of restricting itself to applying regulatory policy only after damage is proved).

Over and above health standard regulations, the EU also utilises non-tariff barriers, such as price referencing, automatic licences, agricultural levies and prior authorisation, for the many HS chapters (Oyejide *et al*., 2000). In addition, the EU utilises quotas that restrict the quantities of certain agricultural products that can enter Europe. The following subsections provide background information on four important regulations applied on fruits in the EU.

3.4.1 Pesticides and MRLs

The EU has a legislation that provides for the harmonisation and simplification of pesticide MRLs. The legislation also provides for the setting of an EU assessment scheme for all agricultural products intended for human consumption or feeding animals that is common for all members of the Union (EU, 2020). Pesticides can be defined as active substances used to provide protection for crops from plant diseases and pests, prior to and post-harvest, with the main purpose of ensuring improved quality and increased quantity of the produce (Xiong and Beghin, 2012). ‘MRL’ is defined by Wilson and Otsuki (2004) as “an index which represents the maximum concentration of a pesticide residue (expressed as mg/kg) legally permitted in food commodities and animal feeds.”

The use of pesticides is a continuous concern, particularly regarding their effect on human health and their environmental effects. Therefore, strict risk assessment is generally done to define the maximum acceptable daily intake of pesticide (Damalas and Eleftherohorinos, 2011). As result, the EU has legislation that stipulates pesticide

standards that aim to address food safety concerns (European Commission, 2019). The enforcement of standards is achieved through the use of MRLs regarding a pesticide's concentration on food, following good agricultural practices (GAP). MRLs generally stipulate varied safety margins that are lower than the level that could pose any dangerous effect for a consumer's health and safety.

Directive No 396/2005 (EC) governs pesticides regulations in the EU (European Commission, 2019). This directive provides for the establishment of MRLs for pesticides residues allowable in plants and animal products meant for consumption purposes, in accordance with proof derived from science, based on risk assessments. Pesticides standards for all EU members are harmonised in this directive, which replaces all national pesticides standards with the new MRLs (European Commission, 2019). This directive is amended as new scientific evidence on developed substances is acquired, and pesticides are increasingly being regulated, which amendment has been done numerous times in the past (European Commission, 2019).

Standards on pesticides are provided by the specified MRL of the pesticide in question. In addition, parts per million indexed as mg/kg are used to measure the stringency of pesticide standards. The stringency of pesticide standards depends on whether the MRLs requirement is low or high. The lower the MRL is, the higher or stricter the pesticide standard is, whereas an increase in the MRL indicates a decline in the pesticide stringency level (Kareem *et al*., 2015). The EU applies a 'precautionary principle' whereby an MRL of 0.01 is fixed as a general default for MRLs that are accepted in cases where a pesticide is not exactly cited (European Commission, 2019). This general MRL default is applied with the aim of protecting the health of consumers in cases where there are genuine health concerns, although in some instance there is a lack of or insufficient or inconclusive scientific evidence regarding the associated food risk. The utilisation of these precautionary principles possibly makes EU pesticides standards some of the most stringent in the world.

3.4.2 Technical regulations: marketing standards

The EU marketing standards aim to promote food quality (European Commission, 2020c). Third-party countries exporting fruit and vegetables to the EU have an obligation to

conform with EU marketing standards, or with those that are equivalent to those standards. The legislated EU standards requirements relate to quality standards established by EEC regulations 315/689 and 316/6810, which set quality standards for fruits and vegetables. Accordingly, if produce falls short of the quality standards that are required, it may not be allowed to be kept or transported within the Union with the purpose of selling it (European Commission, 2020c). The EU marketing standards for fruits and vegetables are comprised of minimum quality requirements; size grading and minimum size requirements; and marking, packaging and presentation requirements (European Commission, 2020c). These marketing standards do not discriminate, as they are applicable to both domestic produce and produce that is imported from third-party countries, and correspond with international standards.

3.4.3 Entry Price System (EPS)

The EU uses the EPS to protect local growers within the Union who produce selected types of fruits and vegetables against international competition (Goetz and Grethe, 2009). Prior 1995, the EU had a system called the Reference Price System (RPS). The RPS was replaced by the EPS, which was implemented on 1 July 1995. The EPS forms part of a complex system that the EU uses to regulate trade with its partner countries. It establishes a price threshold, above which the price of imported produce should remain. The system is designed to restrict fruit and vegetables imports from entering the EU at below the product-specific entry price (Goetz and Grethe, 2009). In cases where the EP is undercut, an extra specific tariff will be applied, and this differs subject to the magnitude gap that exists between the product's actual import price and the EP. If the entry price is undercut by 8 % or above, a specific tariff, of up to 80 % of the EP, is levied.

3.4.4 EU regulation of CBS on citrus from South Africa

South African citrus producers face problems regarding citrus black spot. Council Directive 2000/29/EC63 (2000) deals with *Guignardia citricarpa*, the agent responsible for CBS, which the EU classifies as a harmful quarantine organism. The Directive stipulates protective measures to prevent the introduction into the community of such organisms that are harmful to plants or plant products, and to prevent their spread within

the Community. Council Directive 2000/29/EC63 (2000) also provides for phytosanitary regulations that need to be adhered to, as well as measures that must be taken at the product's place or country of origin, and when the product arrives in the Union.

Subsequently, the European Food Safety Authority (EFSA) published a pest risk assessment of the specified CBS, which concluded that the requirements set out in Directive 2000/29/EC63 (2000) were not adequate to shield the Union against the likely introduction of CBS. The EU then took stricter measures in order to improve the protection of the Union against the introduction of that organism. In 2013, the EU announced that it was restricting the number of allowable CBS interceptions and would then allow only a maximum of five CBS interceptions, as opposed to the thirty-six CBS interceptions that had been stipulated by the EU for citrus exports originating from South Africa during 2012 (Chadwick, 2013).

In a case where South Africa might exceed the maximum of five CBS interceptions, additional restrictions, such as a South Africa citrus imports ban, would be triggered (Van de Geer, 2013). Given that many of the interceptions had been on oranges, oranges were then required to be subjected to testing for latent infection, in addition to the measures applying to all citrus fruits. South Africa regarded these EU measures on CBS as lacking in scientific justification and technical basis, as fruit with CBS did not pose a significant pest risk.

Consequently, South Africa raised the matter of the EU's regulations on CBS at the Sanitary and Phytosanitary Committee of the WTO; however, this has not yet yielded desired results. In 2014, the IPPC, which is part of the United Nation's FAO, called for the nomination of independent experts to a panel to discuss and scrutinise the issue (IPPC, 2014). However, no further steps have been taken in terms of the IPPC process, and so the industry recently requested to withdraw from the process.

In summary, the EU imposes various forms of NTMs on imports of fruit and vegetable products. Some are aimed at directly supporting producer competitiveness, i.e. EPS. While other regulations set by the EU are of legitimate concern in protecting health and safety regarding products for human consumption, compliance with these standards may be costly and may contribute to trade distortion. The lack of ability on the part of South

African citrus exporters to adhere to EU regulations such as CBS could result in trade restrictions, i.e. rejections of exports at the border, import bans or import detentions of South African citrus. This may in turn have negative impacts on export earnings gained from citrus exports to the EU.

3.5 IMPACT OF NTMS ON TRADE

While the negotiations of the WTO have contributed significantly to a decline in tariffs and an increase in global trade (Terborgh, 2003; Lee, 2005), the level of NTMs has grown over time, internationally. The increase in the use of NTMs has resulted in a trade policy environment that is less transparent (Fernandes *et al*., 2017). According to Schlueter *et al*. (2009), fruits and vegetables fall into a class of food items that have recently experienced regulatory measures being imposed to regulate their trade, and these are increasing, over time. This subsection presents the main outcomes reported in the empirical literature on the effect of NTMs on agricultural trade.

According to Beghin *et al*. (2012), the impacts that NTMs have on trade differ because of the contrasting effects that they may have on trade and consumption, and ultimately on welfare. As an example, measures such as SPS measures can indicate an improvement in quality as well as in access to supply chains to larger retail markets for imported products. Hence, trade is increased and such SPS measures may thus play a significant part in reducing or eliminating market failures. However, NTMs can also have an opposing effect on trade, as some measures may require producers to incur the costs of achieving compliance, which include costs of changing the equipment by way of upgrades, obtaining certificates, changing marketing strategies, and the like. As a result, these compliance costs act as a barrier to accessing the market. Hence, the effect of NTMs is indeterminate; the result depends on demand and supply shifts and their respective elasticities.

Ganslandt and Markusen (2001) describe how SPS and TBT have both negative and positive influences on trade; the former by increasing the compliance costs of exporters and the latter by meeting the safety and quality demands of the consumer. Disdier and Marette (2010) use a theoretical framework to illustrate the impact of NTMs measures on quantities traded and the prices. Their theoretical framework is founded on a set of

assumptions that are simplified, while the broad view in its central analytical features is kept intact.

A limited number of empirical studies have attempted to measure the impact that NTMs have on international trade flows. Focusing on SPS measures (regarding total aflatoxin levels), Gebrehiwet *et al*. (2007) estimated the effect of a restriction regarding the total aflatoxin levels of South Africa's food exports set by five OECD countries, namely Germany, Italy, Ireland, Sweden and the USA. They discovered that SPS standards that are stringent have a potentially adverse effect on trade. Furthermore, the study established that if the five OECD countries were to implement the total aflatoxin restriction as suggested in the international standards (CODEX), the South African food exports to those five OECD countries would increase, leading to additional export earnings.

Otsuki *et al.* (2001) quantified the impact that the EU harmonised aflatoxin standard imposed on African food exports by using the gravity model. Their study assessed various protection levels based on the EU standard, as compared with standards recommended internationally. They found that, although the regulations imposed by the EU are scientifically justified and are approved under SPS agreement, they might have a huge negative impact of trade. They found that the some of the EU regulations result in African countries losing on exports for only a small benefit in the form of health improvement.

Using the gravity model, Disdier *et al*. (2008) analysed how the notified SPS and TBT measures have had impacts on bilateral trade flows. They found that SPS and TBT measures negatively affected trade in agricultural products. Furthermore, their study found that these measures did not affect exporters within OECD countries who exported to other OECD member countries. However, exports from the least developed and developing countries were affected negatively by the SPS and TBT regulations. They also found that the negative impact on exports from the least developed and developing countries was even higher on exports destined for the EU.

Fontagné *et al*. (2012) assessed the trade effect of restrictive product standards on margins of trade. Their analysis was restricted to SPS measures and the data analysed was at firm level. The study found that SPS measures affect intensive and extensive margins of trade, which suggests that SPS measures represent additional variable or

fixed costs in gaining entry to foreign markets. They concluded that SPS measures involve costs of compliance, raise unit values, and inhibit market access.

With the aim of understanding the political economy of NTMs better, Disdier and van Tongeren (2010) used cluster analysis to determine the impact of NTMs on agricultural trade flows. Their study focused on NTMs imposed by OECD member countries on 777 agricultural products. Their study found that there is correlation between NTMs, their trade coverage, and the occurrence of trade frictions for 777 agricultural products.

Idsardi and Viviers (2018) conducted a study to explore the impact of NTMs on agricultural exports of four countries from Africa (Cameroon, Kenya, Democratic Republic of the Congo, and South Africa) to the EU market, from 1992 to 2014. Their study found that the agricultural export shares of all four countries to the EU declined during the period under analysis. However, their study could not establish a conclusive association between diminishing agricultural exports and the prevalence of NTMs.

Kapuya (2015) used the gravity model, backed by a price wedge framework, to quantify the impact of technical barriers on oranges exported by South Africa to its major markets. The study found that technical barriers negatively affect exports of oranges destined to South Africa's major markets. Furthermore, the simulation outcome revealed that the removal of technical barriers would contribute an increase to orange exports to the EU from South Africa of at least 0.1%. This small increment suggests that there are additional factors that limit the potential growth of South African orange exports to the EU, other than technical barriers. Kapuya also found that reduced technical barriers would result in a substantial negative impact on orange exports by South Africa to other key markets, predominantly Russia, Canada, the United States of America and China.

This subsection focused on understanding the effect that NTMs have on trade. It also specifically focused on their influence on fruit trade. The discussion provided an indication that the influence of NTMs varies: they can affect trade positively or they can affect trade negatively, and in some instances, they can have no effect whatsoever. This suggests that the study hypothesis, which states that EU NTMs have negative influences on citrus exported by South Africa to the EU and the UK, can be tested. The hypothesis of the study will therefore be either accepted or rejected.

3.6 SUMMARY

This chapter provided a definition of NTMs and a discussion of the classification of NTMs. The importance of a detailed NTM classification to better categorise and differentiate between the various forms of NTMs was emphasised. It was further revealed that it is essential to have an NTM classification that is acknowledged globally for the purposes of harmonisation of data collection across countries, and for comparability of NTMs data internationally. This study will follow the MAST classification of NTM categories to better categorise and differentiate between the various forms of NTMs.

A discussion of the regulation of NTMs, at both the WTO level and the FTA level, between South Africa and the EU under the SADC–EU EPA revealed that there are provisions that aim to ensure that NTMs are not utilised to create unnecessary trade barriers. It is worthwhile to note that, although both the WTO and the SADC–EU EPA provide for the regulation of the NTMs in order to avoid unnecessary trade barriers, failures to comply with these regulations are likely to occur. This is due to the fact that these provisions allow member countries to establish regulations at domestic level to provide improved safety for their own nations, which regulations may sometimes be more stringent than necessary. Therefore, in cases were provisions are not properly managed, member countries might impose NTMs to restrict market access to specific products. If some the NTMs imposed on South African citrus by the EU have been established based on the aforementioned thinking, the relationship between South African citrus exports and the NTMs imposed by the EU would be greatly expected to be negative. Therefore, when these measures are eliminated in the UK after Brexit, it is expected that South African citrus trade with the UK will improve.

This chapter also presented discussion on various forms of NTMs regarding fruit and vegetable product imports imposed by the EU. While some regulations set by the EU are of legitimate concern in protecting health and safety regarding products for human consumption, other regulations are mainly aimed at directly supporting producer competitiveness, i.e. EPS. Compliance with these standards may be costly and can contribute to trade distortion. In the case of South Africa, citrus exporters are expected to comply with EU regulations on CBS. Failure to comply can result in trade restrictions

being imposed that may have adverse impacts on South African export earnings gained from citrus exports to the EU.

This chapter further presented discussion on the effect of NTMs on agricultural trade. It particularly looked at the impact of NTMs on fruit trade. The discussion revealed that the effects of NTMs on trade are ambiguous. Different researchers have found that NTMs can impact on trade either negatively or positively, and in other instances, they may have no effect at all. This suggests that a finding that the relationship between South African citrus exports and NTMs imposed by the EU/UK is not negative may not come as surprise. Additionally, this implies that the third hypothesis of this study, which states that EU NTMs have a negative effect on South Africa's citrus exports to the rest of the EU and the UK, can be tested.

CHAPTER 4: NTM DATABASE AND INVENTORY ANALYSIS

4.1 INTRODUCTION

As indicated in Chapter 2, South Africa was placed among the three top exporters in the global citrus export market in 2018. The rest of the EU (excluding UK) and the UK comprise one of the leading destination markets for citrus fruits from South Africa. The South African share in total global citrus exports to the rest of the EU during 2018 was 29%, while that for the UK was 10%. Figure 4.1 below shows the average values, in dollars, of citrus exports from South Africa to the rest of the EU and the UK during the pre-TDCA, the start of TDCA, and the full TDCA implementation periods.

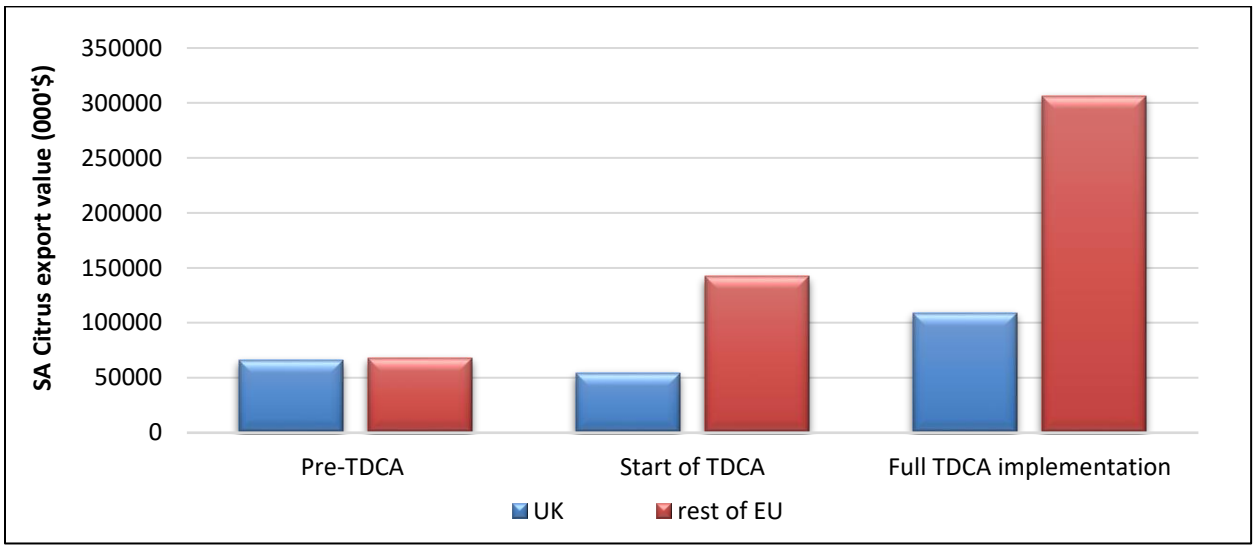

Figure 4.1: **Average South African citrus exports to the rest of the EU and UK**

Source: TRAINS Database, 2020

During the pre-TDCA period, South Africa exported citrus to a value of 67 million USD to the rest of the EU, while the value of citrus exported to the UK was 65 million USD. During the start of TDCA period, citrus exports by South Africa to the rest of the EU increased by 116%, to a value of 141 million USD, while the value of citrus exported to the UK declined by 18% to 54 million USD. During the full TDCA implementation period, South African exports of citrus to the rest of the EU increased by 116% to 306 million USD, while the value of citrus exported to the UK increased by 101% to 108 million USD. This trend

clearly indicates that South African exports, by value, have been increasing over the years. It is worth stating that, on average, the export value of South African citrus was the largest during the full TDCA implementation period, which coincided with low EU average tariffs.

Although South African citrus exports have grown over the years, one might argue that these trends do not totally reflect the extent to which citrus is subject to NTMs in the EU market, which exporters need to comply with. NTMs imposed by the EU may, to some extent, have an impact on South African market access. Some of the NTMs, such as those that aim at plant health, producer support and competitiveness, that are applied by the EU on citrus exports from South Africa may not apply in the UK after Brexit. In order to determine whether South African citrus trade with the UK would improve if these measures were to be removed, there is a need to evaluate and compare the impact of NTMs on exports to the rest of the EU and to the UK. This will require NTMs to be quantified; hence, the first objective of this study is to establish a single-source database of NTMs imposed by the EU that affect South African citrus exports.

The first section of this chapter focuses on describing the approach followed to compile a database of EU NTMs affecting South African citrus exports, as well as sources of NTMs data that are available. The second section shows the trends of the NTM data collected by evaluating NTMs by measure category and shares of NTMs over time. The effects of different NTM categories regarding exports of citrus to the rest of the EU and the UK by South Africa are evaluated by using two indicators, the Frequency Index and the Coverage Ratio, as described in the third section. A summary and conclusions drawn from this chapter are presented in the last section.

4.2 THE APPROACH FOLLOWED TO DEVELOP A DATABASE OF EU NTMS AFFECTING SA CITRUS EXPORTS

4.2.1 NTM Data sources

Data availability on NTMs is a major challenge that faces a study of the trade effects of NTMs applied by countries that are trading among each other (UNCTAD, 2017). The

increasing use of NTMs to regulate international trade makes the need to have an updated database even more compelling (Nicita and Gourdon, 2012). One of the key challenges in measuring the impact of EU NTMs on South African citrus exports to the EU and the UK is the unavailability of organised NTM information. Therefore, the study's first objective is to create a single-source database of NTMs that influenced South African citrus exports to the EU and the UK, from 1988 to 2018.

The collecting of official data on EU NTMs affecting South African citrus exports to the EU and the UK is done through thorough reading and understanding, as well assessing, documents containing the relevant national legislation, such as decrees, directives and laws. The WTO Integrated Trade Intelligence Portal (I-TIP) was very useful in identifying NTMs that affect the South African citrus exports to the EU and the UK that are examined in this study. The portal offers considerable information on NTMs that the member states in the WTO apply in the trade of goods (WTO, 2020a). It is a central access point for information that WTO collects on measures related to trade policy. The information available is comprised of NTMs notifications by the member states, in addition to specific trade concerns that members raise during the meetings of the WTO Committee (WTO, 2020a). The portal has information regarding over 25 000 measures, both tariffs and NTMs, that affect the trade in goods, services, government procurement markets and RTAs, as well as the accession commitments of WTO members (WTO, 2020a).

The compilation of the NTM database began by obtaining information from sources that have partial NTM information. The available NTM information from some of these sources is highly aggregated, while others had information that does not sufficiently cover the periods of time that the study aims to assess. In short, a single repository agency for NTMs that affect South African citrus exports to the EU does not exist. This is because the regulations and laws that have an effect on citrus trade between the EU and its partners are developed by a wide variety of EU agencies and regulatory authorities.

Table 4.1 offers a summary of the different sources of NTM information and respectively maps them to the databases for NTMs used in this study to gather information. In the following, key features of the different data sources and databases are explained.

Table 4.1: Sources and databases of NTM information

Source	Database	Source
Inventories of legislation National legislation (legislative review)	- NTM TRAINS - World Temporary trade barriers database (TTBD) - Global Trade Alert - EUR-Lex	- https://trains.unctad.org/ - https://datacatalog.worldbank.org/ - https://www.globaltradealert.org/ - https://eur-lex.europa.eu/
Notifications Legal notification	- WTO Notifications	- https://docs.wto.org/dol2fe/Pages/FE_Browse/FE_B_S006.aspx
Survey about the perception of NTMs Complaint portals	- ITC Trade Obstacle - WTO STC	- https://ntmsurvey.intracen.org/what-we-do/trade-obstacle-alert/ - http://tbtims.wto.org/en/SpecificTrade Concerns
Import refusals	- EU RASFF	- https://ec.europa.eu/food/safety /rasff_en
Other NTMs sources	- Different sources	- Various websites

Source: Author's compilation (2019)

Inventories of legislation: Under this NTM source, items of national legislation are thoroughly reviewed to identify the measures that are clearly specified in the legal system of a country and which are thus imposed by the country. Knowledge of the rules and regulations that specify NTMs is considered critical in regulatory inventories (UNCTAD, 2013). Over and above that, knowledge about the government ministries/agencies that make the rules is essential. NTM TRAINS is one of the most rigorous and comprehensive regulatory inventories (UNCTAD, 2017). This database covers regulations that are clearly related to trade by indicating imports, foreign firms or the partner countries. This database, however, does not provide information about regulations for domestic production and products.

The methods of data collection for regulatory inventories vary, and range from scanning the entire body of legislative documents, to approaching policy makers or industry participants for their expert knowledge about a specific regulation of a specific products. To some extent, this may result in the inventory presenting expert views and judgements. However, the NTM TRAINS database maintained by UNCTAD and ITC involves desk research to identify and classify legal regulatory texts published by governments.

Survey about the perceptions of NTMs: The WTO member countries have an option to issue concerns about SPS and TBT measures and these are reported as WTO specific trade concerns (STC). These are complementary to NTM inventories like NTM TRAINS. Any WTO member country has the right to raise a concern, but often countries come together as groups in cases where they have similar concerns (WTO, 2020). These concerns are recorded as minutes of the meetings. The STC documents can be downloaded from the WTO website.

Notifications: WTO notifications are among the most important sources of NTM data. Under the WTO Agreement on the application of TBT and SPS measures, each WTO member has a duty in matters of transparency. For instance, member countries are obliged to make all TBT and SPS measures publicly available and to notify whether there are any changes to these measures.

Additionally, the Agreement on Agriculture has the requirements and formats for notifications under the following articles: Article 18.2 (Tariff and other quota commitments); Article 5.7 (Special safeguard provisions); Article 18.3 (Domestic support); and Articles 10 and 18.2 (Export subsidies). All these are central means of providing transparency and predictability of policy. The WTO has formulated a requirement for members to give notice to each other on measures, and compliance with this requirement has since been encouraged. Details of the development of the WTO notification are provided in Bacchetta *et al*. (2012). WTO member states send notifications about changes in regulations and laws, as well as about their administration. It is a requirement that the changes in laws, regulations and their administration should be notified before a member begins with the implementation. The Trade Policy Review Mechanism regularly provides surveillance of national trade policies and this further improves transparency, both nationally and at the multilateral level.

The description of regulations affected is set out in text. Details of NTM codes of the MAST classification are also provided in the notifications. However, the codes of products affected are sometimes not indicated and others are only described. According to Ghodsi *et al*. (2015), mapping and text mining could be used to allocate the NTM codes as well as the HS codes.

Other WTO members are afforded an opportunity to react and to even influence the respective measure being notified, such that measures reported as WTO notifications may be implemented differently or may even be withdrawn. Unfortunately, this information is not recorded, thus leaving the question of implementation open.

Refusals: Import refusals give important information regarding the compliance with the requirements in trade; hence, the information mainly refers to technical measures based on the MAST classification of NTMs, and more precisely, SPS and TBT measures. Products that do not meet the importing country's requirements are refused entry and are not permitted to be traded in the importing country's market. The rejected products are either returned to the country of origin or, in the worst-case scenario, they are disposed of. The EU has a database called the Rapid Alert System for Food and Feed (RASFF) that is based in European Commission Regulation No. 178/2002. It provides information on import refusals of food as well as feed products at the borders of all EU members.

Other NTMs sources: There are other sources of NTMs other than the ones mentioned above that can be used to gather information on NTMs. These include information gained from research reports obtained from private institutions, from research that is published and unpublished, documents concerning national government policies, items of legislation, and other government-gazetted information. Examples of other sources used include the EU - Pesticides database, International Portal on Food Safety, Animal and Plant Health of the FAO, and CGA annual reports.

In summary, the unavailability of a single-source database on EU NTMs means that, in order to analyse their impact on South African citrus exports, there is need for an NTM database to be developed. This requires extensive reading and analysing of a variety of data sources. Some sources of NTM information discussed in this section did not have full NTM information, while others had NTM information that is highly aggregated. The understanding of the key features helped the process of developing a proper EU NTM database.

4.3 BUILDING OF THE DATABASE OF EU NTMS AFFECTING SA CITRUS EXPORTS TO EU AND UK

After visiting all the above databases to extract the information on NTMs that have an impact on citrus exported by South Africa to the EU and the UK, the next step was to build a single database. This was done to meet the first objective of the study. The database will subsequently be used for the analysis in the study. This step was not challenging since some of the databases used to collect NTM data have already classified the NTMs affecting South African citrus exports to the EU and the UK according to MAST classification of categories. All that was required was to identify affected products at HS 6-digit level. To supplement the information collected from the databases, the websites of different government agencies in EU that provide laws and regulations affecting trade were also visited to extract information that may have not been obtained from the databases. This study followed a similar approach to that followed in the study done by Kalaba (2014), where the author collected SADC NTM data.

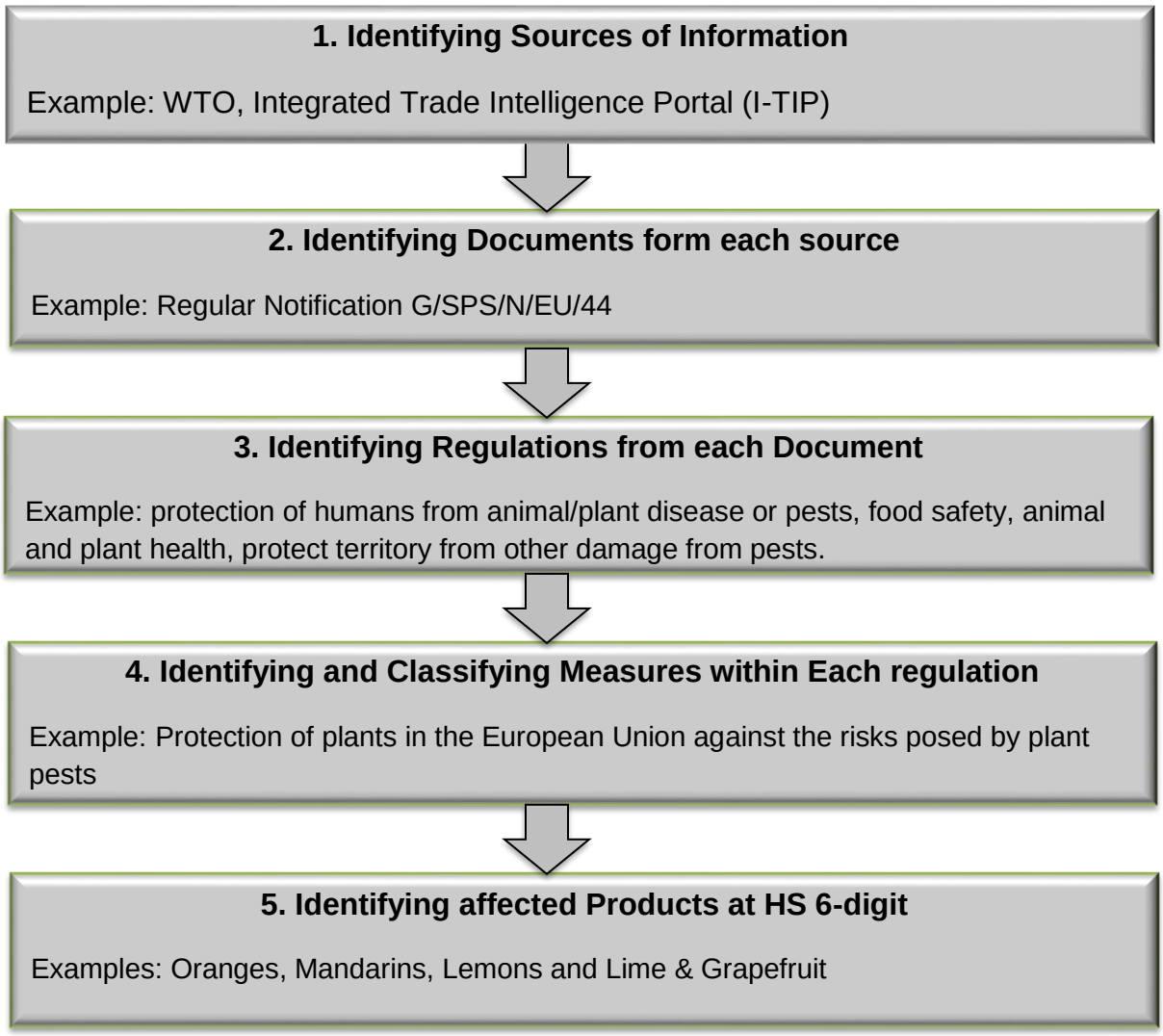

Figure 4.2: Process of compiling EU NTMs affecting SA citrus exports to EU and UK

Source: Adapted from Kalaba (2014)

Figure 4.2 shows a summary of the steps followed in compiling the database of the EU NTMs that affect the exports of citrus from South Africa to EU and UK. The first step was to identify information sources. As indicated above, the main sources of the information were the already existing NTM databases. In addition to this, various EU government agencies and institutions were also identified as sources of information, such as the EU commission and EFSA. The EU mostly publishes its information on laws and regulations online. The WTO SPS management system was very useful for gathering information on existing regulations already reported by the EU.

The subsequent step, Step 2, was to identify documents form each source. Documents that have information on trade regulatory measures, such as national Acts, published in the government gazettes, together with any other trade government regulations, were gathered. These regulation documents are publicly available in different documents, as well as on the websites. In some instances, the same document might be published on two or various websites. The existence of the WTO database, which has notification numbers of the WTO policy documents, make it less challenging to discover such documents.

The third step involves identifying the regulations that are in each document. Some of the documents may set out one or more sets of regulations and may affect one or more plant products. These were then recorded accordingly. The process then started of matching all NTMs identified with the individual citrus products affected.

The fourth step required that the regulations be classified into various categories. After identifying each regulation, the classification process then begins. Kalaba (2014) indicates that a regulation needs to be thoroughly read to determine the matching NTM code, and that is exactly what was done. This part was made easier by the fact that some of the NTM database classifications of various categories had already been done. It is important to also mention that there are certain regulations that are not clearly straight forward, and so it was challenging to allocate the NTM codes to which they belong. In some instances, regulations may belong in more than one category, and for these, the decision was made to select one code for that regulation.

The last step involved identifying the products that are affected. The years considered for the assembly of the EU NTMs dataset range from 1988 to 2018. These NTMs were collected for citrus fruits (HS 0805) only, and were classified at HS 6-digit level. Overall, the number of EU NTMs affecting different varieties of South African citrus exports to the EU and the UK, as compiled, is 1 829. This massive number of NTMs applied by the EU clearly indicates that the use NTMs by EU has gained prominence over the years. The number of NTMs reflected in 1988 were not all introduced during that year, and they also include relevant NTMs that were introduced prior to 1988. All the years are build-ups, since NTMs are rarely reduced after they are enforced, except for temporary bans. The

EU NTMs on varieties of citrus fruit exports from South Africa introduced in the year 1988 numbered just above 25. Summarised results of EU NTMs applied on South African citrus exports can be viewed in Table 7.2 in the Appendix.

4.4 TRADE BARRIERS FACING SOUTH AFRICAN CITRUS IN THE EU

South African citrus exports to the EU have, over the years, faced a variety of trade barriers, including both tariffs and NTMs. The database compiled shows that more than 1 829 NTMs had been imposed by the EU by the end of 2018 that affect different varieties of citrus exported from South Africa to the EU. This section primarily explores these barriers to trade. The first subsection pays attention to tariffs imposed by the EU and to the number of NTMs introduced by the EU over the period under analysis.

4.4.1 Tariffs and NTMs imposed over the years

Prior to the EU–SA TDCA agreement being concluded between the EU and South Africa, citrus exports from South Africa were subject to the Common Customs Tariff (CCT). This EU external market regulation included a seasonally varying ad valorem tariff. In addition, an entry price system was applicable to citrus exports from South Africa (Khuele, 1997). This meant that an extra specific tariff was charged in instances where the entry prices undercut the locally available prices. The amount of the additional tariff charged varied proportionately to the actual product's import price and the entry price difference.

Under the TDCA, South African citrus exports enter the EU without tariffs up until the 16th of October in every year, when tariffs then increase to 16% (Tralac, 2016). The preferential treatment does not affect the reference price system, and South African exporters still need to comply with the minimum price. The introduction of the SADC–EU EPA resulted in improved market access conditions for lemons and certain types of oranges, as compared with the TDCA. Under the TDCA, South African sweet oranges entered the EU duty free only between 1 June and 15 October. However, with the introduction of SADC–EU EPA, seasonal duties that are applicable on sweet oranges between October and 30 November will be removed gradually by 1.8% per year, until they are removed completely at the end of 2027.

Under the SADC–EU EPA, lemons are now allowed to enter in the EU duty free between 1 May and 30 October, while outside these dates, the application of the entry system is applied. Regarding other citrus fruit categories, their market access conditions under the SADC–EU EPA were kept the same as in the TDCA: seasonal duties still apply while the indicative price system also applies to mandarin exports from South Africa (Tralac, 2016).

Figure 4.3 below shows the total NTMs introduced per year (left axis) by the EU (including UK) from 1988, as well as the average tariffs applied to South African citrus exports (on the right axis) by the EU. The tariffs imposed by the EU on citrus exports from South Africa were relatively higher prior to 2000. This can be explained by the fact that during this year 2000 South Africa had entered into a trade agreement with the EU. A spike in tariffs around 1994, which was followed by a sudden drop in 1996, can be attributed to the formation of the WTO in 1995. The formation of the WTO resulted in the implementation of a tariffication process whereby countries moved away from import restrictions that did not take the form of tariffs, such as quotas, to the use of tariffs (WTO, 2020f). Developed countries such as those in the EU were then given a period of over six years, from 1995 to 2000, to gradually reduce these tariffs, whereas developing countries were given up until the end of 2005 to reduce these tariffs (WTO, 2020f). This therefore explains the decline in tariffs in some years, even before trade agreement between South Africa and the EU came into force. The average amount of tariffs applied by the EU on citrus reached the highest of 24.3% in 1998. This coincided with the period when the EU introduced the new entry price system. During the period after 2000, the tariffs began to show declines and this was when the TDCA was introduced. In 2018, the EU reduced tariffs on citrus from South Africa to lower than 1 %, on average.

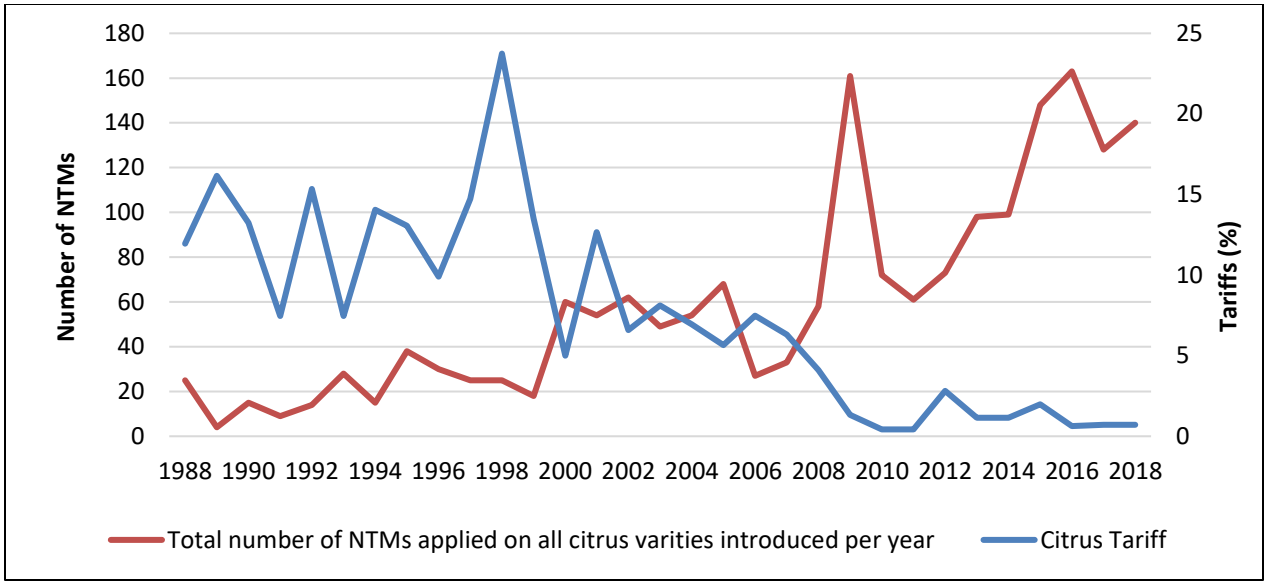

Figure 4.3: Total EU NTMs on citrus from South Africa from 1988 to 2018

Source: ITC Mac Map, TRAINS database and NTM dataset compiled by the Author, 2020

Figure 4.3 further exhibits the point that during the period 1988–1999, there were relatively few NTMs introduced per year that affected South African citrus fruits exports to the EU. During this period, relatively few SPS measures as well as TBT measures were introduced per year. To be precise, based on the database, only 110 SPS measures and 15 TBT measures were introduced per year during this period. The relatively low number of NTMs introduced per year during this period may be explained by the fact that there was no agreement in place between the EU and South Africa.

During 1999, only 20 NTMs were introduced, and in 2000, that number increased three times to 60, representing a 300% increase. This increase coincided with the year during which the TDCA was implemented. In addition, this was the year that the euro currency was introduced. According to Stehfest and Henning (2014), this occurred in the same year during which the EU adopted a new food safety concept that, among other things, requires that food safety along the whole food chain be known, including all production and processing phases.

This concept also required that risk assessment should form the core basis on which food safety policy is based. As a result, the EFSA was started as an impartial scientific centre

for risk assessment expertise. The EFSA is responsible for providing key outcomes in support of the European Commission, such as peer reviews of the valuation of active substances in pesticides. It is also responsible for assessing the information and data on chemical contaminants, food consumption, biological hazards and emerging risks (EFSA, 2020). The EFSA is also responsible for receiving the applications for new or revised EU MRLs. After the inception of the EFSA, the MRL regulations imposed by the EU increased. Furthermore, the EFSA provided a scientific view of the risk posed by CBS to the EU territory, with the identification and assessment options available to reduce risk. This resulted in the EU imposing strict CBS measures upon South Africa in 2013.

The NTM numbers increased from 58 in 2008 to 161 in 2009, representing a jump of more 200%. This observation coincides with the period when the TDCA was fully phased in and therefore some enquiries are required. Based on the database developed, a number of these regulations introduced during this period related to food safety, human health and MRL regulations. The introduction of these regulations declined the following year, 2010, and as a result, the number of NTMs introduced went down from 161 to 72. Figure 4.3 also shows that there was a steady rise in the number of NTMs introduced from 2011, which was primarily due to the consistent introduction of regulations for plant health and pests such as CBS. A huge spike is observed in 2016 and this can be attributed to the EU introducing a number of regulations on MRLs for pesticides, which subsequently declined in the year 2017 (European Commission, 2019).

Basically, it appears from Figure 4.3 that, as average tariffs imposed on citrus exports from South Africa were declining, the number of NTM measures introduced per year were rising. This decline in tariffs applied by the EU on citrus exports from South Africa was mainly due to both parties signing a trade agreement. Prior to the introduction of the TDCA in 2000, the number of NTMs introduced was below 20, on average, and the tariffs applied by the EU were 15%, on average. However, from 2000 onwards, the number of NTMs introduced per year began to increase, reaching the highest of 163 in year 2018, while the tariffs went down to less than 1%. It is therefore clear that the role of tariffs as a trade barrier declined over the years, and that the NTMs became significant barriers to the trade of citrus between South Africa and the EU.

The NTM database developed shows that some of the NTMs introduced by the EU are specific to the citrus product category. Accordingly, Figure 4.4 below shows the total EU NTMs introduced per year that affected different varieties of citrus fruit exported by South Africa from 1988 to 2018. This type of NTM data segregation is essential for determining the effects of various NTM measures on different citrus categories. The figure below provides a picture of which citrus category faces what proportion of NTMs, compared with others.

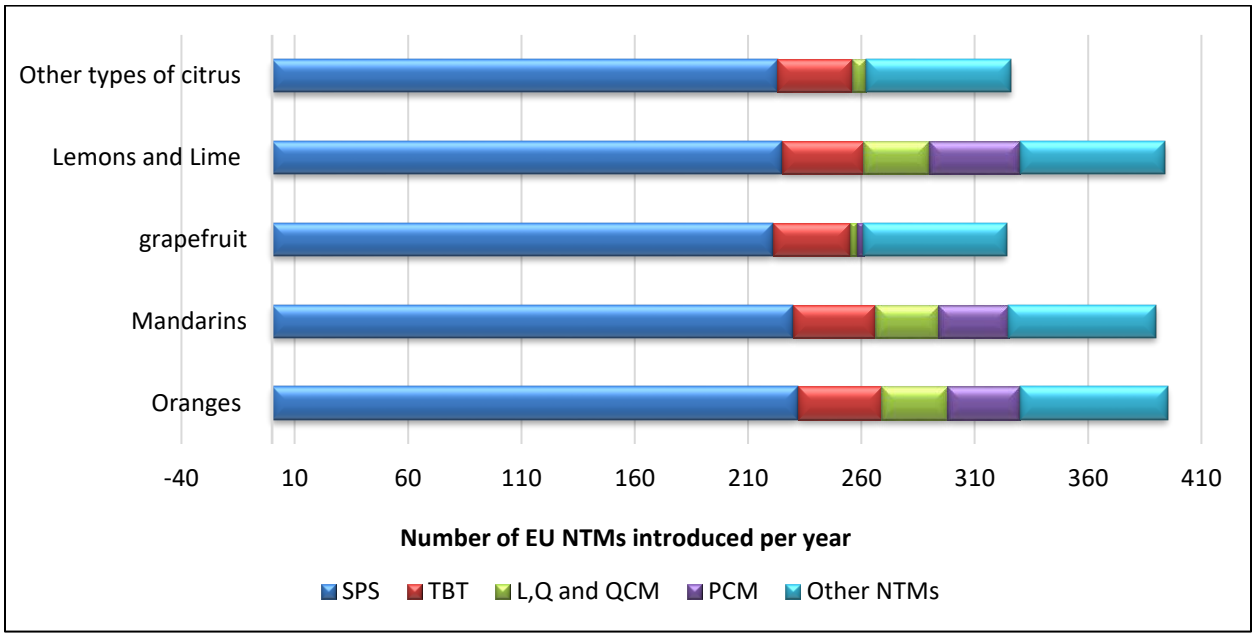

Figure 4.4: Total EU NTMs on varieties of citrus fruits from South Africa from 1988 to 2018

Source: compiled from the Author's NTM dataset

Figure 4.4 shows that oranges exports from South Africa faced a total of 395 NTMs introduced per year, and they are the most affected by the number of NTMs introduced per year by the EU. Lemons and limes exports are the second most affected by NTMS, facing a total of 394 NTMs introduced by the EU per year. The third most affected citrus category is mandarins, facing 390 NTMs introduced by the EU per year. The citrus category least affected by the NTMs introduced by the EU per year is grapefruit. It is also clear that the bulk of NTMs introduced per year were SPS measures, across all citrus categories. SPS measures were mainly introduced on oranges and mandarins, two of the

most important citrus categories in terms of export shares to the EU and the UK. Ironically, the same citrus categories are produced in large quantities in, and exported by, EU countries such as Spain, which is the main citrus competitor for South Africa in the EU market.

4.4.2 NTMs by measure category, over time.

The section above highlighted the point that the introduction of NTMs by the EU followed certain trade events that took place during different periods. In order to determine if the NTMs increased over time, three periods were selected to analyse the EU NTMs by measure of category. The first period analysed is the pre-TDCA period, from 1988 to 1999. During this period, South Africa and the EU had a trade agreement in place and the tariffs imposed by the EU were relatively higher. The second period covers the start phase of the TDCA, from 2000 to 2008. This period represents the early stages of the trade agreement between South Africa and the EU. The third period covers the full implementation phase of the TDCA, from 2009 to 2018. This period also includes the early stages of the SADC–EU EPA agreement that replaced the TDCA, which came into force in 2016. As indicated in the preceding section, the application of NTMs by the EU to citrus exports from South Africa was relatively low during the pre-TDCA period (1988–1999). After the introduction of the TDCA in 2000, there was a steady rise in the number of NTMs introduced. From 2009, there was a sharp increase in the use of NTMs and this period coincides with period of full TDCA implementation. The following subsection focuses on NTMs regarding exports to the rest of the EU (excluding UK) and UK, by measure category, during the Pre-, Start- and Full-TDCA implementation phases.

4.4.2.1 NTMs by Measure Category (Pre TDCA, Start of TDCA and Full TDCA Implementation)

Figure 4.5 below displays the overall number of NTMs by measure category during the pre-TDCA, start TDCA and full TDCA implementation periods imposed by the rest of the EU. During the pre-TDCA period, the rest of the EU preferred other types of NTMs over TBT and SPS measures. However, during the introduction of the TDCA, SPS measures became the most preferred category used by the rest of the EU on citrus exports from

South Africa. By 2008, about 355 SPS measures had been already imposed by the rest of the EU on citrus exports from South Africa. The number SPS measures increased drastically to 1156 during the full TDCA implementation period. This huge increase was mainly due to several MRL regulations that were introduced by the rest of the EU during this period.

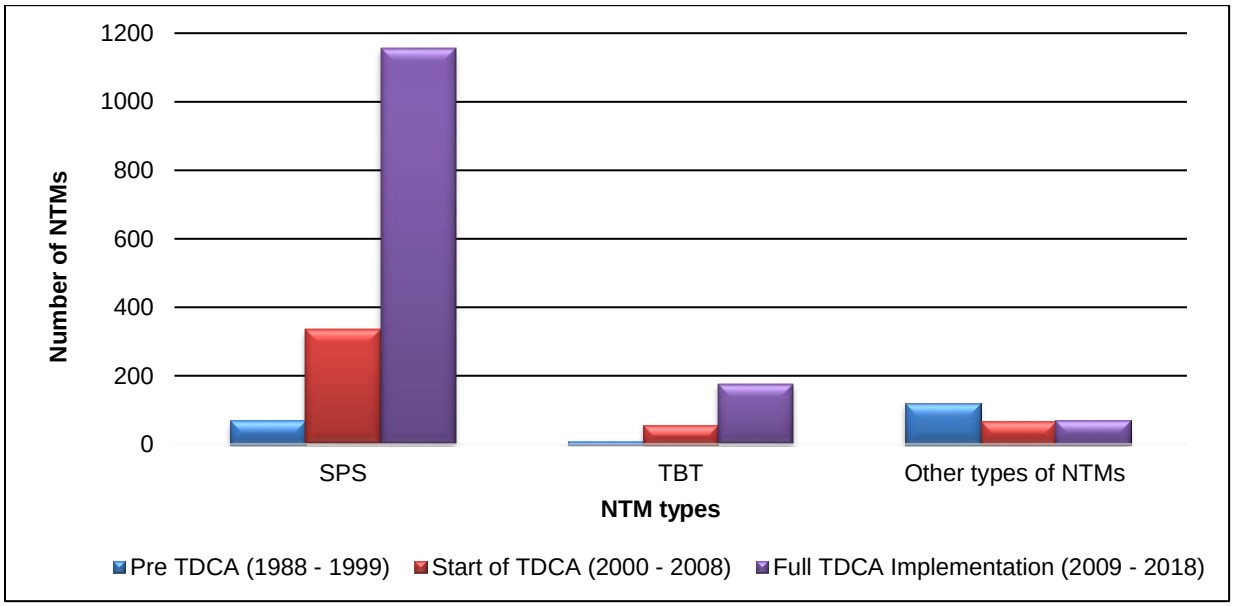

Figure 4.5: Total rest of the EU NTMs by Measure category during pre-TDCA, start of TDCA and full TDCA implementation

Source: compiled from the Author's NTM dataset

The numbers of TBT measures imposed were also relatively low during the pre-TDCA period. However, these increased slightly during the start of the TDCA period. There was a significant increase during the full TDCA implementation period, when there were 176 TBT measures in place by the end of 2018. Other types of NTMs were at the highest during pre-TDCA period, but these declined during the full TDCA implementation period. From this analysis, it can be concluded that during the pre-TDCA period, the rest of the EU imposed a low number of NTMs, particularly SPS and TBT measures. During this period, South African citrus exports faced relatively high tariffs, as compared with the periods covering the start of the TDCA and the full implementation of the TDCA. When the TDCA was fully implemented, there was a large jump in the number of NTMs imposed

by the rest of the EU on South African citrus exports, mostly SPS-related measures. During this period, the tariffs were relatively low, compared with the other two periods.

Figure 4.6 below reflects a scenario that depicts the UK as if it were not a member of the EU. The figure accordingly reflects NTMs that notionally applied in the UK, by measure category, during the pre-TDCA, start of TDCA and full TDCA implementation periods. It is thus expected that SPS measures would dominate, followed by the same TBT measures in the UK as in the EU. This is due to the fact that most of these measures are introduced for food safety reasons, and so they are likely to remain in force in the UK. However, UK SPS and TBT measures would not include those that are related to pests, plant health, plant protection and territory protection.

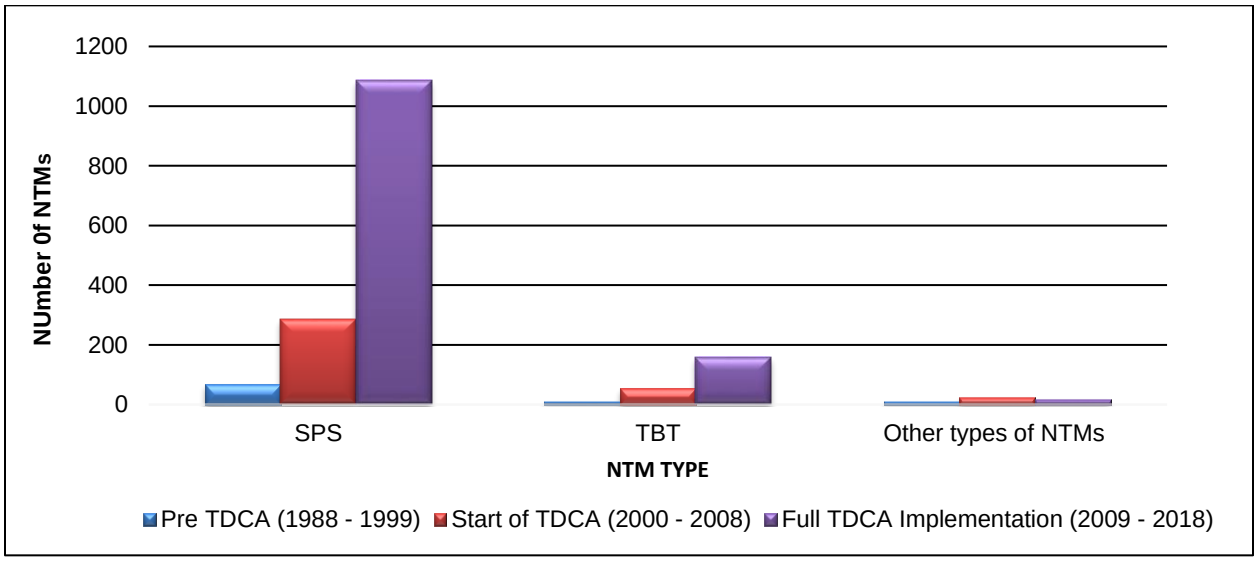

Figure 4.6: NTMs likely to apply in the UK by Measure category during Pre, start of TDCA and full TDCA implementation

Source: compiled from the Author's NTM dataset

The numbers of SPS and TBT measures that would likely apply in the UK would be the highest during the full implementation period of the TDCA, as compared with the other periods. During the full implementation of the TDCA, about 1 086 SPS measures and 158 TBT measures would likely apply in the UK. It is clear from Figure 4.6 that many NTMs under the 'Other types of NTMs' category would most likely not apply in the UK. This category comprises 'License, Quota, and Quantity Control Measures (L, Q, and QCM),

Price Control Measures (PCM)' and other NTMs. A similar conclusion from the analysis of NTMs applied by the EU described above also applies in this case to UK NTMs. A low number of UK NTMs is observed during the period when tariffs were relatively high, and a high number of UK NTMs coincide with the period when the tariffs were relatively low.

An alternative way of assessing how various NTM categories have grown over time is to look at the growth rates. The Figures from 4.7 to 4.9 compare shares of rest of the EU NTMs and those of the UK, by category, during the pre-TDCA, start of TDCA, and full TDCA implementation periods.

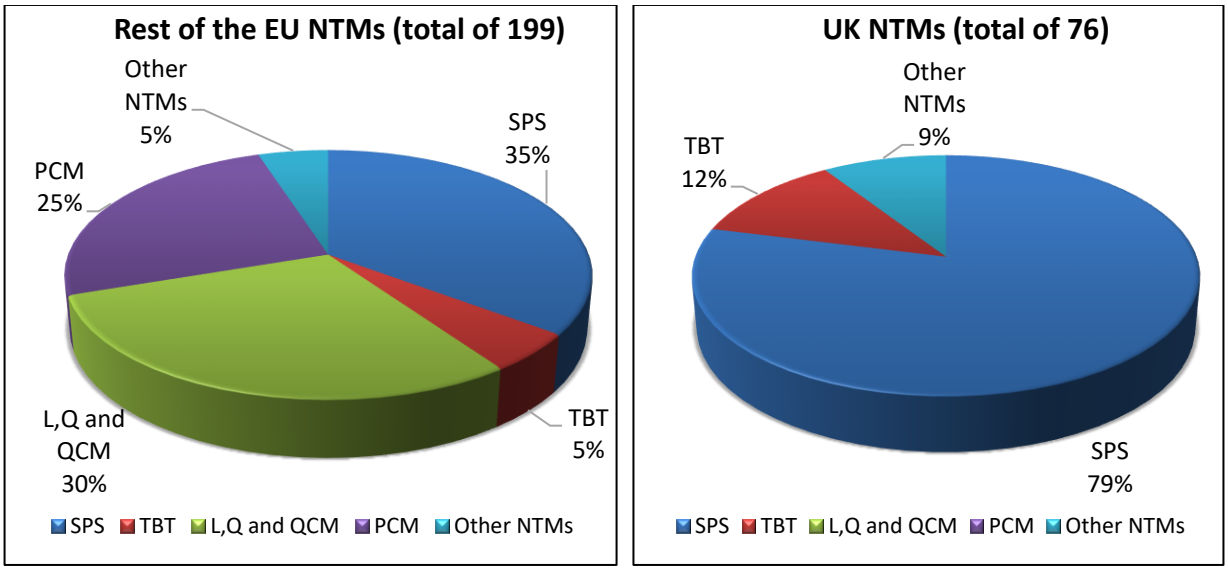

Figure 4.7: **Shares of the rest of the EU NTMs and NTMs likely to apply in the UK by category during the pre-TDCA period (1988–1999)**

NTM database compiled from the Author's calculations, 2020

During the pre-TDCA period, SPS measures commanded the highest share (35%) of all NTMs imposed by the rest of the EU on citrus exports by South Africa. Categories L, Q, and QCM had a share of 30%, followed by PCM with a share of 25%. Both TBT and other NTMs commanded a share of 5% of the total NTMs imposed by the rest of the EU on citrus. In terms of shares of the NTMs that are likely to apply in the UK, SPS measures accounted for a large share of 79%, while TBT measures accounted for only a 12% share.

Other NTMs had a share of 9%. NTMs with least share in the UK are PCM and L, Q, and QCM with a share of 0%.

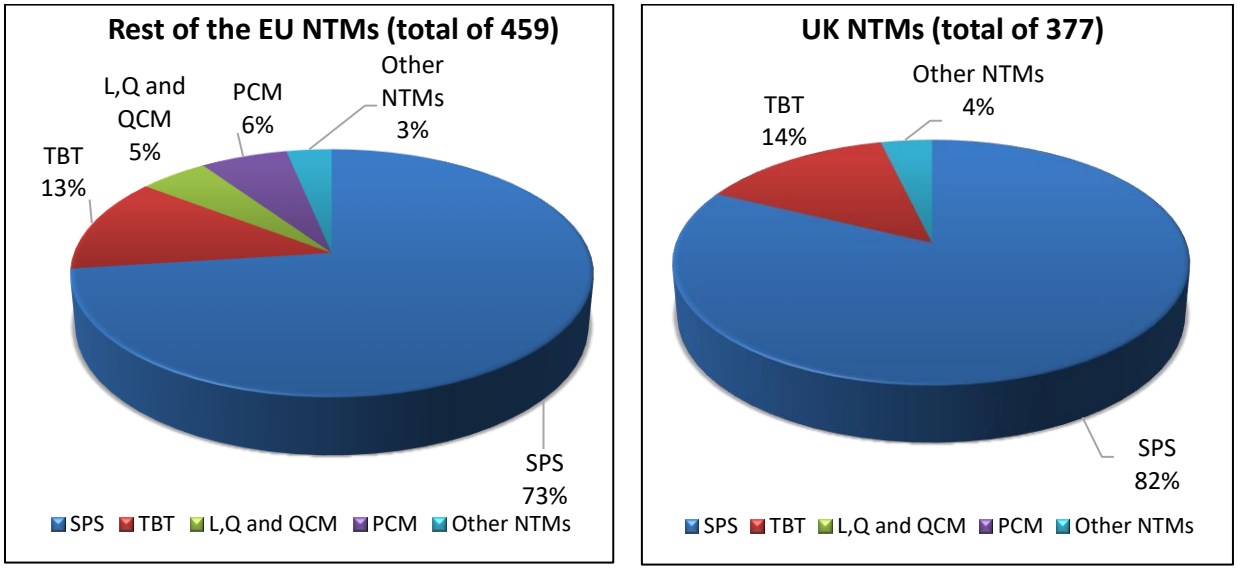

Figure 4.8: Shares of the rest of the EU NTMs and NTMs likely to apply in the UK by category during at the start of TDCA (2000 – 2008)

NTM database compiled from the Author's calculations, 2020

Figure 4.8 shows the shares of rest of the EU NTMs and NTMs likely to apply in the UK, by category, during at the start of TDCA. At the start of the TDCA, the share of SPS measures increased from 35% to 73% of all NTMs imposed by the rest of the EU on citrus exports from South Africa. The share of TBT measures also increased from 5% to 13%. Category L, Q, and QCM declined to 5%, and PCM shares declined to 6%. Other NTMs only had a share of 3% of all NTMs imposed by the rest of the EU on citrus exported from South Africa. In terms of shares of the NTMs that are likely to apply in the UK, SPS measures increased to 82% at the start of TDCA, up from 79% during the pre-TDCA period. TBT measures increased to 14%. Other NTMs shares decline to 4%. PCM and L, Q, and QCM shares remained at 0%.

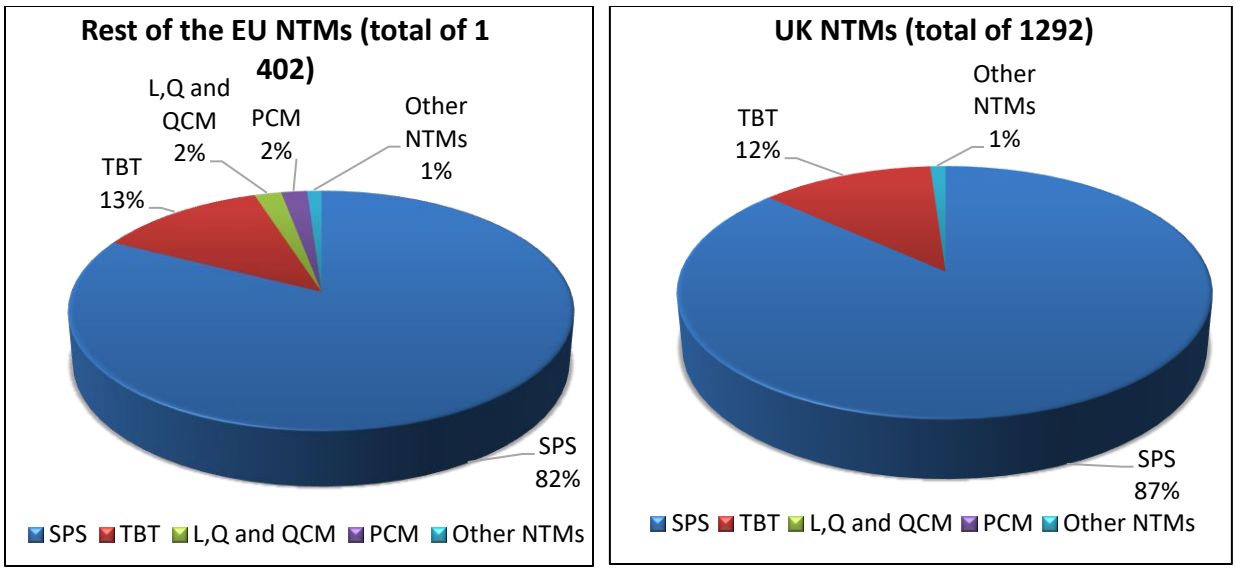

Figure 4.9: Shares of the rest of the EU NTMs and NTMs less likely to apply in the UK by category during full TDCA implementation (2009–2018)

Source: NTM database compiled from the Author's calculations, 2020

Figure 4.9 shows that both the rest of the EU and UK consolidated the use of SPS measures during full TDCA implementation. By the year 2018, the share of SPS measures had risen from 73% of all NTMs used by the rest of the EU to more than 82%, while the share of SPS measures applied by the UK increased from 82% to 87%. This clearly indicates that as time passed, both the rest of the EU and the UK shifted towards using SPS measures more and more, as compared with other types of NTM categories. It is essential to note that the share of TBT measures remained relatively the same, from the start of TDCA to the full TDCA implementation. The shares of PCM and L, Q, and QCM applied by the rest of the EU declined drastically during the full TDCA implementation period, while the UK did not apply these, as indicated by the 0% share.

It was expected that the application of SPS measures would outnumber other NTMs categories, given that these are the regulations related to food safety and the protection of plant health (WTO, 2020a). The other reason why SPS measures were expected to dominate is that they are mainly imposed on agricultural products, which citrus fruit falls under. In addition to this, the WTO allows countries to use SPS measures as long as they are justifiable. Although the SPS measures dominate other categories, according to the

database developed, almost 89% of SPS measures applied by the rest of the EU to citrus fruit exports from South Africa deal with permitted limits for residues. MRL regulations were mostly introduced during the full TDCA implementation period and they are mainly used to ensure a high level of consumer protection. They are currently established in Regulation (EC) No 396/2005, and are most likely going to apply in the UK; hence, SPS measures also dominate in terms of NTM measures that would likely apply in the UK.

In summary, the numbers of NTMs by measure category vary across the three different periods, pre-TDCA, Start of TDCA and Full TDCA Implementation, for both the rest of the EU and the UK. The analysis showed that, as NTMs imposed by the EU were increasing, the average tariffs imposed by the EU were declining over the years. The decline in tariffs is attributed to the trade agreement that South Africa and the EU have signed. This clearly shows that the role of tariffs in the citrus trade has diminished over the years. During the pre-TDCA period, when tariffs were relatively high, both the rest of the EU and the UK imposed a low number of NTMs, while the number of NTMs was relatively high during the full TDCA implementation period. The share of SPS measures was high compared with other NTM categories throughout the three periods examined. It was the highest during the full TDCA implementation period, where it recorded 82% and 87% for the rest of the EU and the UK, respectively. It is worth noting that although the share of SPS measures in the UK is higher than that of the rest of EU, in absolute terms, the UK has fewer SPS numbers. The other reason why the percentage share of UK SPS measures is high is that the UK does not have other NTMs, like L, Q, and QCM and PCM. The share of TBT measures also increased over the years, while that of other types of NTMs declined.

4.5 DESCRIPTIVE ANALYSIS

Various approaches are available for measuring NTMs in order to study their effects on trade. Since attention in this section is placed on explaining the NTM data collected, the primary focus is to use simple inventory measures to achieve the second objective of the study. The FI and CR indicators are utilised to determine the effects of NTMs on citrus exports by South Africa to the rest of the EU and the UK. The calculated FI and CR for both the rest of the EU and the UK will be compared to illustrate the extent of the

restrictiveness of EU NTMs, before and after Brexit, on a variety of citrus exports from South Africa for the period from 1988 to 2018.

The two indicators are based upon inventory listings of observed NTMs. The calculations of these indicators are normally based on total trade, taking into account all forms of NTMs, but they are also suitable for displaying the occurrence of NTMs regarding specific groups of products (e.g. average number of TBT measures applied per citrus product category). They are calculated at the HS 6-digit classification level.

The frequency index (FI) shows the percentage of products (different citrus varieties) that are affected by at least one or more NTMs (Nicita and Gourdon, 2012). The FI only takes into account whether the NTM is present or absent, without demonstrating the value of imports considered. The approach does not quantify the restrictive effect of NTMs. It is calculated as follows:

$$FI_j = \left[\frac{\sum D_i M_i}{\sum M_i}\right] * 100 \quad \text{(4.1)}$$

where D represents a dummy variable that takes the value of zero if there is no NTM on product *I* and takes one if there is any. M is also is a dummy and it takes one if there were imports from the country that is exporting *j* good *i* and zero if there were no imports, and t is the year of measurement of the NTM. The weakness of FI is that it fails to show relative values of products that are affected by NTMs. As a result, the approach is unable to offer an idea of the significance of the NTMs to an exporter, or the significance within the items that are exported (Kalaba, 2014).

In order to obtain the overall measure of significance of NTMs on citrus imports from South Africa to the rest of the EU and the UK, the coverage ratio (CR) must be used. The CR reveals the percentage of trade subject to NTMs for the country that is exporting, according to the chosen industry or sector. The CR represents the ratio of imports that are subjected to NTMs to the value of total imports. It is used to determine the significance of NTMs on imports. The trade CR is calculated as follows:

$$CR_j = \left[\frac{\sum D_i V_i}{\sum V_i}\right] * 100 \quad \text{..... (4.2)}$$

where D is a dummy variable that takes the value of one and zero if there is no NTM. V represents the value of imports of product *i*. A low ratio means less restrictiveness of NTMs, and a higher ratio means that the NTMs are more restrictive.

As indicated in the previous chapter, the UK is treated in this study as if it was not part of the EU over the study period, i.e. after Brexit. This is to enable the NTMs imposed by the EU on citrus exports from South Africa to be compared with those of the UK. Figure 4.10 provides a comparison of average FI during the pre-TDCA, start of TDCA and full implementation of TDCA periods for the rest of the EU and the UK. Five citrus categories at HS 6 level were considered when the FI calculation was done.

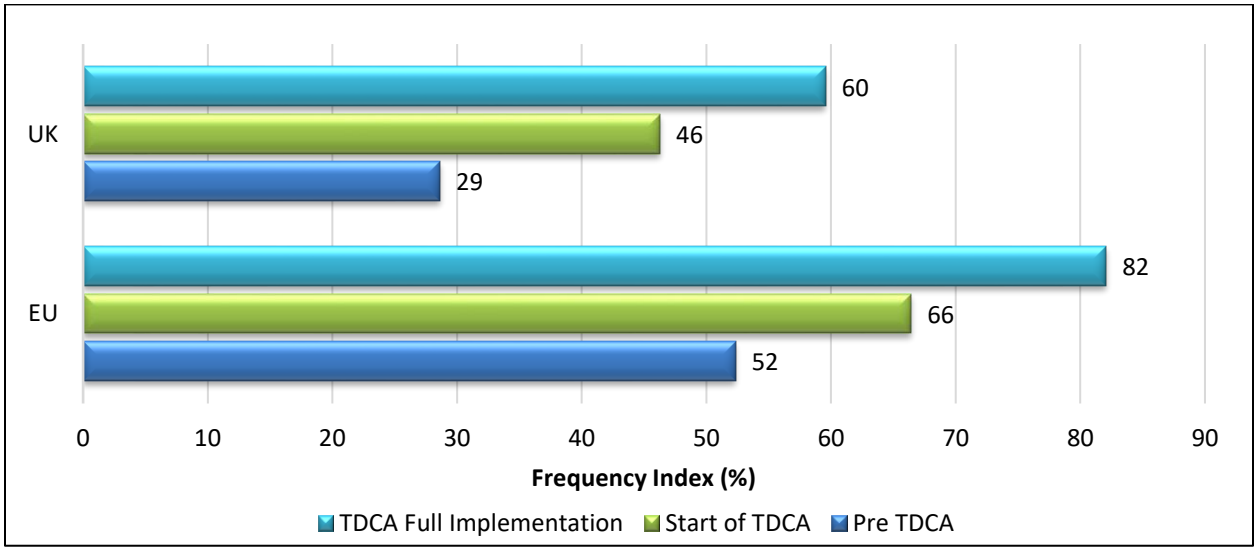

Figure 4.10: Frequency Index for the rest of the EU and UK, 1988 to 2018

Source: Calculated from the Author's NTM dataset

Overall, the figure shows that the calculated FI results are, on average, higher in the rest of the EU than in the UK throughout the three selected periods. On average, the FI shows that almost 52% of citrus product lines exported to the rest of the EU by South Africa are affected by one or more NTMs, while only 29% of citrus product lines destined for the UK

would potentially be affected by NTMs during the pre-TDCA period. This implies that during the pre-TDCA period, South African citrus exports would face 79% more NTMs, on average, when going to the UK than they would have if UK were not part of EU.

At the beginning of the TDCA, the FI shows that, on average, almost 66% of citrus product lines exported to the rest of the EU by South Africa are affected by one or more NTMs, while only 46% of citrus product lines destined for the UK would potentially be affected by NTMs. This implies that during the Start TDCA period, South African citrus exports face 43% more NTMs going to the UK, on average, than they would have if UK were not part of EU.

On average, the FI shows that almost 82% of citrus product lines exported to the rest of the EU by South Africa are affected by one or more NTMs, while only 60% of citrus product lines destined for the UK would potentially be affected by NTMs during full TDCA implementation. This implies that during the full TDCA implementation period, South African citrus exports face 37% more NTMs going to the UK, on average, than they would have if UK were not part of EU.

Figure 4.11 below shows the percentages of citrus products imported from South Africa by the rest of the EU and the UK that were affected by at least one NTM during the pre-TDCA, start of TDCA, and full implementation of TDCA periods. The calculated CR shows that, on average, almost 60% of the total value of citrus exported by South Africa to the rest of the EU is subjected to NTMs, while only 25% of citrus exports destined for the UK would be potentially affected during the pre-TDCA period. This implies that during the pre-TDCA period, on average, South African exports of citrus to the UK, by value, would be affected by NTMs by 140% more than they would have if UK were not part of EU.

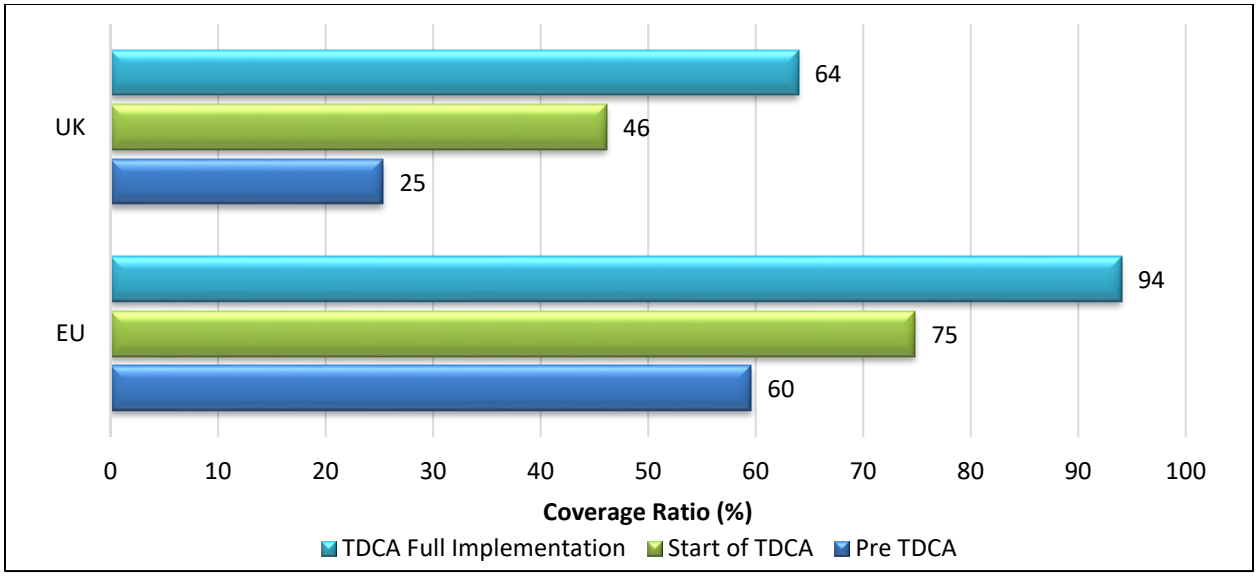

Figure 4.11: Coverage Ratio for the rest of the EU and UK, 1988 to 2018

Source: Calculated from the Author's NTM dataset

At the beginning of the TDCA period, the CR shows that, on average, almost 75% of the total value of South African citrus exports to the rest of the EU is subjected to NTMs, while only 46% for exports to the UK. This implies that during the start of the TDCA period, on average, South African citrus exports, by value, to the UK would potentially be affected by NTMs by 63% more than they would have if UK were not part of EU.

The calculated CR further shows that, on average, almost 94% of the total value of citrus exported to the rest of the EU by South Africa is subjected to NTMs, but only 64% potentially for the UK during the full TDCA implementation period. This implies that during the full TDCA implementation period, on average, 64% more of South African exports, by value, to the UK would potentially be affected NTMs more than they would have if UK were not part of the EU.

In summary, the CR indicator is, on average, higher in the rest of the EU than in the UK throughout the three selected periods, implying that high values of citrus exports to the EU were affected by NTMs, as compared with the UK. Furthermore, the CR was higher for both the rest of the EU and the UK during the full implementation of TDCA period, as

compared with the pre- and start of TDCA periods, suggesting that, over time, more numbers of NTM measures affecting citrus exports from South Africa were introduced.

A comparison between the CR and FI results for the rest of the EU and the UK was done for the period during the full implementation TDCA, and these results are shown in Figure 4.12 below.

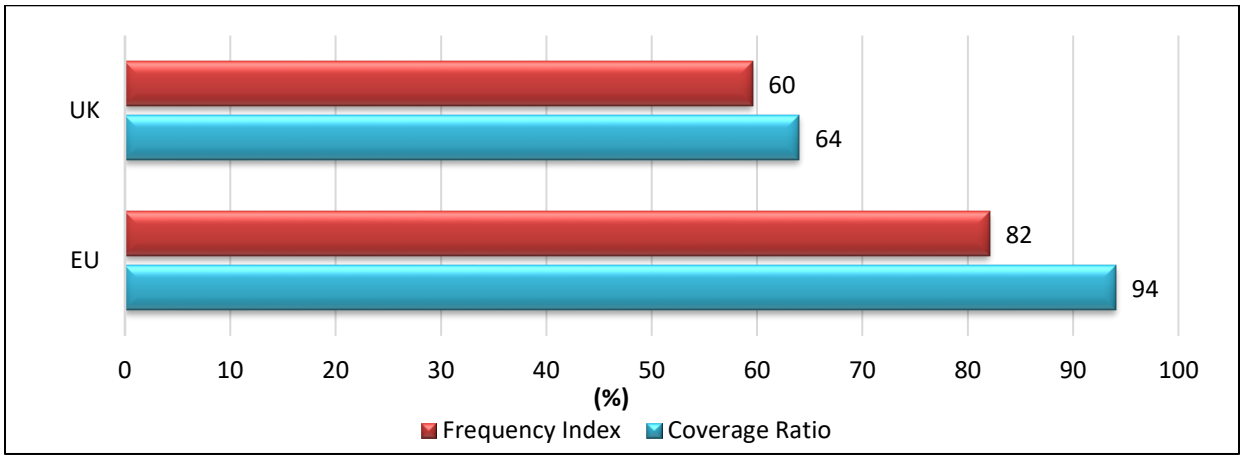

Figure 4.12: **Frequency indices and Coverage Ratios during full TDCA implementation for both the rest of the EU and UK**

Source: Calculated from the Author's NTM dataset

The figure shows that the CR values for both the rest of the EU and the UK are greater than those for the FI. This suggests that larger volumes of citrus products were traded where the use of NTMs was extensive.

To further understand the impact of specific categories of NTMs on citrus trade, the FI ratios for South African citrus trade with the rest of the EU and the UK were calculated, according to three broad NTMs categories (SPS, TBT and other NTMs). The FI results in Figure 4.13 clearly show that SPS measures are the NTMs most frequently used by both the rest of the EU and the UK, with almost 99% of citrus imports being affected in the rest of the EU. This is due to the fact that their application is vital for the protection of consumers' health and well-being, as well as the protection of the environment (WTO, 2020a).

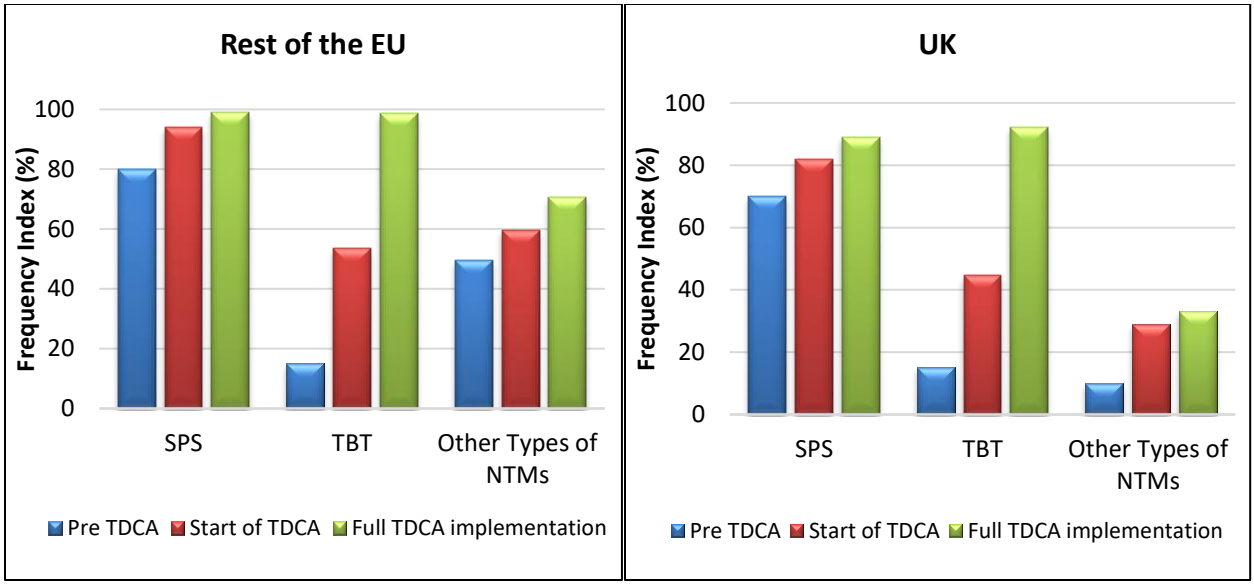

Figure 4.13: Frequency Index for the rest of the EU and UK, 1988 to 2018

Source: Author's calculations

The utilisation of SPS measures increased by both in the rest of the EU and the UK, over time. During the pre-TDCA period, on average, 80% of South African citrus product lines entering the EU were affected by SPS measures, while about 77% of South African citrus product lines entering the UK were affected by at least one SPS. This implies that, during the pre-TDCA implementation period, South African citrus exports faced 3.9% more SPS measures, on average, going to the UK than they would have if UK were not part of EU.

At the start of the TDCA, the percentage of South African citrus product lines affected by SPS measures increased to 94% for the rest of the EU, while those going to the UK increased to 81%. This implies that during the start of the TDCA period, South African citrus faced 16% more SPS measures, on average, going to the UK than it would have if UK were not part of EU.

There was a further increase in South African citrus product lines affected by SPS measures during the full implementation of the TDCA period as, on average, 99% of South African citrus products entering the EU were affected by at least one SPS, while 89% of South African citrus products entering the UK were affected by at least one SPS. This implies that during the full TDCA implementation period, South African citrus faces 11% more SPS measures going to the UK, on average, than it would have if UK were not

part of EU. It is also clear that the use of SPS measures is highest in the rest of the EU, as compared to the UK. Moreover, the utilisation of SPS measures has been increasing over a period of years, both in the rest of the EU and the UK.

The utilisation of TBT measures also changes over time for both the rest of the EU and the UK. During the pre-TDCA (period TBT), both the rest of the EU and the UK recorded an FI of 15, which means that, on average (for those years), 15% of South African citrus products entering the EU and the UK were affected by at least one TBT. This implies that during the pre-TDCA implementation period, the UK would face the same number of TBT measures as did the rest of the EU. At the beginning of the TDCA, the percentage of South African citrus products affected by TBT measures increased to 54% for the rest of the EU, while that for the UK increased to 45%. This implies that during the start of the TDCA implementation period, South African citrus faces 20% more TBT measures, on average, going to UK than it would have if UK were not part of the EU.

There was a further increase in South African citrus product lines affected by TBT measures during the full implementation of the TDCA as, on average, 99% of South African citrus products entering the EU were affected by at least one SPS, while 89% of South African citrus products entering the UK were affected by at least one TBT. This implies that during the pre-TDCA implementation period, South African citrus face 10% more TBT measures, on average, going to the UK than it would have if UK were not part of EU. It is clear that the utilisation of TBT measures is higher for the rest of the EU than for the UK. In addition, the utilisation of TBT measures has been increasing over the years for both the rest of the EU and the UK.

During the pre-TDCA period, other types of NTMs affected 49% of citrus products exported to the rest of the EU by South Africa, while in the UK, only 10% were affected. This implies that during the pre-TDCA implementation period, South African citrus faces 390% more of other types of NTM measures, on average, going to UK than it would have if UK were not part of EU. At the start of the TDCA, the percentage of South African citrus exports affected by other types of NTMs measures increased to 60% for the rest of the EU, while only 29% of citrus destined for the UK was affected. This implies that during the start of TDCA implementation period, South African citrus faces 107% more of other

types of NTM measures, on average, going to the UK than it would have if UK were not part of EU. During the full TDCA period, other types of NTMs affected 71% of citrus exported to the rest of the EU by South Africa, while in the UK only 33% was affected by other types of NTMs. This implies that during the full TDCA implementation period, South African citrus faces 115% more of other types of NTM measures, on average, going to the UK than it would have if UK were not part of EU.

In short, the FI calculations show that, as a result of the UK being a part of the EU, and even though the UK does not have citrus production, South African citrus exports faced 3.9 to 16% more SPS measures than they would have if the UK was not part of the EU. The results further showed that South African citrus exports would have faced 10% - 20% more TBT measures than they would have if the UK was not part of the EU. As for other types of NTMs, South African citrus exports would have faced 33% - 390% more of other types of NTMs than they would have if the UK were not part of the EU.

The percentages of citrus imports by the rest of the EU and the UK from South Africa that are affected by at least more than one NTM are depicted in Figure 4.14 below for the periods pre-TDCA, start of TDCA and full implementation of the TDCA. During the pre-TDCA period, 87% of citrus imports from South Africa, by value, were affected by SPS measures in the rest of the EU, while in the UK, only 80% of imports by value were affected by SPS measures. This implies that during the pre-TDCA period, on average, 8.8% more of UK citrus imports by value from South Africa are affected by SPS measures than they would have if UK were not part of EU.

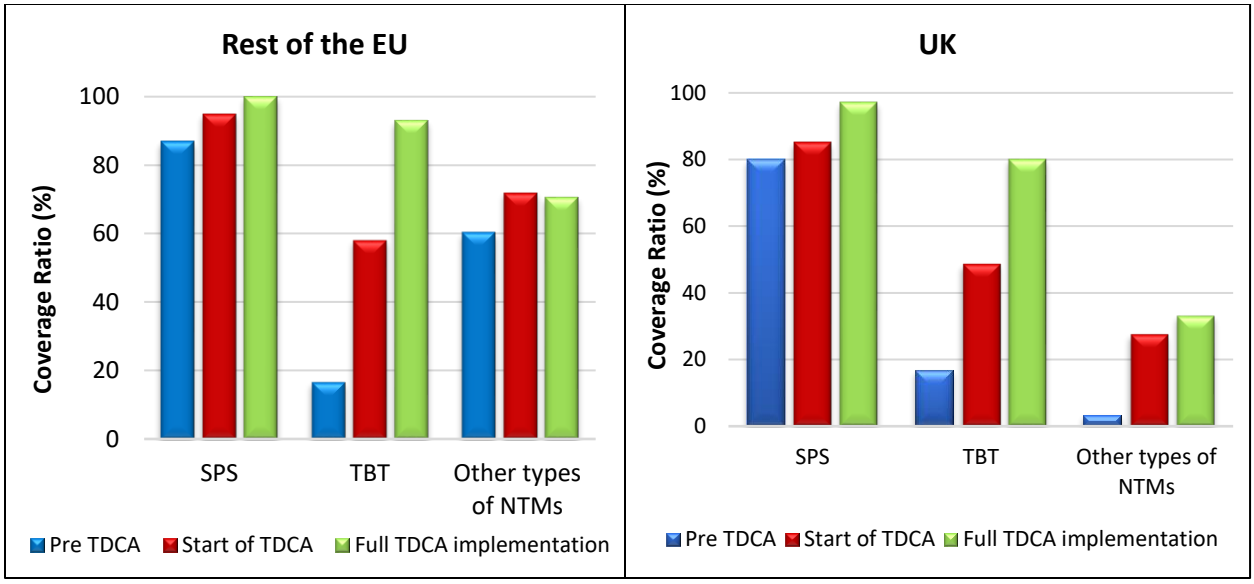

Figure 4.14: Coverage Ratio for rest of the EU and UK, 1988 to 2018

Source: Author's calculations

At the start of the TDCA, 95% of citrus imports, by value, to the rest of the EU from South Africa were affected by SPS measures, while in the UK 85% of imports were affected by SPS measures. This implies that during the start of TDCA period, on average, 11.7% more of UK citrus imports, by value, from South Africa are affected by SPS measures than they would have if UK were not part of EU.

During the full TDCA implementation period, 100% of citrus imports, by value, to the rest of the EU from South Africa were affected by SPS, while in the UK 98% of imports were affected by SPS measures. This implies that during the full TDCA implementation period, on average, 2.1% more of UK citrus imports by value from South Africa are affected by SPS measures than they would have if UK were not part of EU.

During the pre-TDCA period, both the rest of the EU and the UK had a CR of 17, suggesting that 17% of citrus imports from South Africa, by value, were affected by TBT measures. This implies that during the pre-TDCA period, UK citrus imports by value from South Africa are affected by TBT measures, on average, in the same way as for imports from South Africa to the rest of the EU. At the start of TDCA, 58% of imports of citrus by value from South Africa to the rest of the EU were affected TBT measures, while in the UK, 49% of citrus imports by value from South Africa were affected by TBT measures.

This implies that during the start of the TDCA period, on average, 18.4% more of UK citrus imports by value from South Africa are affected by TBT measures than they would have if UK were not part of the EU.

During the full TDCA implementation period, 93% of citrus imports from South Africa by value to the rest of the EU were affected by TBT measures, while in the UK, 80% of citrus imports from South Africa by value were affected by TBT measures. This implies that during the full TDCA implementation period, post Brexit, South African citrus exports to UK by value will or should be affected by 16.3% less by TBT measures.

During the pre-TDCA period, other types of NTMs affected 49% of South African citrus imports by value to the rest of the EU, while in the UK, only 10% of imports were affected. This suggests that during the pre-TDCA period, post Brexit, South African citrus exports to UK by value will or should be affected by 390% less by other types of NTMs. At the start of the TDCA, the percentage of citrus imports from South Africa by value to the rest of the EU were affected by other types of NTMs measures increased to 60% for the rest of the EU, while only 29% of UK citrus imports by value from South Africa were affected. This implies that during the start of the TDCA period, post Brexit, South African citrus exports to UK by value will or should be affected by 106% less by other types of NTMs.

During the full TDCA implementation period, other types of NTMs affected 71% of the citrus imports by value from South Africa to rest of the EU, while in the UK, only 33% of imports are affected by other types of NTMs. This implies that during the start of the TDCA period, on average, 63% more South African import citrus by value to the UK are affected NTMs than they should. This implies that during the full TDCA implementation period, post Brexit, South African citrus exports to UK by value will or should be affected by 115% less by other types of NTMs

In short, the rest of the EU had the highest CR, compared with the UK, suggesting that high values of citrus imports from South Africa are affected the most in the rest of the EU, compared with the UK in all NTM categories. The CR calculation shows that, as a result of the UK being part of the EU, and even though it does not have citrus production, a high value of South African citrus exports was affected by SPS measures, 2.1%–11.7% more than they would have if the UK was not part of the EU. The results further showed that a

high value of South African citrus exports were affected by TBT measures, 16.3%–18.4% more than they would have if the UK was not part of the EU. As for other types of NTMs, South African high value citrus exports were affected by other types of NTMs, 106%–390% more than they would have if the UK was not part of the EU.

4.6 SUMMARY

To evaluate the impact of NTMs on exports of citrus from South Africa to the rest of the EU and the UK requires obtaining reliable exports data and that the relevant NTMs be quantified. This chapter consequently described the methods used to collect data on the EU NTMs that affect South Africa's citrus exports. The UNCTAD nomenclature was followed for purposes of EU NTMs data collection and classification.

The database revealed that the number of NTMs applied by the EU to citrus fruit exports originating from South Africa had increased during the period from 1988 to 2018. However, the EU average tariffs imposed on citrus exports that originate from South Africa had declined during the same period. The highest number of NTMs were imposed during the period covering the full implementation of TDCA, when tariffs were relatively low. The database further revealed that EU NTMs are specific to citrus product category. Exports of lemons and limes faced the highest number of NTMs, followed by oranges. Grapefruits faced the lowest number of NTMs. Oranges and mandarins, which are the citrus categories that are most exported by South Africa to the EU and the UK, face more SPS measures than any other citrus categories do. The SPS measures are the most frequently used by the rest of the EU and the UK on citrus exports from South Africa, recording totals of 1156 and 1086, respectively, during the period covering the full implementation of the TDCA.

The two inventory approaches (FI and CR) were used to evaluate and contrast the effects of different NTM categories on exports of citrus to the rest of the EU and to the UK by South Africa. The FI results revealed that percentages of SPS and TBT measures that South African citrus face going to UK than it would have if UK were not part of EU are relatively low during the pre-TDCA period, compared with the start and full TDCA implementation periods. The FI results show that, due to the UK being part of the EU, and even though it does not have citrus production, South African citrus exports faced 3.9%

to 16% more SPS measures than they would have if the UK was not part of the EU. Furthermore, South Africa would have faced 10%-20% more TBT measures than it would have if the UK was not part of the EU. Regarding NTM types , the results revealed that the percentages of other types of NTM measures that South African citrus exports would face going to the UK than they would have faced if UK were not part of EU are relatively higher during the pre-TDCA period, as compared with during the start and full TDCA implementation periods. It was also found that South Africa would have faced 33 to 390% more of such other types of NTMs than they would have if the UK were not part of the EU.

The CR results also revealed that the percentages of citrus values of imports from South Africa in the UK that are affected SPS and TBT more than they would have if UK were not part of EU are relatively low during the pre-TDCA period, compared with the start and full TDCA implementation periods. The CR calculations show that as a result of the UK being part of the EU, even though it does not have citrus production, UK imports by value from South African citrus were affected by SPS measures, by 2.1%–11.7% more than they would have if the UK was not part of the EU. The results further showed that UK imports by value from South African citrus were affected by TBT measures, by 16.3%–18.4% more than they would have if the UK was not part of the EU. For other types of NTM measures, the results revealed that the percentages of citrus imports from South Africa by values in the UK, which are affected by such other NTMs, are relatively higher than they would have if the UK was not part of the EU be during the pre-TDCA period, compared with the start and full TDCA implementation periods. It was found that high values of South African citrus exports were affected by other types of NTMs, by 106–390% more than they would have if the UK was not part of the EU.

CHAPTER 5: RESEARCH METHODOLOGY

5.1 INTRODUCTION

The main purpose of this chapter is to present the empirical approach used in this study towards achieving the third and the fourth objectives of the study. The gravity model was selected for use in this study. The gravity model has been comprehensively employed by researchers to determine the effects of various policy decisions on bilateral trade (Kalaba and Kirsten, 2012). Although there have been differences among economists, Melchior *et al*. (2009) point out that the gravity model has demonstrated itself to be a vigorous tool for analysing empirical relationships and have succeeded in explaining trade flows despite the changing focus in trade theory. Many trade researchers use a gravity model as a preferred model because of its outstanding accomplishments in analysing trade flows (Kareem, 2013). Gravity trade models can be simply adjusted to examine how NTMs affect international trade; therefore, they fit exactly into this study's framework to meet the third and fourth objective of this study.

The following section presents the specification of the model and the study's modelling framework. The third section of this chapter focuses on data description, data sources and explanatory variables, and their expected signs are discussed in the fourth section. Lastly, the chapter concludes by providing a summary.

5.2 MODEL SPECIFICATION

The gravity model of international trade is used to determine the effects of NTMs on South Africa's citrus exports to the rest of the EU and the UK. As discussed in the introduction above, the gravity model has been extensively used to provide an explanation of trade flows among countries, which other economic theories cannot explain. The gravity model uses the concept of gravitational force as an equivalence to explain the flow of trade between countries, globally. Newton's universal law of gravitation states that the attraction due to gravity between the two objects is proportional to their masses, and is inversely related to the square of their distance apart.

Newton's law is specified as follows (Kareem, 2013):

$$F_{ij} = G\,\frac{MiMj}{D2ij} \text{ ………………………………………………………… } (5.1)$$

where F_{ij} represents the gravitational attraction between two masses; M_i,M_j represents the mass of two objects; G represent the gravitational constant; and D_{ij} represents the distance separating the two masses.

Tinbergen and Pöyhönen first applied the gravity model to the study of international trade flows in the early 1960s.

In analysing trade, the basic gravity trade model that has been used in empirical work over the years was originally specified by Tinbergen (1962) and Pöyhönen (1963), as follows:

$$Trade_{ij} = \beta_0\,(GDP_i)^{\beta_1}\,(GDP_j)^{\beta_2}\,(D_{ij})^{\beta_3}\,\varepsilon \text{………………..……………………} (5.2)$$

where $Trade_{ij}$ represents the measured bilateral trade value between country i and country j, while the gross domestic products of both country i and j are denoted by GDP_i and GDP_j respectively. D_{ij} is used as a proxy for bilateral distance between country i and j, generally understood to include all factors that might create trade resistance. β represents unknown parameters, and the signs of β_0, β_1 and β_2 are expected to be positive, while that for β_3 will have an a priori negative sign. ε is a disturbance term, assumed to be statistically independent of the explanatory variables.

Rewriting Equation (5.2) in logarithmic format, a stochastic linear version of the model can be represented as follows (Ghosh and Yamarik, 2004):

$$Trade_{ij} = \beta_0 + \beta_1 GDP_i + \beta_2 GDP_j + \beta_3 D_{ij} + \varepsilon \text{ …....................................... } (5.3)$$

The most prevalent approach used to estimate the multiplicative gravity model for trade given by Equation (5.3) is to use a log-log transformation yielding:

$$\ln Trade_{ij} = \beta_0 + \beta_1 \ln GDP_i + \beta_2 \ln GDP_j + \beta_3 \ln D_{ij} + \varepsilon \text{ ……..…………………..…...} (5.4)$$

and then to estimate the parameters of interest by ordinary least squares (OLS).

Numerous empirical studies suggest that Equation (5.4) fits data well and gives robust results. However, Trabelsi (2013) indicates that there are various other factors that have potential to impact trade flows which are not included in Equation (5.4). Bikker (2009) indicates that trade flows from one country to another depend on: (i) the exporting country's supply conditions; (ii) the importing country's demand conditions; and (iii) many other factors which may impact trade flows negatively or negatively. In study done by Ghosh and Yamarik (2004), a list of 49 variables (1 independent and 48 independent) is provided and which has been used in the literature to estimate the gravity model in different combinations. Linders and De Groot (2006) augmented the original gravity model by specifying as follows:

$$\ln Trade_{ij} = \beta_0 + \beta_1 \ln GDP_i + \beta_2 \ln GDP_j + \beta_3 \ln D_{ij} + \beta_5 ADJ_{ij} + \beta_4 RIA_{ij} + \beta_6 Lan + \beta_7 Col_{ij} + \beta_8 Rel_{ij} + \varepsilon \quad \text{.....(5.5)}$$

where:
$Trade_{ij}$ is merchandise imports from country i to j;
GDP_i and GDP_j are GDPs of the countries i and j;
D_{ij} is the distance between countries i and j;
ADJ_{ij} is a dummy for common border;
RIA_{ij} is a dummy for the same regional integration agreement;
Lan is a dummy for common primary language;
Col_{ij} is a dummy for a common colonial empire;
Rel_{ij} is a dummy for a common major religion; and
ε is a stochastic disturbance term.

Parameters β_4, β_5, β_6, β_7, and β_8 for the dummy variables for common border, the same regional integration agreement, common primary language, common colonial empire, and common major religion are all time invariant.

5.3 MODELLING FRAMEWORK

Various modifications to the gravity equation have been adopted by researchers as indicated above. In this study, we estimate an augmented version of the basic gravity

model specified in Equation (5.5). This is done by incorporating other factors that facilitate or inhibit South African citrus exports to the rest of the EU and the UK. The augmented gravity equation employed in this study, which aims to examine the impact of NTMs on South African citrus exports to the UK, is expressed as follows:

$$LnEx_{ijt} = \beta_0 + \beta_1 lnGDPPCSA_{jt} + \beta_2 lnGDPPC_{it} + \beta_3 ln\ (1+Tar_{ijt}) + \beta_5 lnER_{jit} + \beta_8 NTM_{it} + \varepsilon_t \quad \ldots\ldots (5.6)$$

where:

Subscript *i* represents the EU and the UK, *j* represents South Africa, and subscript *t* represents time period.

$lnEx_{ijt}$ = natural log of citrus exports from country *j* to country *i* in period *t* (tons);

$lnGDPPCSA_{jt}$ = log of GDP per capita in the South Africa (USD);

$lnGDPPC_{it}$ = log of GDP per capita in country *i* (USD);

$lnTar_{ijt}$ = log of Tariffs imposed by country *i* (%);

$lnER_{ijt}$ = log of Exchange rate between country *j* and country *i* in year *t;*

NTM_{it} = Trade Weighted NTM

ε_t = is the error term.

This study utilises GDP per capita and South Africa's citrus export volumes to the EU and the UK in tons as demand and supply conditions, respectively. They represent the propensity of the EU and the UK to import citrus, and the latter represents South Africa's potential to export citrus.

Tar_{ijt} accounts for bilateral tariffs, where Tar_{ij}, is the ad-valorem tariff and non-ad-valorem tariffs that the country imposes on imports from country *i* at time *t*. In order to allow for the logarithm transformation during the years where the tariff was zero, one is added.

ER_{ijt} represents the exchange rate between country *j* and country *i*. Exchange rate is included as an explanatory variable because previous studies done by Bergstrand (1985) and Dell'Arricia (1999) revealed that its inclusion in the gravity model has assisted in explaining variation in trade flows among participating countries.

NTM_{it} represents Trade weighted NTM measure.

5.4 VARIABLE AND DATA DESCRIPTION AND SOURCE

The focus of this study is on assessing the effect of NTMs on citrus trade between South Africa and the EU as well as the UK from 1988 to 2018. The study period was preferred primarily to examine South Africa's citrus export performance during various periods. The period also includes the period when the TDCA came into force, under which tariff reduction took place, as well as when the EPA that came into force as from 2016. The analysis will provide valuable information on performance of citrus exports by South Africa in the face of diminishing tariffs and the impact of NTMs during the same period.

As shown in Table 5.1 below, the dependent variable, exports (Ex_{ij}), is given to major citrus exports products, namely oranges, lemons and limes, mandarins and grapefruits to country *i*, given as yearly estimations in tons during the period from 1988 to 2018. The data for citrus exports from South Africa to the rest of the EU and the UK is gathered from the ITC database and Quantec. In terms of the relevant HS code, citrus is classifiable under Chapter 8 and the data collection was gathered at heading HS-6 digit level.

The data on GDP per capita for South Africa, the EU and the UK was sourced from databases of the International Monetary Fund (IMF) (2019) and World Bank, and is given in real terms as USD. The Trade Analysis Information System (TRAINS) database was used to get tariff data. The TRAINS data has missing values from 2007 on, and so tariffs and outstanding tariff data from 2008 was then obtained from ITC. The tariff data is expressed in percentages. The exchange rate data was retrieved from the South African Reserve Bank (SARB).

With regard to NTM information, there are several indicators that have been used as a proxy to evaluate the effect of NTMs on trade. Other research studies have used numerical values in the regression to assess the effect of NTM measures on trade, and such studies include Otsuki *et al*. (2001) who used maximum residue levels (MRLs) values to assess their impact on trade. However, in most cases, NTMs cannot be directly measured and their identification is mostly qualitative (Fugazza, 2013). For regression analysis, proxies of NTMs that could result in different trade effect estimations of technical measures are constructed. The NTM proxies include frequency ratios, count variables, ad valorem equivalents of the policies, and dummy variables (Fugazza, 2013).

In this study, a measure for NTM was developed. It is referred to as Trade weighted NTM. This measure considers the importance of exports of citrus from South Africa within the total citrus imports received from the world by the rest of the EU and the UK. It considers the share of citrus exports from South Africa to the rest of the EU and the UK that is affected by NTMs. This measure is mathematically formulated as follows;

Trade weighted NTM = $\frac{X_{ji}^{ot}}{Y_{wi}^{ot}} NTM_j^{ot}$*100 …… (5.7)

where X represents the value of citrus category *o* from South Africa, represented by *j*, to the EU, represented by *i*. NTM_j^{ot} is the number of NTMs affecting an individual citrus category in period *t* . Y represent the total imports of citrus category 0 by the EU from the world represented by *w*. And so, the term that appears first on the left denotes a fraction of the South African value of citrus exports to the EU's total value of citrus imports. Hence, the Trade weighted NTM is a measure of NTMs that is weighted by the share of affected South Africa's citrus exports to total EU citrus imports.

The rationale for using trade weighted NTMs is to allocate higher weights for NTMs that coincided with larger values of imports. Therefore, a high number NTMs, combined with a larger share of EU citrus imports from South Africa, is expected to be trade restrictive. It suggests that if the number of NTMs applied is high in a citrus category that has a relatively large export share in the EU citrus market, then exports of that citrus category will be affected negatively. The consequences therefore will be reduced for South African citrus exports to the EU. The higher values suggest that NTMs are more restrictive toward

South African exports, whereas lower values imply NTMs that are less prohibitive to South African citrus exports.

To examine the impact of NTMs across citrus categories, the trade weighted NTM measure was calculated at the HS 6-digit level. The results of this measure will be used to compare the impact of NTMs between the rest of the EU and UK hence it is augmented in the gravity model of this study. The incidence counts of NTMs used to calculate the trade weighted NTMs for individual citrus categories are shown in Table 7.1 in the Appendix. The table shows the number of NTMs on individual citrus product categories in the EU and the UK. Because the UK does not produce citrus (USDA, 2020), the UK NTMs exclude NTMs that are aimed at protecting plant health, preventing plant diseases and pests, and those that are aimed at producer support and competitiveness.

Table 5.1 Variables and data sources

Variables	**Unit of measurement**	**Description**	**Data Source**	**Expected Sign**
Ex	Tons	Citrus exports	ITC trade map and Quantec	
GDPPC	USD	Real GDP per Capita	World Bank Development Indicators	+ve
Tar	%	EU tariffs	TRAINS and ITC trade map	-ve
ER	Rand/Pound and Rand/Euro	Nominal exchange rate	SARB	+ve
NTM	Trade weighted NTM	NTM Indicator	Trade data and NTM Database	-ve

Source: Compiled by the Author

In terms of the expected signs, the GDP per capita is expected to affect exports of citrus to the EU and the UK from South Africa positively. A greater GDP per capita in South Africa implies that a greater citrus production capability exists, which then translates to

enhanced ability of the citrus producers in South Africa to produce and export increased quantities. While a higher GDP per capita for the EU and the UK would suggest a greater capacity to import more citrus from South Africa, and greater number of persons would afford citrus, and it represents potential demand for citrus imports by the EU and the UK.

Theoretically, it is expected that the sign of a tariff coefficient would be negative since tariffs have trade-restricting effects, and they form part of trade costs. However, in this study, the tariffs are expected to be insignificant in explaining the exports of citrus because they have been declining over the years due to the trade agreement that South Africa has with the EU and the UK.

A positive sign in the coefficient of the exchange rate is expected in relation to bilateral trade. This implies that when the Rand depreciates against the Euro and the Pound, citrus exports to EU and UK increases. The effects of exchange rates in the long run becomes less serious due to the fact that the importers and exporters adjust their demand and supply requirements in order to use the effects of exchanges rates to their own benefit. Herrera and Baleix (2010) state that the exchange rate can affect traded volumes negatively or positively, subject to the techniques used for estimation, product traded, and industries as well as countries concerned. The expected sign for this NTM variable is negative. This means that the NTMs are expected to negatively affect South Africa's citrus export to the EU and the UK. A negative sign would imply that the null hypothesis, that NTMs negatively affected citrus exports to the EU and the UK over the period 1988 to 2018, cannot be rejected.

During the interpretation of the gravity model results used in this study, the estimated coefficients will be interpreted as elasticities because they would be derived from the log-log model specification. That is, the coefficient of a variable that is logged, say ER, denotes a change in the percentage of citrus exports (dependent variable) due to a change in the exchange rate (explanatory variable). The NTM variable was not expressed logarithmically. In subsequent econometric analysis, coefficients of variables not expressed logarithmically are semi-elasticities.

5.5 REGRESSION MODEL DIAGNOSTICS

In assessing the dependability of the results, three (3) diagnostic tests were performed – the Regression Error Specification Test (RESET), the Breusch–Godfrey serial correlation LM test, and the Breusch–Pagan test for heteroskedasticity. De Benedictis and Giles (1998) state that in the econometrics it is important to test for the regression model specification. To test for any functional form misspecification, this study used a RESET test that was developed by Ramsey (1969). The RESET test can identify if there are variables omitted in the model estimated and if the model is correctly specified. The test null hypothesis is that the model has been specified in a correct way and that there is no omission of important variables. Inability to reject the null hypothesis would suggest that all the important variables were included in the model, and vice versa.

Serial correlation is a condition when the residuals are serially correlated, over time (Gujarati and Porter, 2009). Serial correlation is not desirable in econometric models. It can arise as a result of omitted variables, model misspecification, inappropriate functional form, or data that is erroneously transformed. The existence of serial correlation can be detected by using various approaches. In this study, the Breusch–Godfrey serial correlation LM test is used. This test null hypothesis is that there is no serial correlation (no correlation between residuals). The rejection of the null hypothesis would suggest the absence of serial correlation in the model, and vice versa.

Heteroskedasticity is among the inherent problems encountered when estimating a model by using OLS. If the error terms of the model do not have constant variance, they are said to be heteroskedastic. When the data exhibits heteroskedasticity, the OLS is not an efficient estimator, and the OLS estimates of the gravity model are extremely biased (Silva and Tenreyro, 2006). To determine if the data used for estimation displays heteroskedasticity, the Breusch–Pagan test was conducted in this study. The null hypothesis of this test is homoscedasticity, i.e. error terms are constant. If the null hypothesis is rejected it would suggest that the model has the problem of heteroskedasticity. Accordingly, other alternative ways of dealing with heteroskedasticity, such as Robust Standard Errors, will be explored.

5.6 SUMMARY

This chapter described the empirical method that is employed in this study to assess the impact of NTMs on volumes of exports of citrus from South Africa to the UK and the EU. The preferred model for this purpose is the gravity model, which is estimated by using OLS. The gravity model was chosen due to the fact that it has been extensively used by researchers in assessing the effects of bilateral trade. Many researchers prefer the gravity model because of its remarkable achievement in providing the explanation of changes in trade flows.

This chapter further provided a discussion on the variables which are used in this study, along with where the sources of data details were obtained. The expected effects of the explanatory variables and their expected signs were also discussed. The influence of the exchange rate and GDP per capita is expected have a positive sign, whereas that of the tariffs is expected to be negative on exports of South African citrus to the EU and the UK. The NTM variable, which is a variable of special interest, is expected to have a negative sign.

CHAPTER 6: RESULTS AND DISCUSSION

6.1 INTRODUCTION

The earlier chapters outlined the problem statement of this study, the objectives of the study, the development of the database of EU NTMS affecting South African citrus exports, an inventory analysis of EU NTMS affecting South Africa's citrus fruit exports, and the empirical approach that is used towards the achievement of the third and fourth objectives. This chapter serves to present the econometric results of the impacts of NTMs on South African citrus exports to the rest of the EU and the UK. This chapter's overall aim is to estimate the impact of NTMs on citrus exports and to determine if South African citrus trade would become easier when the UK leaves the EU (Brexit) than when the UK is part of the EU.

To do this, the impact of NTMs on the rest of the EU is compared with the potential impact of NTMs on the UK (post Brexit). The estimation is done in a scenario where the UK is presented as if it was not part of the EU throughout this study period. Eight equations were estimated using OLS model for four citrus categories (oranges, mandarins, lemons and limes, and grapefruit) following Equation 5.6 set out in the methodology chapter. For each citrus category, two models were estimated, representing the rest of the EU and the UK, respectively. NTMs were grouped into three groups for the reason that, at the highest level of disaggregation, there are approximately 200 types of NTMs. The group comprised TBT and SPS measures, commonly referred to technical measures. The two groups are NTMs authorised by the WTO. The third group is a total of all other NTMs, the use of which is not promoted by the WTO. Figure 6.1 below illustrates a breakdown of the estimation procedure followed.

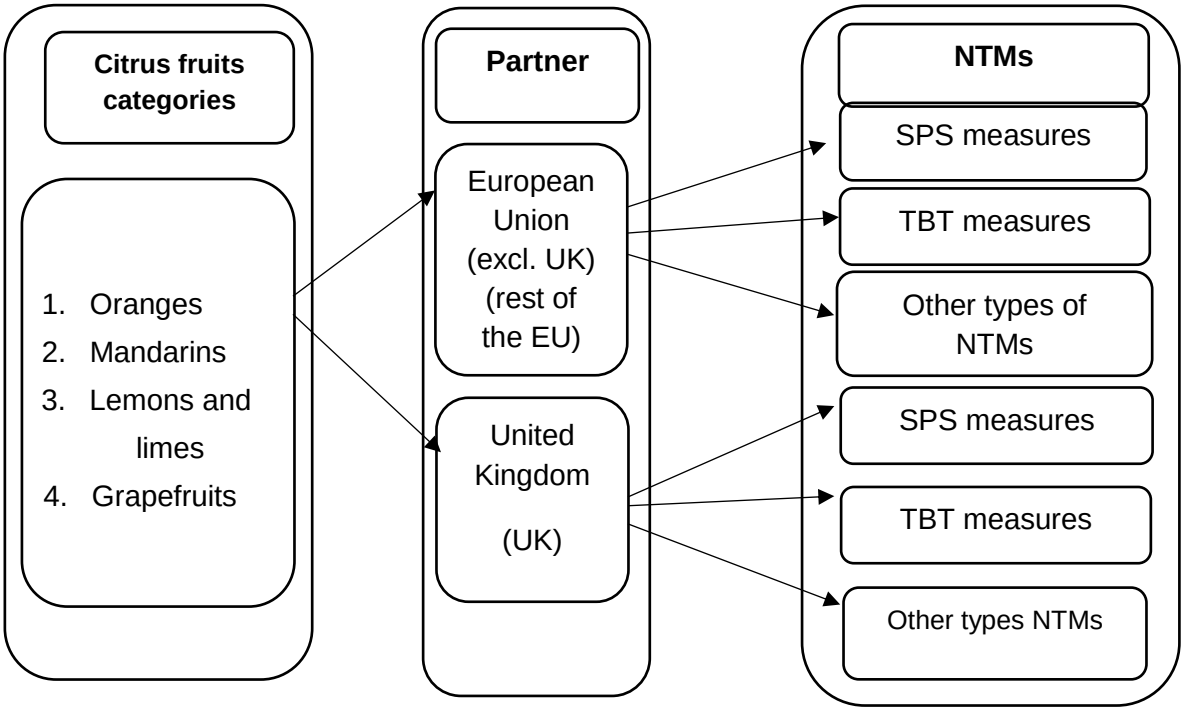

Figure 6.1: The gravity model estimation

The arrangement of this chapter is as follows. The first parts show the regression results involving SPS measures, TBT measures, and other types of NTMs, followed by a discussion. The regression results derived from the OLS estimations show the impacts of different NTM categories across different citrus categories, GDP per capita, exchange rate, and tariffs. The results of the model are then followed by brief discussions and conclusions on the effects of NTMs on four citrus categories and on the differences of the effects of NTMs applied by the rest of the EU and the UK on citrus exports from South Africa. A summary of the discussions in this chapter is presented in the last section.

6.2 ESTIMATING THE IMPACT OF NTMS ON REST OF THE EU AND UK

The estimated results of SPS measures, the TBT measures, and other types of NTM models are shown in Tables 6.1, 6.2 and 6.3, respectively. In all eight (8) estimated equations, the dependent variable was a log of citrus exports to the rest of the EU and the UK by South Africa over the period from 1988 to 2018. The explanatory variables include NTM variables, which are explained in Chapter 5, the log of GDP per capita, the log of exchange rates, and the log of Tariffs. The coefficients of these variables are

reported in the tables. The models are estimated for the same four citrus products, except for other citrus types that were excluded because they account for less than 10% of the overall citrus volume exported to both the rest of the EU and the UK. Tables 6.1, 6.2 and 6.3, respectively, further show the diagnostic results of all the models.

6.2.1 Diagnostic Results

The individual estimated regression equations were tested for misspecification by using the Ramsey RESET test. A null hypothesis being tested by the test is that the model has no omitted variable bias. The outcomes of the tests for all estimated equations reveal that the RESET test statistic is statistically insignificant at all conventional levels of significance. This suggests that the null hypothesis cannot be rejected, and we conclude that the estimated models have no omitted variable bias. The test for autocorrelation in the estimated models was done using the Breusch–Godfrey LM test. A null hypothesis being tested by this test is that the model has no autocorrelation. The outcomes for all estimated equations reveal that the Breusch–Godfrey test statistic is statistically insignificant at all conventional levels of significance. This suggests that we unable to reject the null hypothesis, and we conclude that the estimated models have no autocorrelation.

To test if the models have a problem of heteroskedasticity, a Breusch–Pagan test was performed. The null hypothesis for the test was that the error variances are all equal. The results for the nine models reveal that the Breusch–Pagan test statistic is statistically insignificant at all conventional levels of significance, and consequently we conclude that there is no problem of heteroskedasticity in these models.

It was, however, found that the other 15 estimated models had Breusch–Pagan test statistics that are statistically insignificant. This means that there is existence of heteroskedasticity. Therefore, this suggests that the variances of the error terms in these models are not constant. According to Gujarati and Porter (2009), heteroskedasticity does not destroy the unbiasedness and consistency properties of the OLS estimators; however, the statistical inference based on the variance of the error terms would be

biased, and t-statistics and F-statistics are inappropriate. Gujarati and Porter (2009) suggest that one of the remedial measures that can be used to address heteroskedasticity is by estimating the model by using “robust” standard errors. The technique is used to obtain unbiased standard errors of OLS coefficients, even though there is existence of heteroskedasticity. In terms of the model goodness fit, across all estimated models, the R^2 statistic ranges from 0.65 to 0.90. This represents a fair to a very good model fit. The F statistic is significant for all products, implying that all variables are jointly significant.

6.2.2 SPS NTM related measures gravity model results

The SPS NTM related gravity model results are presented in Table 6.1. The results present the impact of the SPS measures on South African citrus exports to rest of the EU and UK. The table also shows the impact of other important determinants citrus exports from South Africa destined to the rest of the EU and UK i.e. GDP per capita, exchange rates and tariffs. OLS estimation results of oranges, mandarins, lemons and limes and grapefruit respectively are shown in the table below.

Table 6.1: **Gravity Model results of only SPS measures for rest of the EU and UK**

Dependent Variables	**Oranges**		**Mandarins**		**Lemons and Limes**		**Grapefruit**	
Explanatory Variables:	**Coefficients**							
Partner countries	**EU**	**UK**	**EU**	**UK**	**EU**	**UK**	**EU**	**UK**
LnGDPPC	**4.185*** **	2.127	**13.183*** **	**11.002*** **	-0.156	**4.690***	**3.835***	-2.741
	0.000	0.140	**0.000**	**0.000**	0.794	**0.091**	**0.090**	0.623
LnGDPPCSA	-0.026	-0.841	-14.989	-13.640	-0.323	1.503	-1.610	2.170
	0.966	0.321	0.560	0.341	0.570	0.417	0.485	0.744
LnTar	0.049	0.025	-0.477	-0.543	0.223	-0.099	-0.049	-0.455
	0.276	0.567	0.215	0.665	0.259	0.541	0.827	0.413
LnER	0.334	**0.485***	**4.686** **	0.073	**2.105** **	-0.328	1.029	1.454
	0.265	**0.091**	**0.009**	0.955	**0.004**	0.546	0.174	0.292
NTM (SPS)	**-0.002** **	**-0.001***	**-0.020** **	**-0.011** **	0.000	-0.001	-0.005	-0.002
	0.002	**0.054**	**0.014**	**0.045**	0.948	0.659	0.729	0.863
Constants	-31.210	-3.334	-64.887	-121.186	9.498	-52.292	-16.207	16.464
	0.006	0.745	0.117	0.003	0.023	0.003	0.595	0.526
R^2	0.886	0.861	0.874	0.870	0.862	0.778	0.658	0.765
F	57.290**	24.750***	47.450**	46.150***	31.240***	23.040***	32.730***	28.960***
Ramsey RESET test Prob>F=	0.515	0.209	0.109	0.140	0.569	0.308	0.468	0.323
Breusch-Godfrey Prob > chi2=	0.311	0.756	0.164	0.654	0.264	0.206	0.262	0.336
Breusch-Pagan test for heteroskedasticity Prob > chi2=	0.003	0.220	0.000	0.000	0.394	0.107	0.036	0.000
Estimation method	Robust standard errors	OLS	Robust standard errors	Robust standard errors	OLS	OLS	Robust standard errors	Robust standard errors

Source: Compiled by author

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

The GDP per capita variable has a positive significant effect on South African exports of oranges, mandarins and grapefruits to the rest of the EU, as well as on mandarins and lemons exported to the UK. The results are in line with theoretical expectations, as well as the literature, whereby increasing income is linked to an increase in the demand for a commodity. For an instance, the coefficient estimate of GDP per capita in the oranges model is 4.18. This suggests that if GDP per capita increased by 1% in the rest of the EU,

it would result in an increase of approximately 4.18% in South African orange exports to rest of the EU, *ceteris paribus*. The GDP per capita variable for South Africa had no significant effect on South African citrus exports, implying that the South African GDP per capita does not influence South Africa's ability to export more amounts of citrus to the rest of the EU and the UK.

The results show that the exchange rate had a positive influence on exports of South African mandarins and lemons and limes to the rest of the EU. In addition, the exchange rate also had a positive influence on orange exports to the UK. For example, a 1% relative depreciation in the rand would, on average, result in about a 2.1% relative increase in South African lemons and limes exports to the rest of the EU, *ceteris paribus*. Hence, this implies that export flows of South African lemons and limes are fairly sensitive to changes in the exchange rate.

In this subsection, the NTM category that is being assessed is SPS, which is an NTM category that is among those that are authorised by the WTO. All citrus categories reveal no proof that SPS measures impact on exports, apart from oranges and mandarins. The model results demonstrate a negative and statistically significant influence of SPS measures on orange and mandarin exports from South Africa to the rest of the EU and the UK. It is worth to noting that SPS measures have an effect on the two citrus categories that are the most important exports by South Africa to the rest of the EU and the UK due to the fact that they are exported the most. This outcome is the result of the fact that South African export shares of these citrus categories in the rest of the EU and the UK were the highest, and they faced the highest number of SPS measures. The results are consistent with expectation because costs are added towards trade in these categories as a result of the implementation of SPS measures, and thus as these costs increase, South African exports of oranges and mandarins to rest of the EU and the UK should decline.

In the EU market, the coefficient of –0.002 for SPS measures on orange exports from South Africa suggests that that, if the trade weighted SPS measure increases by 1%, South Africa's orange exports in tons to the rest of the EU would go down 0.002% per annum. The results are consistent with expectation due to the fact that costs are added

towards trade as a result of the implementation of SPS measures; hence, as they increase, South African exports of oranges and mandarins to the rest of the EU and the UK should decline. This implies that a high number of incidences of SPS measures imposed on oranges, coupled with a large South African oranges export share in the rest of the EU market, would restrict exports. The coefficient of –0.020 for SPS measures on mandarins exported from South Africa suggests that that, if the trade weighted SPS measures increase by 1%, mandarin export volumes from South Africa to the rest of the EU would decline by 0.020% per year. This implies that a high number of incidences of SPS measures imposed on mandarins, coupled with a large South African mandarin exports share in the rest of the EU market, would restrict exports.

In the UK market, the coefficient of –0.001 for SPS measures on South African orange exports suggests that that, if the trade weighted SPS measures increase by 1%, orange export volumes from South Africa to the UK would decline by 0.001% per year. This implies that a high number of incidences of SPS measures imposed on oranges, coupled with a large South African oranges exports share in the UK market, would restrict exports. The coefficient of –0.011 for SPS measures on mandarins exported from South Africa suggests that, if the trade weighted SPS measure increases by 1%, mandarin exports from South Africa to the UK would decline by 0.011% per year. This implies that a high number of incidences of SPS measures imposed on mandarins, coupled with a large South African mandarins export share in the UK market, would restrict exports.

Essentially, the results show that a large amount of SPS measures imposed on exports of South African oranges and mandarins play a significant part in reducing prospective exports to the rest of the EU and the UK. These SPS measures relate to regulations that the rest of the EU and the UK implemented with the aim of protecting the health of humans, plants and animals, as well as enforcing restrictions against diseases and pests. Although the WTO permits the use of these measures, they are capable of restricting South African citrus exports to the rest of the EU and the UK, as appears from the results of this study. This is primarily due to the fact that they can be a challenge for citrus exporters because of the restrictive nature of the requirements of the standards.

The model results clear show that although SPS measures applied by the UK affect South Africa's orange and mandarin exports negatively, their impact is low compared with those applied by the rest of the EU. The value of -0.001 represents the margin by which South African orange exports to the UK suffer unnecessarily through the SPS measures, and is obtained by subtracting the NTM (SPS) coefficient for exports to the EU from that for exports to the UK. The value of -0.009 represents the margin by which South African mandarin exports to the UK suffer unnecessarily through the SPS measures, and is obtained by subtracting the NTM (SPS) coefficient for exports to the rest of the EU from that for exports to the UK.

The estimated results also show that tariffs have no impact on any of the citrus categories exported to both the rest of the EU and the UK. This outcome is consistent with what was expected in the study. This is due to the fact that EU tariffs imposed on citrus have declined over the years, and have been relatively low for some time, which is largely attributable to the existence of the trade agreement that South Africa and EU entered into in 2000. Currently, South Africa and the rest of the EU conduct trade under the SADC–EU EPA that came into force in 2016, replacing the earlier TDCA. In 2019, South Africa concluded a similar trade agreement with the UK. It is worth noting that because tariffs do not emerge to constitute a significant determinant of South African citrus exports to the rest of the EU and the UK, SPS measures have instead been found to be influential. This, of course, shows the rising significance of SPS measures for South African trade with the rest of the EU and the UK. It is clear that SPS measures are increasingly restrictive of South African orange and mandarin exports, particularly to the rest of the EU, as compared with tariffs.

6.2.3 TBT NTM related measures gravity model results

The results presented in Table 6.2 below are for the TBT NTM related gravity model. They show the impacts of the TBT measures on South African citrus exports to the rest of the EU and to the UK. They further show the impacts of GDP per capita, exchange rate, and tariffs on citrus exports from South Africa. OLS estimation results are given for oranges, mandarins, lemons and limes, and grapefruit, respectively.

Table 6.2: **Gravity Model results of only TBT measures for rest of the EU and UK**
Source: Compiled by author

Dependent Variables	**Oranges**		**Mandarins**		**Lemons and Limes**		**Grapefruit**	
Explanatory Variables:	**Coefficients**							
Partner countries	**EU**	**UK**	**EU**	**UK**	**EU**	**UK**	**EU**	**UK**
LnGDPPC	**4.097*** **	2.286	**9.081** **	**13.837*** **	-0.123	**4.473** *	3.612	-4.402
	0.000	0.140	**0.002**	**0.000**	0.838	**0.095**	0.119	0.468
LnGDPPCSA	0.036	-1.074	-14.739	-13.258	-0.302	1.902	-1.630	4.170
	0.958	0.277	0.988	0.771	0.542	0.325	0.501	0.579
LnTar	0.041	0.033	-0.582	-0.434	0.175	-0.115	-0.029	-0.424
	0.413	0.497	0.349	0.387	0.351	0.399	0.898	0.441
LnER	0.287	0.341	**4.450** *	-0.302	**2.256*** **	-0.254	0.885	1.554
	0.342	0.312	**0.024**	0.815	**0.000**	0.595	0.215	0.251
NTM (TBT)	**-0.013** **	-0.008	**-0.125** **	-0.052	-0.007	-0.015	-0.022	-0.013
	0.029	0.399	**0.101**	0.565	0.806	0.421	0.271	0.665
Constants	-30.753	-2.734	-55.161	-122.373	8.844	-53.620	-13.565	16.134
	0.008	0.804	0.246	0.006	0.043	0.003	0.665	0.527
R^2	0.881	0.842	0.865	0.857	0.862	0.780	0.667	0.651
F	55.490***	21.290***	46.030***	35.840***	31.320**	22.640**	56.760***	34.750***
Ramsey RESET test Prob>F=	0.385	0.375	0.107	0.546	0.197	0.102	0.380	0.361
Breusch-Godfrey Prob > chi2=	0.407	0.641	0.107	0.416	0.272	0.297	0.374	.0.775
Breusch-Pagan test for heteroskedasticity Prob > chi2=	0.004	**0.208**	0.001	0.002	0.482	0.106	0.040	0.000
Estimation method	Robust standard errors	OLS	Robust standard errors	Robust standard errors	OLS	OLS	Robust standard errors	Robust standard errors

Note: ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively

The model results reflect that the GDP per capita variable has a significant and positive influence on South African orange and mandarin exports to the rest of the EU and on exports of mandarins and lemons and limes to the UK. This is in line with the gravity model theory as it suggests that, as the economic environments improve, trade among countries increases. For instance, the coefficient estimate for the rest of the EU GDP per capita is 4.10. This suggests that, if the GDP per capita for the rest of the EU changes by 1%, it would result in an increase of approximately 4.10% in orange exports to the UK from South Africa, *ceteris paribus*. Again, in these results, the South African GDP per capita variable does not seem to be a key determinant of citrus exports from South Africa to both the rest of the EU and to the UK. This is the case for all citrus categories considered in this study. The exchange rate had a positive influence on South African mandarin and lemon exports to the rest of the EU. For instance, a 1% relative depreciation

in the rand, on average, would result in approximately a 4.45% relative increase in South African mandarin export flows to the rest of the EU, *ceteris paribus*. This implies that the flows of South African mandarin exports are sensitive to exchange rate changes.

In terms of the NTM coefficient, TBT measures have a negative effect only on oranges and mandarins exported by South Africa to the rest of the EU. This corroborates early evidence about the detrimental role of TBTs in constraining trade, although they only accounted for 13% of the total NTMs imposed by the EU on South African citrus exports. In the rest of the EU market, the coefficient of –0.013 for TBT measures applied by the EU on orange exports from South Africa suggests that, if the trade weighted TBT measures increase by 1%, orange export volumes originating from South Africa to the rest of the EU would go down by 0.013% per annum, *ceteris paribus*. This implies that a high number of incidences of TBT measures imposed on oranges, coupled with a large South African oranges exports share in the rest of the EU market, would restrict exports. The coefficient of –0.125 for TBT measures applied by the EU on mandarins exported from South Africa suggests that, if the trade weighted SPS measure increases by 1%, South Africa's mandarin export volumes to the rest of the EU would decline by 0.125% per year, *ceteris paribus*. This implies that a high number of incidences of TBT measures imposed on oranges, coupled with a large South African mandarins exports share in the rest of the EU market, would restrict exports. The model results basically show that different forms of TBT measures, such as food standards, labelling, nutrition information and plant health regulations, play a key part in decreasing potential orange and mandarin exports from South Africa to the rest of the EU, but not to the UK.

Similar to the SPS NTM related model, the estimated results also show that tariffs have no impact on any of the citrus categories exported to both the rest of the EU and to the UK. This outcome is consistent with what was expected in the study. This is due to the fact that EU tariffs imposed on citrus exports from South Africa have declined over the years, and have been relatively low for some time, which is largely attributable to the existence of the trade agreement that South Africa and the EU entered into in 2000. It is also worth noting that, as tariffs do not appear to be an essential factor for South African citrus exports to the rest of the EU and the UK, TBT measures have been found to be

influential. This, of course, shows the rising significance of TBT measures for South African trade with the rest of the EU and the UK. Like SPS measures, TBT measures are also becoming increasingly restrictive of South African orange and mandarin exports, predominantly in the EU market, as compared with tariffs.

6.2.4 Other NTMs gravity model results

Other NTM gravity model results for both the rest of the EU and the UK are presented in Table 6.3 below. This group of NTMs represents the aggregate of NTMs imposed by the EU on citrus exports from South Africa, other than SPS and TBT measures. This group of NTM measures is also referred to as non-technical measures. The main aim of estimating these measures independently from TBT and SPS was to determine if the WTO promotes trade protectionism, or promotes the use by countries of non-authorised NTMs. The results present the impacts of Other NTM measures on South African citrus exports to the rest of the EU and the UK.

Table 6.3: **Gravity Model results of only other NTM measures for rest the EU and UK**

Dependent Variables	Oranges		Mandarins		Lemons and Limes		Grapefruit	
Explanatory Variables:	**Coefficients**							
Partner countries	**EU**	**UK**	**EU**	**UK**	**EU**	**UK**	**EU**	**UK**
LnGDPPC	**4.653*** **	**2.683** **	**12.940** **	**6.409**	-0.750	**10.060*** **	3.935	**15.598***
	0.000	**0.094**	**0.002**	**0.078**	0.211	**0.000**	0.123	**0.077**
LnGDPPCSA	-0.317	-1.459	-14.315	-7.983	0.355	0.824	-2.642	0.826
	0.613	0.153	0.830	0.860	0.511	0.476	0.263	0.892
LnTar	0.100	0.042	0.163	0.052	0.227	-0.013	-0.032	0.055
	0.641	0.383	0.593	0.694	0.240	0.863	0.894	0.915
LnER	0.027	0.242	**3.603** **	**1.269***	**2.204*** **	-0.869	0.456	-0.921
	0.920	0.473	**0.019**	**0.101**	**0.000**	0.181	0.488	0.401
NTM (Other NTMs)	0.066	-0.043	0.205	1.487	0.126	-0.563	0.118	-1.776
	0.550	0.680	0.379	0.890	0.320	0.900	0.389	0.780
Constants	-33.394	-3.342	-59.113	6.056	9.156	-100.424	-7.599	-155.782
	0.003	0.785	0.190	0.826	0.009	0.000	0.830	0.113
R^2	0.895	0.838	0.857	0.950	0.886	0.868	0.658	0.621
F	37.910***	20.720***	36.120***	54.540***	38.690***	32.930***	32.730**	34.260***
Ramsey RESET test Prob>F=	0.658	0.112	0.139	0.376	0.858	0.485	0.299	0.005
Breusch-Godfrey Prob > chi2=	0.948	0.460	0.126	0.168	0.271	0.404	0.406	0.198
Breusch-Pagan test for heteroskedasticity Prob > chi2=	0.014	0.176	0.001	0.000	0.785	0.785	0.066	0.000
Estimation method	Robust standard errors	OLS	Robust standard errors	Robust standard errors	OLS	OLS	Robust standard errors	Robust standard errors

Source: Compiled by the Author

Note: ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively

The model results reveal that the GDP per capita variable has a significant and positive effect on South African orange and mandarin exports to the rest of the EU and on exports of oranges, mandarins, grapefruit, and lemons and limes to the UK. This implies that, as the economic performances of the rest of the EU and the UK increase, so does the demand for exports of these categories. However, the GDP per capita variable for South Africa was statistically insignificant in all citrus categories exported to the rest of the EU and the UK. The exchange rate variable has a positive influence on South African mandarin exports to the rest of the EU and on exports of lemons and limes and grapefruit to the UK. This suggests that the depreciation of the South African rand contributes positively towards increased exports of these two citrus categories to both the rest of the EU and the UK. Again, the estimated results also show that tariffs have no impact on any

of the citrus categories exported to both the rest of the EU and the UK.

The models results further show that the other types of NTMs variable is statistically insignificant in all estimated equations. This suggests that other NTMs have no influence on all citrus categories exported to both the rest of the EU and the UK by South Africa. These results are in line with the expectations since other types of NTMs account for a very small proportion of the overall number of NTMs imposed by the EU. They only accounted for 15% of NTMs applicable in the EU by the end of 2018. Moreover, these other measures have been declining over the years. This suggests that these other NTMs are not important in restricting South African citrus exports to the rest of the EU and the UK, and therefore do not have an impact on South African exports of citrus to both the rest of the EU and the UK.

6.2.5 The effects of NTMs on citrus categories exported by SA to the rest of the EU and UK.

The descriptive analysis of NTMs discussed in Chapter 4 shows that the number of NTMs affecting each citrus category varied during the period from 1988 to 2018. Based on the descriptive analysis, the theory adopted in this study is that the effects of NTMs vary according to the type of citrus category and that the categories that are exported the most by South Africa and have a larger share in rest of the EU and the UK market will suffer the most from NTMs. The model results from tables 6.1, 6.2, and 6.3 above indeed confirm that the effects of NTMs measures vary according to the individual citrus categories exported to the rest of the EU and the UK by South Africa. The estimated models show evidence that oranges are the most affected category, followed by mandarins. Oranges and mandarins are responsive to TBT and SPS measures, and not to other NTMs. These findings are explained by the fact that oranges and mandarins are the citrus categories most exported by South Africa to the rest of the EU and the UK, and they have faced greater numbers of SPS and TBT than any other of the citrus categories over the years. The rest of the other categories were not affected by NTMs.

6.2.6 The effects of NTM types on citrus exports to the rest of the EU and UK.

During the analysis, types of NTMs were separated and grouped to determine if different categories of NTMs have different effects on South African citrus exports to the rest of the EU and the UK. The purpose of focusing on the subset of NTMs is that economic theory does not provide simple and clear predictions of their different effects on trade. Moreover, this study aimed to discover if the effects of NTMs that are authorised by the WTO (SPS and TBTs) and applied by the EU and the UK to citrus exports from South Africa differ from non-technical measures (other types of NTMs). The results show strong evidence that the citrus, mainly oranges and mandarins, exported by South Africa to the rest of the EU and the UK are mostly affected by SPS measures, as compared with other NTMs. TBT measures are second to SPS measures in terms of their effect on citrus exports from South Africa to the rest of the EU. Other NTMs had no significant impact on exports both to the rest of the EU and to the UK. This is consistent with expectation as these NTMs were relatively low and have been declining over the years. Therefore, it can be concluded that the WTO does not promote trade protectionism or permit the rest of the EU and the UK to use NTMs that are not authorised by WTO.

6.2.7 Comparing the effects of NTMs on SA citrus exports to the rest of the EU and UK

As discussed in Chapter 4, the EU has, over the years, implemented NTMs, and amongst these are those that are aimed at protecting plants, producer support and competitiveness. Therefore, in this study it is assumed that these NTMs are likely not going to apply in the UK after Brexit. Accordingly, the main aim of this study is to determine if South African citrus trade with the UK would then become easier or improve, as compared with when the UK is part of the EU. The model results show strong evidence that trade with UK would be easier or improve after Brexit, as compared with when the UK is part of the EU.

The value of -0.001, which is obtained by subtracting the value of the NTM (SPS) coefficient for exports to rest of the EU from that for the UK, represents the margin by

which South African orange exports to the UK suffer needlessly through SPS measures. Similarly, the value of -0.009 represents the margin by which South African mandarin exports to the UK suffers needlessly through SPS measures. Essentially, these results suggest that, if regulations on pesticides, pests, and plant health (including CBS measures) are removed in the UK, the negative impact of SPS measures on South African orange and mandarin exports to the UK can be reduced. This also means, as a result of the removal of these regulations, that the costs incurred by exporters in complying with these measures, comprising the administrative costs of testing, inspection and certification, may also decline.

Furthermore, the results from the TBT NTM related gravity model also support the argument that citrus trade will be easier or improve with the UK after Brexit, as compared with when the UK is part of the EU. The model results confirm that TBT measures do not affect exports to the UK. This is because TBTs, such as the bans of citrus exports from South Africa applied by the EU for reasons related plant health or life, or the environment, would not be applicable because the UK does not produce citrus. Overall, the results imply that exporters who have been excluded from exporting to the UK could also benefit from the removal of measures that are aimed at protecting plants, producer support and competitiveness.

6.3 SUMMARY AND CONCLUSION

In this chapter, an augmented gravity model was used to estimate the impact of NTMs on South African citrus exports. Specifically, the estimated models were used to determine and compare the impact of NTMs on various citrus categories exported to the EU (excluding the UK) and to the UK (after Brexit). Eight equations were estimated for four citrus fruit categories for both the rest of the EU and the UK. NTMs were tested to determine if various NTMs categories have different effects on various citrus categories exported to the rest of the EU and the UK by South Africa.

The RESET test was used to check if the estimated models had any misspecification, and the results confirmed the nonexistence of misspecification in all the estimated

models. The Breusch–Godfrey test was used to test for serial autocorrelation in the models and it was found that the models estimated did not have correlation. The existence of heteroskedasticity was tested using the Breusch–Pagan test. The results revealed that 15 of the estimated models have a problem with heteroskedasticity. This problem was resolved by estimating the models through using robust standard errors.

The model results showed that South African orange and mandarin exports are mostly affected by SPS measures, compared with NTMs, and their impact is higher in the rest of the EU as compared with the UK. The differences of -0.001 and -0.009, which are obtained by subtracting the respective values of the NTM (SPS) coefficients for exports to the rest of the EU from those of the UK for oranges and mandarins, represent the margins by which South Africa exports to UK suffer unnecessarily through SPS measures. This is consistent with the expectation due to the fact that there are no commercial citrus orchards in the UK, and as result the regulations that have been imposed by the EU to protect citrus-producing countries in the Union, such as Spain, may no longer apply in the UK. These are regulations related to pests, plant health (including CBS), plant protection, and territory protection.

The model results also show that TBT measures only affected South African exports of mandarins and oranges to the rest of the EU. These measures had statistically insignificant effects on all South African citrus categories exported to the UK. This also supports the argument of the study that, if TBTs such as the restrictions established for reasons related plant health or life, or the environment, are removed, exports to the UK would not be affected by those TBT measures. For instance, removing the ban that applies to South African citrus shipments from regions where CBS is present, which covers the bulk of the country's production, would allow many exporters who have been excluded from EU markets to export to the UK.

The model results show that the other types of NTMs (non-technical measures), such as quotas, import or export licences, additional taxes and surcharges, rules of origin, and many others, had no significant impact on both exports to the rest of the EU and the UK. The model results further show that tariffs had no significant impact on all citrus categories

exported to the rest of the EU and the UK, across all NTM categories. This finding implies that the role of tariffs on citrus trade between South Africa and the EU and the UK is low. This finding can be explained by the fact that South Africa has trade agreements with the EU and the UK, being the SADC–EU EPA and the SACUM–UK EPA, respectively, which have over the years resulted in a decline in tariffs.

Overall, the study confirmed that NTMs, mainly SPS and TBT measures, have the highest impact in the rest of the EU, as compared with the UK, predominantly on orange and mandarin exports. This implies that South African citrus exporters who have been excluded from exporting to the UK would likely benefit, if the NTMs are eliminated or reduced. Tariffs are insignificant, whereas NTM measures show the rising significance of SPS and TBT measures that apply to South African trade with the rest of the EU and the UK. This suggests that NTMs are becoming more and more restrictive to South African citrus exports, as compared with tariffs, and these must be addressed in order to enhance South African citrus exports to rest of the EU and the UK.

CHAPTER 7: SUMMARY, CONCLUSION AND RECOMMENDATIONS

7.1 INTRODUCTION

This study evaluated the potential impact of NTMs on South African citrus exports to the rest of the EU and the UK. The study was primarily motivated by the fact that citrus production in the UK is non-existent. Therefore, the UK is unlikely to impose plant health, producer support and competitiveness measures on citrus imports from South Africa. The second fact is that the UK is an important market for South Africa, as it is the largest importing country of citrus from South Africa in the EU. Consequently, the first objective of this study was to develop a database of NTMs imposed by the EU that affect citrus exports to the EU originating from South Africa. Subsequently, the study endeavoured to determine the effects of NTMs on citrus exports from South Africa to the UK (post Brexit) and the EU by using the inventory approach. The study also attempted to evaluate the potential effects of NTMs on South African citrus exports to the UK after Brexit by using the gravity model approach.

Several approaches can be used to evaluate the effects that NTMs have on trade. To achieve objective number two of this study, an inventory approach was used to determine NTMs impacts on citrus exports to the rest of the EU and the UK originating from South Africa. A contrast was made between the UK and the EU to determine if South African citrus would face fewer NTMs in the UK than in the rest of the EU. Two indices are used when analysing using this approach, namely FI and CR. The FI shows the percentage of products that are subject to at least one or more NTMs. The significance of NTMs for total imports is determined by using the CR, which shows the proportion of trade that is subject to NTMs for the importing country. The calculated FI and CR for both the rest of the EU and the UK were used to illustrate the extent of impact of the NTMs on different South Africa citrus exports categories over three periods – the pre-, start, and full TDCA implementation periods.

To achieve the third and fourth objectives of the study, the gravity model was used to evaluate the impact of NTMs on South African citrus exports to the rest of the EU and the

UK. This model has been previously employed by several researchers to analyse the impact of a number of factors that may be trade enhancing or inhibiting, for example tariffs, NTMs and other trade-related costs. In this regard, there were minor adjustments that needed to be done for the model to fit the current study. Models for South African exports of oranges, mandarins, lemons and limes, and grapefruits to the rest of the EU and the UK were estimated using OLS and this was done for three NTMs categories, namely SPS measures, TBT measures, and other of NTMs.

7.2 SUMMARY OF THE FINDINGS

The evaluation of the impact of NTMs on citrus exported by South Africa to the EU and the UK started with the realisation that the EU imposes a variety of NTMs on citrus imports from South Africa. Some of these may possibly not apply in the UK after Brexit. There is currently no study that has attempted to assess the impact of EU NTMs on citrus exports to the rest of the EU and the UK and how these NTMs would potentially affect South African citrus trade between South Africa and the UK after Brexit.

To do this assessment, a database of NTMs imposed by the EU on citrus exports originating from South Africa was constructed with the aim to compile a single repository of EU NTMs. In quantifying the EU NTMs, a database was defined, in the same way as the international database, using the UNCTAD MAST nomenclature. Oranges, mandarins, lemons and limes, grapefruits and other types of citrus at the HS 6-digit level exported by South Africa to the EU and the UK were included in the database. The NTM database showed that the overall number of NTMs applied by the EU to citrus exports that originated from South Africa over the period 1988 to 2018 was 1 829. The number of NTMs had been increasing over time, while the average tariffs applied by the EU on citrus had declined. South African lemon and lime exports to the EU were affected the most by the number of NTMs. Oranges and mandarins exported from South Africa faced the largest number of SPS measures. Grapefruit exports were the least affected by number of NTMs.

The rest of the EU and the UK were than compared. Furthermore, the analysis was done for three periods: the pre-TDCA (1988–1999), Start of TDCA (2000–2008), and the Full TDCA implementation (2009–2018) periods. The rationale for this was to test the hypothesis that, as tariffs were declining, the numbers of NTMs introduced then rise.

The first use of the database was to compare the NTM use by the rest of the EU and the UK and to assess whether the use of NTMs had grown, reduced, or stayed the same during the three periods: the pre TDCA (1988–1999), Start of TDCA (2000–2008) and the Full TDCA implementation (2009–2018). The rationale for this was to test the hypothesis that, as citrus tariffs imposed by the EU declined due to the South Africa and EU trade agreement, the number of NTMs increased.

Using the FI and CR to assess the presence and prevalence of NTMs showed that there is clear evidence that the NTMs increased over a period of time. The percentage of citrus products affected by NTMs during the full TDCA implementation period is much higher than in the pre-TDCA period. A similar conclusion was reached when the effects of NTMs on the values of citrus imports were evaluated using the CR. Therefore, it can be concluded that the use of NTMs by the EU on citrus originating from South Africa has indeed been increasing, whereas tariffs have declined during the same period.

The inventory analysis was further used to compare the effects of NTMs on citrus exports by South Africa to the rest of the EU and the UK. The results showed evidence that the NTMs effects are higher on citrus destined to the rest of the EU than on those that are destined for the UK. The FI results revealed that, due to the UK being part of the EU, and even though it does not have citrus production, South African citrus exports faced 3.9%–16% more SPS measures than they would have if the UK was not part of the EU. Furthermore, South African citrus exports would have faced 10%–20% more TBT measures than they would have if the UK was not part of the EU. It was further found that South African citrus exports would have faced 33%–390% more of other types of NTMs than they would have if the UK was not part of the EU.

The CR calculations revealed that, as a result of the UK being part of the EU, and even though it does not have citrus production, high values of South African citrus exports were affected by SPS measures by 2.1%–11.7% more than they would have if the UK was not part of the EU. The results further showed that high values of South African citrus exports were affected by TBT measures by 16.3%–18.4% more than they would have if the UK was not part of the EU. It was found that high values of South African citrus exports were affected by other types of NTMs by 106%–390% more than they would have if the UK was not part of the EU.

Although FI and CR are useful in identifying NTMs occurrence and use, as well as the affected products, they are inappropriate when the aim is to determine the magnitude of the NTM protection. This then requires an econometric model to be used to evaluate the effects of the NTMs. Consequently, the gravity model was used in this study to estimate the magnitude of these effects. The model was estimated and results showed that the influence of SPS measures is higher on orange and mandarin exports, and their impact is the highest in the rest of the EU than in the UK. This is consistent with the expectation because there are no commercial citrus orchards in UK. After Brexit, the regulations that were imposed by the EU to protect citrus-producing countries in the Union, such as Spain, may no longer apply in the UK. These are regulations related to pests, plant health (including CBS), plant protection, and territory protection.

The results from the model further showed that TBT measures only affected South African orange and mandarin exports to the rest of the EU. TBT measures are statistically insignificant in their effect on citrus exports from South Africa to the UK. This is also consistent with the case made in this study, that if TBT measures such as the restrictions established for reasons related to plant health or life or to the environment are removed, exports to the UK would not be affected. The other types of NTMs (non-technical measures) had no significant impact on both exports to the rest of the EU and the UK.

Tariffs had no significant impact on all South African citrus categories exported to the rest of the EU and the UK, across all NTM categories. This implies that citrus exports from South Africa to the EU and the UK are not restricted by tariffs. These results are consistent

with theory and expectation since tariffs imposed by the EU have declined over the years and have been relatively low for some time due to the trade agreements that South Africa has with the EU and the UK. These are important results as they confirm that the restrictiveness of NTMs is becoming more and more significant for citrus exports, as compared with tariffs.

7.3 POLICY IMPLICATIONS

The findings of the study show that SPS measures had a statistically significant and negative effect on orange and mandarin exports from South Africa to the rest of the EU and to the UK, and that the effect of SPS measures is higher on exports to the rest of the EU than to the UK. This implies that SPS measures applied on orange and mandarin exports from South Africa carried additional costs to South African exporters, which in turn restricted their export opportunities. For that reason, it is important to address SPS measures, particularly those that are restrictive, to ensure that South African exporters continue to benefit from trade with the rest of the EU and UK markets. Since negotiations between South Africa and the UK are still open, this study therefore recommends that the South African trade policy makers should prioritise negotiations for the reduction or removal of some of the measures that do not apply to the UK due to the absence of commercial orchards in the UK. Measures that must be negotiated for removal include regulations related to pests, plant health (including CBS), plant protection, and territory protection. This will contribute to improved South African citrus exports to the UK.

It has also been shown in the study that TBT measures had a significant negative effect on oranges and mandarin exports to the rest of the EU and had no negative effect on citrus exports to the UK. Therefore, this study recommends that South African citrus producers should focus on exporting more amounts of citrus to the UK, and export less to the rest of the EU.

The results of this study also revealed that the other types of NTMs had no significant effect on South African citrus exports to both the rest of the EU and the UK. While tariffs have been declining, the overall application of NTMs has increased. This suggests that there is a possibility that other types of NTMs could still rise in the future and likely have

a negative impact on South African citrus exports to the UK. Hence, this study further recommends that South African policy makers should continue to monitor other types NTMs and endeavour to ensure that the status quo remains. Cooperative action and continued consultations between the UK and South Africa would ensure that this is achieved. In addition, this will ensure that any measures imposed by the UK in future are better understood by South Africa, and that any preventable trade restrictive impacts would have been eliminated, even before implementation.

Furthermore, this study found that tariffs applied by the EU and the UK had no significant effect on South African citrus exports to the EU and to the UK. This is due to the fact that, from 2000, South Africa had entered into a trade agreement with the EU and the UK that resulted in a significant decline in tariffs on the citrus export trade. This clearly shows the significance of having trade agreements in place. Therefore, this study recommends that South African policy makers should consider opening trade agreement negotiations in other lucrative markets, such as Asia i.e. China, Japan and the whole of the Association of Southeast Asian Nations (ASEAN), that would result in the reduction or removal of tariffs imposed on South African citrus exports.

7.4 LIMITATIONS OF THE STUDY FURTHER STUDY RECOMMENDATIONS

Although this study's specific objectives were successfully achieved, some limitations were encountered. One of the main limitations of this study is that the main assumption is that the UK has been considered as not being part of the EU, whereas it actually is. Accordingly, the UK NTMs and trade data used to analyse the impact of NTMs on South African citrus exports to the UK as if it was independent has components that are influenced by the EU because the UK is factually part of the EU. Once Brexit is complete, future research could look to following up on this study with real data and fewer assumptions on similar issues.

Furthermore, an NTM variable in this study is represented by trade weighted NTMs, but not by an individual specific measure, i.e. CBS requirements. The NTM data used to calculate a trade weighted NTM does not indicate how important any restrictions or limitations are. It only lists measures that affect exports, associated with the affected citrus products. That suggests that there may be a possibility of overriding NTMs with regard to

the effect that may encompass the influence of NTMs altogether. Because this study did not evaluate the impact of specific measures that are dominant, it could still be improved upon. Future research could look at identifying specific dominant EU NTM measures that encompasses the impact of all other NTMs and assess their impacts separately.

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APPENDIX

Table 7.1: Total number of NTMs applied introduced per year

Period/NTM	SPS	TBT	L, Q and QCM	PCM	Other NTMs
1988	10	5	6	4	0
1989	10	5	3	1	0
1990	15	10	3	2	0
1991	15	10	6	3	0
1992	20	10	3	6	0
1993	25	10	6	12	5
1994	25	10	5	5	5
1995	35	10	8	9	11
1996	40	10	8	8	10
1997	55	10	1	0	10
1998	65	10	6	0	10
1999	70	10	4	0	10
2000	110	15	6	0	10
2001	150	15	2	3	10
2002	195	19	1	3	10
2003	220	22	4	8	10
2004	260	22	2	3	10
2005	305	27	1	3	15
2006	310	27	5	3	15
2007	320	32	1	3	15
2008	335	57	1	3	15
2009	445	87	4	3	15
2010	490	92	8	0	15
2011	520	97	8	3	15
2012	569	101	1	3	15
2013	633	106	5	3	15
2014	709	111	0	3	15
2015	832	111	0	3	15
2016	970	111	0	3	15
2017	1057	131	0	3	15
2018	1131	176	2	3	15
Total	**1131**	**176**	**38**	**42**	**220**

Source: EU NTM dataset, 2020

Table 7.2: Total number of NTMs applied introduced per year

Period	Oranges	mandarins	grapefruit	lemons and lime	Other citrus varieties	all citrus varieties
1988	7	6	4	5	3	25
1989	1	1	0	2	0	4
1990	3	5	2	3	2	15
1991	3	3	0	3	0	9
1992	3	3	1	6	1	14
1993	8	8	2	8	2	28
1994	4	3	1	6	1	15
1995	10	9	3	12	4	38
1996	8	7	3	9	3	30
1997	5	5	5	5	5	25
1998	6	6	4	5	4	25
1999	4	4	3	4	3	18
2000	13	13	11	12	11	60
2001	11	11	11	11	10	54
2002	13	13	11	14	11	62
2003	12	11	9	10	7	49
2004	11	11	10	12	10	54
2005	14	14	13	14	13	68
2006	7	7	4	5	4	27
2007	7	7	6	7	6	33
2008	12	12	11	12	11	58
2009	33	33	31	33	31	161
2010	15	15	13	16	13	72
2011	12	12	10	13	14	61
2012	15	15	14	16	12	72
2013	20	20	16	20	16	92
2014	21	20	19	20	19	99
2015	30	30	25	27	29	141
2016	33	32	29	30	32	156
2017	26	26	25	26	22	125
2018	28	28	28	28	27	139
Total	**395**	**390**	**324**	**394**	**326**	**1829**

Source: EU NTM dataset, 2020