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A General Equilibrium Analysis of the EU regulations on South Africa's Citrus Industry

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Abstract

Eight rounds of multilateral liberalization under the General Agreement on Tariffs and Trade (GATT) led to substantially lower tariffs rates in global trade. Over the past two decades, applied tariffs have been halved on average globally. The reduction in global tariffs over the past few decades has shifted the focus of trade policy research to better understanding the impacts of non-tariff measures (NTMs), including their potential to nullify the benefits of tariff liberalization. NTMs tend to be more common in agriculture than in other sectors. Currently there is an ongoing trade dispute between South Africa and the European Union (EU) regarding trade regulations imposed by EU on South Africa's citrus exports. Recent SPS regulations by the European Union on citrus imports from South Africa, aimed at managing pests like the False Codling Moth and citrus black spot, have led to higher compliance costs and trade tensions.

While partial equilibrium studies have explored the direct trade effects, this study examines the broader, economy-wide impact of these measures. Using the standard GTAP computable general equilibrium (CGE) model and SplitCom for sectoral disaggregation, we simulate the macroeconomic effects of EU citrus regulations. Econometric estimates from a gravity model, based on a UNCTAD-led NTMs database, are converted into ad valorem equivalents and incorporated into the CGE framework. Three policy simulations are conducted: implementation of EU SPS rules, export market diversification, and price adjustments due to rising costs. Preliminary expectations point to GDP decline, rising agricultural unemployment, and reduced export competitiveness, with potential implications for rural incomes and food security. The study aims to inform trade policy responses and agricultural adaptation strategies.

Key words: CGE**,** *Non-tariff measures, EU citrus regulations*

Introduction

Eight rounds of multilateral liberalization under the General Agreement on Tariffs and Trade (GATT) led to substantially lower tariffs rates in global trade. Over the past two decades, applied tariffs have been halved on average globally. The reduction in global tariffs over the past few decades has shifted the focus of trade policy research to better understanding the impacts of non-tariff measures (NTMs), including their potential to nullify the benefits of tariff liberalization (Fugazza and Marc, 2008). In 2004, UNCTAD's TRAINS database sensed on average 5,620 tariff lines being subject to one type of non-tariff barriers (NTB) in each country. Technical measures account for 58.5 per cent of that total. NTMs are defined as policy measures other than tariffs that can potentially have an economic effect on international trade (Arita et al., 2015). For agriculture, sanitary and phytosanitary (SPS) measures and technical barriers to trade (TBT) stand out as costly impediments to trade (Skorobogatova and Knebel, 2011, Cadot et al., 2015). While SPS and TBT measures are intended to ensure that imports meet food safety, animal or plant health, and technical regulations of the importing countries, these requirements may affect trade by adding increased compliance, inspection, and operational costs (WTO, 2024). Exporters have claimed that some SPS/TBT (NTMs) measures have requirements disproportionate to the actual levels of risk and excessively impede trade, often acting as disguised barriers to trade (Arita et al., 2015). As such, reducing the potential barriers to trade created by NTMs measures has been a prominent feature of many recent free trade agreement (FTA) negotiations.

NTMs tend to be more common in agriculture than in other sectors. Agriculture is one of the most protected sectors in international trade, with higher tariffs than manufacturing (Perali et al., 2012), this is because of technical measures, notably SPS, and because of more traditional forms of NTMs, which are also more frequently applied to agriculture, such as quotas or price mechanisms ref. Currently there is an ongoing trade dispute between South Africa and the European Union (EU) regarding trade regulations imposed by EU on South Africa's citrus exports (WTO, 2024).

South Africa and EU are part of SADC-EPA arrangement, which is an agreement between EU and SADC countries. The agreement was concluded and signed on 10 June 2016 and only covers trade in goods. The EU has offered South Africa a full liberation of 95% of tariff lines, partial liberation of around 3% of tariff lines (mostly on agricultural products), and exclude

from liberation about 2% of tariff lines. South African citrus products re amongst the product that enjoy duty-free access to EU market (Tralac, 2018).

Globally, South Africa is the third largest oranges exporter following Spain and Egypt (ITC, 2023). Valencias, Midknights and Navel are major exported varieties (CGA, 2024). The European Union (EU) is the main destination, accounting for approximately 37% of South Africa's orange exports (ITC, 2023). In 2018, the EU declared the False Codling Moth (FCM) a quarantine pest and prescribed specific import requirements like cold treatment to prevent this pest from entering the European Union (Adom et al., 2021). South Africa's citrus industry responded by developing the FCM management system, which was implemented in 2017 to continue exporting to the lucrative EU market.

In July 2022, the EU imposed import restrictions on South Africa's oranges and other citrus products. The import restrictions imposed relate to Thaumatotibia leucotreta (False codling moth) (WTO, 2024). False codling month (FCM) originates in Southern and East Africa (Carpenter,2007). In 1899, it was initially reported as a pest of citrus in Natal and is now regarded as a major pest of almost all varieties of citrus in some parts of the country (Carpenter, 2007). Hitherto, South African oranges and citrus products were freely exported to the EU, given that they went through an effective systems approach or other effective post-harvest treatments to make sure they were free from FCM. Accordingly, an effective citrus systems approach was developed, and South Africa has been exporting to the EU without major problems ever since.

The EU has recently made unexpected and radical changes to phytosanitary measures applied to South African oranges and other citrus products imports. For the first time, the EU now requires fruits to undergo mandatory specific cold treatment procedures and precooling processes for a specific time before importation. These requirements apply to all imports, regardless of whether the exporting country has an effective systems approach and post-harvest treatment to prevent FCM (WTO, 2024).

The EU has also imposed import restrictions on South African citrus fruit due to *Phyllosticta citricapa*. *Phyllosticta citricapa* is a fungus affecting citrus fruit that may cause citrus black spot (CBS). CBS is a cosmetic disease that causes external blemishes on the rind of the citrus fruit, although the fruit itself remains safe for human consumption (WTO, 2023). Even though citrus fruit is not a viable pathway for the transmission of this organism, the EU has categorised it as a union quarantine pest and a priority pest. The EU has adopted these decisions based on

the Scientific Opinion conducted by the European Food Safety Authority (EFSA) in 2014, which concluded, among other things, that citrus fruit without leaves can be a pathway for the introduction and spread of P. citricarpa into the EU territory. South Africa argues that the 2014 EFSA Scientific Opinion lacks a proper scientific basis (WTO, 2023).

Literature Review

One study by (Vinti and Makapaye, 2016) examined the legality of the European Union's sanitary and phytosanitary (SPS) regime implemented against citrus produce from South Africa. This article concludes that the European Union SPS regime is neither based on sufficient scientific evidence nor scientific certainty; rather, it is based on speculation and conjecture, both of which are never grounds for establishing an appropriate level of protection (WTO, 2024). Currently, there is a dearth of empirical evidence on the economy-wide implications of non-tariff measures (NTMs) on South Africa's citrus exports to the EU.

A study by (T. Kapuya, 2015) aimed to measure trade effects of technical barriers on South Africa's orange exports. He employed a gravity model to measure the trade effects of technical barriers in South Africa's major markets for oranges. The simulation of the gravity equation shows that removing technical barriers will have a 0.1% increase in South Africa's orange exports to the EU. Other Existing research on the impact of NTMs on citrus trade primarily relies on partial equilibrium models, which offer valuable insights but remain limited in scope. For instance, a study by BFAP (2013) assessed the potential impact of EU market restrictions on citrus exports, emphasizing price effects. The study pointed out the importance of EU market on the South African citrus industry, indicating that the closure of this market will have significant impact on prices. Potelwa (2016) analyzed the socio-economic implications of Citrus Black Spot regulations using the WITS-SMART partial equilibrium model. These studies, however, do not capture the broader economy-wide effects of SPS regulations, such as shifts in employment, GDP, household welfare, and intersectoral linkages.

Therefore, this study aims to fill this critical gap by employing a computable general equilibrium (CGE) model to assess the full economy-wide impact of EU SPS regulations on South Africa's citrus industry. Unlike partial equilibrium models, which focus on isolated market segments, CGE models provide a comprehensive framework that accounts for interactions across various economic sectors. By examining the spillover effects on

employment, consumer demand, production costs, and trade flows, this study offers a novel contribution to understanding the broader implications of NTMs on South Africa's agricultural sector. Given the continued enforcement of these regulations, such an analysis is imperative for informing policy decisions, trade negotiations, and strategies to enhance the resilience of South Africa's citrus industry.

Methodology

This paper uses a detailed NTMs database to obtain econometric estimates of the effect of different types of NTMs on South Africa's exports into EU countries, using a gravity model framework. The database of NTMs used has been compiled in a multi-agency project led by United Nations Conference on Trade and Development (UNCTAD). The values obtained from the econometric analysis are transformed into ad valorem tariffs equivalents (AVEs) and introduced into a computable general equilibrium (CGE) model to study their effects.

In analysing the economic effect of the EU regulations on South Africa's Citrus industry, we employed the Global Trade Analysis Project (GTAP) Data Base (Version 10) and the standard GTAP model. This study employs the static GTAP model. The standard GTAP model is part of the family of computable general equilibrium (CGE) models. These models offer a comprehensive representation of an economy, whether for a single country or multiple countries, by capturing the interconnected activities of various economic agents, including commodities, activities, endowments, households, government investments/savings, enterprises, and the rest of the world. CGE models are generally classified into two main categories: single-country models and multi-country models, with GTAP falling under the multi-county model category.

The GTAP Data Base 10 has the base year 2014, thus the values indicated in this analysis are expected in constant 2011 US$ terms. Data is for 141 regions and 65 commodities, and in the consideration of South Africa the regions were aggregated into 3 from the original regions, the aggregated regions are South Africa, European Union (27) and ROW. Regions were disaggregated into 12 sectors. Citrus sector was disaggregated from fruits, vegetables and nuts (v_f) sector.

However, most CGE models including GTAP suffer from serious aggregation issues due to product level data constraints. (Horridge, 2005) documented utility, SplitCom, the aim of the SplitCom project is to develop a set of programs to facilitate the addition of sectors to a standard GTAP Data Base. SplitCom is designed to work with the 'classic' data format used by Version 6 of the GTAP model. The program has input folder which must contain the original GTAP database. UserWgt.har, contains a pre-existing file of user weights, , containing splitting proportions. To create this database, a subset of data that includes all fruits and vegetables (included in GTAP sector v_f) as well as citrus fruits is required. Both datasets will then be aggregated to the regional aggregation. Citrus fruits production share is 17.2%, 3.7% and 6.8% in South Africa, the EU and ROW respectively.

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