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Welfare, macroeconomic and trade effects of the hypothetical Southern African Customs Union-United States free trade agreement

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Background: There is lingering uncertainty surrounding the renewal of the African Growth and Opportunity Act (AGOA), a United States (US) Trade Act enacted in 2000 and set to expire in 2025. However, the US is a traditional trading partner of the Southern African Customs Union (SACU), and all SACU members predominantly access the US market through AGOA.

Aim: This article assesses the welfare, macroeconomic and trade effects of the potential Southern African Customs Union-United States Free Trade Agreement (SACU-US FTA).

Setting: The expiry of AGOA and the uncertainty surrounding its renewal present trade policy challenges for AGOA beneficiary countries, particularly the SACU nations.

Method: The article employs the Global Trade Analysis Project (GTAP)-Computable General Equilibrium (CGE) model to simulate a scenario where SACU and the US eliminate all import taxes and export subsidies in their bilateral trade.

Results: The GTAP-CGE model simulation results reveal welfare gains of US$316.47 million for SACU and US$678.01 million for the US with favourable macroeconomic and trade effects for both parties. Net trade creation is estimated at US$3.06 billion.

Conclusion: The US interest in the potential SACU-US FTA rests in enhanced access to a smaller, but highly protected market where the European Union (EU) has already concluded preferential trade arrangements. Correspondingly, SACU aims for enriched access to a much larger, though less protected, market.

Contribution: While most studies on FTAs focus on distributional effects using CGE and partial equilibrium models, there is limited research on the welfare, macroeconomic, and trade impacts of the potential SACU-US FTA. This article, therefore, stimulates debate and navigate domestic policies on the welfare, macroeconomic and trade implications of the prospective trade agreement.

Keywords: AGOA; CGE model; FTA; GTAP model; SACU; trade creation; trade diversion; trade negotiations; trade policy; US; welfare.

Introduction

This article presents an assessment of the welfare, macroeconomic and trade effects of the potential Southern African Customs Union (SACU)-United States (US) Free Trade Agreement (FTA) within the framework of the lingering uncertainty surrounding the renewal of the African Growth and Opportunity Act (AGOA) after it expires in 2025. Southern African Customs Union, established in 1910 with membership of Botswana, Eswatini, Lesotho, Namibia and South Africa, is the largest Customs Union (CU) in the world (SACU 2008). The United States (US), on the other hand, is the global largest importer (US$3.38 trillion) and second-largest exporter (US$2.06 trillion) of merchandise as of 2023 (International Trade Centre 2023). In the context of SACU, the US is a vital traditional trading partner for the CU from an import and export perspective. However, it is surprising to notice the deficiency of a formal agreement that includes products between SACU and the US. This is despite the existence of a Trade and Investment Framework Agreement (TIFA), namely the Trade, Investment and Development Cooperation Agreement (TIDCA), concluded between SACU and the US in July 2008 following the collapse of the 2003–2007 SACU-US FTA negotiations (USTR 2016).

In the absence of a formal trade agreement, the trade relations between SACU and the US are primarily governed by the World Trade Organization (WTO)'s Most-Favoured Nation (MFN)

principle (WTO 2022). However, SACU and the US's trade relations are also governed by two unilateral trade arrangements, namely the General System of Preferences (GSP) and AGOA, which form the focus of this article. African Growth and Opportunity Act is due to expire in 2025 and the uncertainty surrounding its renewal persists. This presents challenges of trade policy uncertainty to AGOA beneficiary countries and, more particularly, to the US's traditional trading partners, such as SACU countries who predominantly access the US market through AGOA, as their post-AGOA trade relationship with the US remains undefined. Furthermore, AGOA is a unilateral US Trade Act and not a reciprocal trade arrangement (USTR 2014).

By employing the Global Trade Analysis Project (GTAP)-Computable General Equilibrium (CGE) model, we simulate an ambitious or full trade liberalisation policy reform scenario in which SACU and the US eliminate all their import taxes and export subsidies to their bilateral trade. Given the significance of the US in SACU's export accomplishments and economic development endeavours, this article recommends that SACU proactively re-engage the US in negotiating an FTA that builds on AGOA and takes reciprocity into account. This is considered to be the most comprehensive approach relative to other options such as permitting AGOA to expire without taking any alternative action (i.e. the wait-and-see approach) or negotiating a partial scope agreement with the US.

While extant literature has approached the distributional implications of potential FTAs by largely applying both CGE and partial equilibrium (PE) frameworks, there is a dearth of literature documenting the welfare, macroeconomic and trade effects of the prospective SACU-US FTA. During the negotiating process of the failed 2003–2007 SACU-US FTA, scholars such as DeRosa and Gilbert (2004), Kiyota and Stern (2005), and Brown, Kiyota and Stern (2008) attempted to assess, *ex-ante*, the welfare effect of the FTA, with Lehloenya (2009) presenting more of an *ex-post* descriptive commentary of the failed SACU-US FTA. Given the time period that has lapsed after these studies were carried out, it is sensible to revive the discourse on the flouted 2003–2007 SACU-US FTA negotiations, in light of the economic and political conditions that have transformed since then. Hence, the current article presents a new scenario framed within the lingering uncertainty surrounding the renewal of AGOA after it expires in 2025. Moreover, in studies where CGE modelling is applied utilising the GTAP model, the model version, the simulated scenarios and the regional and sectoral aggregation schemes adopted often differ, a virtue that inevitably makes this article unique thereby contributing to the knowledge base of the extant trade negotiations and agreements literature.

Even though quantitative analysis cannot provide all the answers to trade policy questions, the results obtained in this article can assist in directing the trade policy formulation process in SACU and the US and safeguard that preferences are based on detailed awareness of the underlying welfare, macroeconomic and trade realities. This is of significance, particularly to consumers, businesses, workers, investors and international partners who largely bear the potential benefits, costs and distributional effects of trade liberalisation efforts. Accordingly, assessments in the current article are profound in navigating domestic policies pertaining to the welfare, macroeconomic and trade implications of the prospective SACU-US FTA. In fact, perceived bias in bilateral and/or regional trade deals has compelled countries, in recent years, to question what is in it for them and, in some cases, pulled out (e.g. the Brexit) or threatened to pull out (e.g. the US in the context of the North American Free Trade Agreement, NAFTA, now the United States-Mexico-Canada Agreement, USMCA) unless there are robust transformations.

The rest of the article proceeds as follows: firstly, we provide some contextual information and stylised facts on SACU-US bilateral trade; secondly, literature review and hypothesis development are provided; thirdly, the main facets and the database of the GTAP-CGE model utilised in the present article to assess the welfare, macroeconomic and trade effects of the potential SACU-US FTA are described in brief; and this is followed by, lastly, the results and discussions as well as the conclusions and recommendations of this article.

Contextual information and stylised facts on Southern African Customs Union-United States bilateral trade

The proposition that free trade among countries enhances overall economic welfare is overwhelmingly acknowledged in economic and international trade literature (Irwin 1996). However, free trade is only possible through trade agreements, which are an outcome of trade negotiations. Consequently, securing and strengthening external trade relations through distinct trade negotiations and agreements have facilitated the widening and deepening of international trade cooperation among trading nations (Dent 2006). Southern African Customs Union and the US, in particular, have laid concrete foundations for free trade through the advancement of regional integration and extensively instituting a range of internal economic and trade policy reforms aimed at liberalising trade (WTO 2015).

Besides the WTO MFN principle, SACU members access the US market through the GSP and AGOA. The GSP is a unilateral trade preference, which is not legally binding upon the benefactors, granted under the Enabling Clause of the WTO (DTI 2016). In the context of the US, the GSP was established by the country's Trade Act of 1974 to promote economic development by eliminating duties on thousands of products, mainly industrial, when imported from any of the 120 designated beneficiary countries and territories (Legal Information Institute 2018).

The US offers GSP to many developing countries in order for them to utilise trade as a tool to expand their economies and alleviate poverty (USTR 2018). A total of 47 of the 48

sub-Saharan Africa (SSA) countries, including all SACU members, are currently GSP eligible (ITA 2018). Hence, the products originating from SACU qualify for preferential market access and the trade arrangement covers specified industrial and agricultural products (DTI 2016). In addition to stimulating economic growth and development in SACU and the developing world, GSP supports US jobs and enhances the competitiveness of US companies (USTR 2018). It also promotes American values by supporting beneficiary countries' advancement towards affording worker rights to their citizens, enforcing intellectual property rights and upholding the rule of law (Jones 2017).

African Growth and Opportunity Act, on the other hand, is a US Trade Act, enacted on 18 May 2000 as Public Law 106 of the 200th Congress (USTR 2014). Since its enactment in 2000, AGOA was renewed for 5 years in 2005 and 2010 and again for 10 years in 2015. The Trade Act is now set to expire in 2025, and there is lingering uncertainty surrounding its renewal. The US, however, has long openly expressed its desire for AGOA to evolve into trade agreements of a bilateral nature. African Growth and Opportunity Act aims to expand US trade and investment with SSA in order to stimulate economic growth, encourage economic integration and facilitate SSA's integration into the global economy (USTR 2014). The Act also establishes the annual US-SSA Economic Cooperation Forum, better known as the AGOA Forum, to promote advanced dialogue between the US and SSA countries on trade- and investment-related issues (DAFF 2009). All SACU members are AGOA beneficiaries along with many other SSA AGOA eligible countries and largely access the US market through AGOA.

To illustrate the magnitude of aggregate trade between SACU and the US, as well as the respective trade under the GSP and AGOA schemes, Figure 1 reveals that aggregate SACU exports to the US increased from US$4.94 billion in 2001 to US$11.19 billion in 2008 before declining to US$7.53 billion in 2020. Southern African Customs Union imports from the US generally follow a similar trend to that of exports with aggregate SACU imports from the US increasing from US$3.27 billion in 2001 to US$7.84 billion in 2012 before declining to US$4.67 billion in 2020. Over the period from 2001 to 2020, SACU enjoyed a positive trade balance with the US.

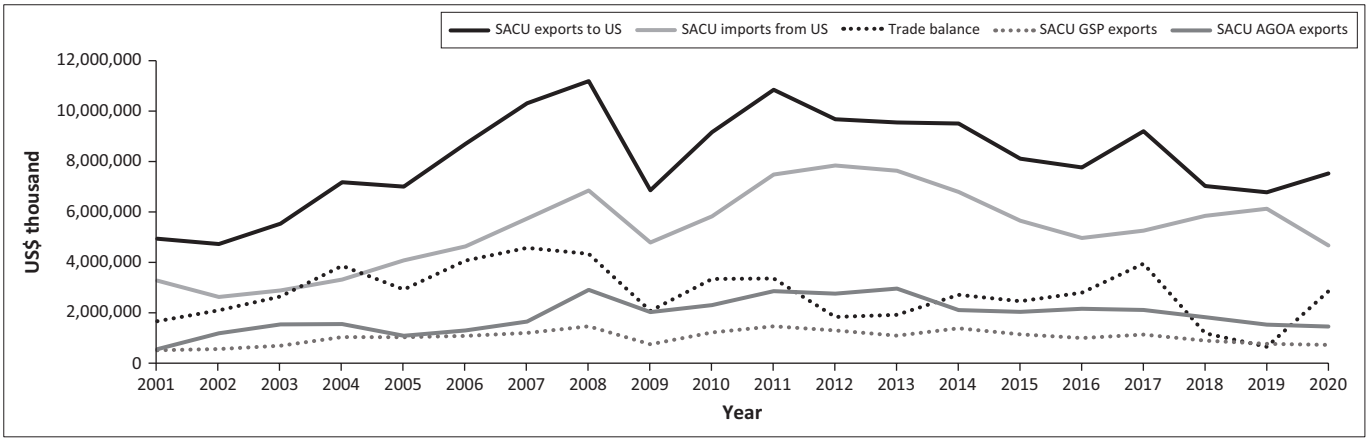
Southern African Customs Union exports under the US GSP scheme reached a maximum of US$1.46 billion in 2011, increasing from US$513.83 million in 2001 and declining to US$725.14 million in 2020. Southern African Customs Union exports under the US AGOA scheme, on the other hand, reached a maximum of US$2.96 billion in 2013 after increasing from US$555.09 million in 2001 and before declining to US$1.45 billion in 2020. It is clear from Figure 1 that since the enactment of AGOA in 2000, SACU countries have exported more products into the US market under AGOA than the GSP programme.

The SACU-US TIDCA is merely a cooperative framework agreement and does not include any commitments on actual products or services traded. In fact, TIDCA is a form of US's TIFAs, which establishes a forum for consultative discussions, cooperative work and possible agreements on a wide range of trade issues, with a special focus on customs and trade facilitation, technical barriers to trade, sanitary and phytosanitary measures and trade and investment promotion (USTR 2016).

The SACU-US TIDCA is designed to build on and potentially capture some of the progress made in the flouted 2003–2007 FTA negotiations between SACU and the US. Ideally, the TIDCA helps to put fundamentals in place for any future FTA, which remains a longer-term objective for the US and SACU (USTR 2016). It is imperative to note that the SACU-US TIDCA currently makes no provision for any tariff eliminations (DTI 2016). Therefore, the only provisions the US and SACU could build upon in the negotiations of the prospective SACU-US FTA are the strong relations between the two sides and the existing cooperation provisions in TIDCA.

Literature review

Trade agreements, which are an outcome of trade negotiations, are not a new phenomenon. In fact, even before the 1947 General Agreement on Tariff and Trade (GATT), trade



SACU, Southern African Customs Union; US, United States; GSP, general system of preferences; AGOA, African Growth and Opportunity Act.

FIGURE 1: Bilateral trade between the Southern African Customs Union and the United States of America from 2001 to 2020.

agreements have been prevalent for centuries. As such, countries have secured and strengthened trade relations through various trade arrangements throughout modern history (Dent 2006). In addition to economic, political and strategic motives, this has generally enabled the widening and deepening of international trade cooperation by reaching into new policy areas such as trade in services, foreign investment, intellectual property and government procurement (WTO 2011). However, in any negotiation of trade agreements, there are benefits that ought to be sought and welfare and economic positions that should be safeguarded, while an equivalent circumstance is encountered on the other side of the negotiating table (Dyson & Featherstone 1999).

Theoretical literature and hypothesis development

Viner's (1950) seminal theory of CU serves as the foundation for welfare, macroeconomic and trade analysis of Preferential Trade Agreements (PTAs). Subsequent refinements of the ideas of Viner (1950) by Johnson (1962), Kendall and Gaisford (2007) offer clear expositions of CU theory, while Baldwin and Venables (1995) and Panagariya (2000) survey the more recent extensions of the theory. The CU theory describes the welfare effect of a PTA on each member as the sum of the efficiency gains or losses that result from trade creation and diversion and its Terms of Trade (TOT) changes. Non-members are also affected through changes in their TOT. Because the TOT gains of one country are the TOT losses of its trading partner, the net TOT effect is zero at the global level suggesting global welfare to be the sum of gains and losses in regional efficiency.

The impacts of an FTA on the members and non-members of the agreement are mainly transmitted through welfare, macroeconomic and trade effects. As such, the transmission channels of welfare effects include allocative efficiency, endowment effect and TOT effects. For macroeconomic effects, the transmission channels include real gross domestic product (GDP), export volume and trade balance, while those of trade effects include trade creation and trade diversion.

A key question raised by the formation of an FTA is whether it will make member countries better or worse off. In fact, FTAs are expected to be welfare enhancing. This is partially possible through allocative efficiency (i.e. optimal allocation of resources) stemming from factors such as specialisation and comparative advantages, improved market access and competition, dynamic effects on growth and technological progress, consumer benefits and income effects (Leibenstein 1966). In terms of dynamic effects, for instance, through promoting specialisation, innovation and knowledge transfer, free trade can stimulate productivity growth and technological advancement over time (Acemoglu 2008; Romer 1990). These dynamic effects further enhance allocative efficiency and contribute to long-term improvements in welfare. Similarly, the endowment effect can promote efficiency in resource allocation by encouraging individuals to allocate resources towards goods they highly value (Burfisher 2017). Also, improvement in the TOT can enhance welfare by increasing purchasing power, boosting incomes, improving the balance of payments, stimulating investment and growth and reducing relative poverty (Feenstra 2015; Krugman & Obstfeld 2009). Within this context, the following null hypothesis is specified:

> **H_1:** The potential SACU-US FTA improves welfare in SACU and the US.

Free Trade Agreements can influence the macroeconomic environment of member states through growth in GDP and trade balance. As such, FTAs can stimulate GDP growth by promoting trade, investment and economic efficiency (Hufbauer & Schott 2005). For example, increased exports resulting from improved market access can contribute positively to economic growth. Trade balance can be affected through the alteration of import and export flows. In fact, FTAs can theoretically lead to increased exports because of reduced tariffs and trade barriers, potentially improving the trade balance (Baier & Bergstrand 2007). However, this effect may vary depending on the specific terms of the FTA and the competitiveness of domestic industries. In this setting, the following null hypothesis is specified:

> **H_2:** The potential SACU-US FTA improves macroeconomic indicators in SACU and the US.

Drawing from Viner (1950), FTAs theoretically affect trade through trade creation and trade diversion, which juxtapose the welfare-enhancing effects within the established or potential trade agreement with the welfare-reducing effects emanating from trade discrimination (Burfisher 2017). According to Viner (1950), trade creation is defined as the shift in the volume of production of traded goods from a high-cost producer in the established agreement to a lower-cost member. The resulting increase in production efficiency unambiguously increases global welfare. Trade diversion, in contrast, is defined as the shift in members' source of imports from low-cost non-members to high-cost members resulting in deterioration of production efficiency and welfare. Hence, the following null hypothesis is specified:

> **H_3:** The potential SACU-US FTA is net-trade creating.

Insights from the literature relating to the welfare, macroeconomic and trade effects of existing and potential FTAs follow.

Insights from the empirical literature

The probing of welfare consequences of FTAs is an empirical matter, and estimating welfare implications of potential trade agreements is challenging as it requires knowledge of the counterfactual (Freund & Ornelas 2010). Because this remains unknown, assumptions must be made. It is in this context that we see the prevalence of one strand of extant literature employing gravity models (Caliendo & Parro 2015; Cernat 2001; Qiu, Tian & Wang 2022; Singh 2021; Timsina & Culas 2022), CGE models (Abrego et al. 2019; Mustilli 2015;

Quartey 2023; Timini & Viani 2022; Yi 2020) and PE models (Biden, Ker & Duff 2020; Jagdambe & Mouzam 2019; Makochekanwa 2014; Sabaruddin 2022; Wonyra & Bayale 2022) to examine the welfare, macroeconomic and trade impacts of potential trade agreements. In cases where trade agreements are already in existence, we see another strand of literature (Alhassan & Payaslioğlu 2023; Clausing 2001; Díaz-Mora, Esteve-Pérez & Gil-Pareja 2023; Khadan & Hosein 2015; Uzair & Nawaz 2018; Wei, Chen & Rose 2019) using disaggregated data to examine the welfare, macroeconomic and trade impacts of particular trade agreements.

However, for a trade agreement to be welfare improving, sufficient conditions must be satisfied. Kemp and Wan (1976) point out that a trade agreement is necessarily welfare improving if external tariffs are adjusted so that its establishment does not discriminate against external trade. According to Freund and Ornelas (2010), the logic for this is facile given that if external tariffs necessitate that external trade is perpetual, it follows that any supplementary intra-trade should be trade creating. This warrants that non-members are not made worse off by the formation of the trade agreement, and this general outcome also extends to FTAs (Panagariya & Krishna 2002).

By using variation in liberalisation across industries to isolate trade creation and diversion, Trefler (2004) finds both trade creation and diversion in the Canada-US FTA but determines positive welfare effects on the average Canadian. Likewise, through the utilisation of CGE analysis, scholars such as Evans (1998) and Lewis, Robinson and Thierfelder (1999) find positive net effects of regional integration initiatives in Southern Africa, while Flôres (1997) reaches comparable inferences concerning MERCOSUR. Cernat (2001) also dismissed the widely held opinions and theoretical expectations that South-South trade agreements are trade diverting and concluded otherwise. However, in the case of the Canada-US FTA, Romalis (2007) finds that the expansion of the Canada-US FTA to Mexico (i.e. NAFTA, now USMCA) has been trade diverting.

Besides the aforementioned seemingly revolutionary and mid-pioneering studies, many other contemporary studies have examined the welfare and trade effects of distinct existing and potential trade agreements. Such studies include Uzair and Nawaz (2018), who find substantial evidence in favour of trade creation in the Pakistan-China FTA; Abrego et al. (2019), who find significant welfare gains from the formation of the African Continental Free Trade Area (AfCFTA), emanating mostly from a reduction in Non-Tariff Barriers (NTBs); Wei et al. (2019), who find positive welfare gains for both participants in the South Korea-US FTA; Laget et al. (2020) who find that the depth of trade agreements contributes to an increase in GVC trade among parties; Oberhofer and Pfaffermayr (2021), who find that the negative welfare effects of Brexit can be partially compensated for by the conclusion of FTAs with other countries, including the European Union (EU); and Mattoo, Mulabdic and Ruta (2022), who find that deep trade agreements lead to more trade creation and less trade diversion than shallow agreements and that some provisions of deep trade agreements have a public good aspect and enhance trade also with non-members.

For the potential SACU-US FTA, in particular, DeRosa and Gilbert (2004) revealed that the economic welfare of SACU would deteriorate as a consequence of an individual FTA with the US. An analysis by Brown et al. (2008) of the expected economic effects from the potential FTA concluded that the welfare benefits of an FTA between SACU and the US were relatively small and that the interests of both parties, along with the global community, could be better served by unilateral liberalisation, particularly in a multilateral setting. In contrast, Kiyota and Stern (2005) showed a significant increase in welfare gains for both SACU and the US as an outcome of the likely formation of the SACU-US FTA. However, whereas Lehloenya (2009) acknowledges that the failed 2003–2007 SACU-US FTA would have brought some benefits such as locking in AGOA benefits, he submits that the finalisation of the trade deal would have probably caused more harm given the extensive intellectual property rights sought by the US, as well as the country's persistent refusal to reverse its farm subsidy policy.

In light of the aforementioned literature appraisals, it is apparent that there are mixed conclusions about the welfare, macroeconomic and trade implications of the failed SACU-US FTA. These divergences may be partially attributable to variations in the models applied (i.e. CGE, PE or gravity model) and whether the assessment was carried out *ex-ante* or *ex-post*. Also, in studies where CGE modelling has been applied using the GTAP model, the simulated scenarios, the model version and the regional and sectoral aggregation schemes adopted often differ. Despite this, it must be acknowledged that the global political and domestic economic conditions within both SACU and the US have significantly transformed since then. In this regard, AGOA, which is set to expire in 2025, might not be renewed. Hence, considering the lingering uncertainty surrounding the expiry of AGOA and the significance of the US in SACU members' trade and economic development endeavours, SACU has to be proactive. This entails locking in AGOA benefits through re-engaging the US in negotiations of an FTA that builds on AGOA by strengthening trade and investment relations while addressing AGOA drawbacks and taking reciprocity into account. It is here where the present article joins the conversation by assessing the welfare, macroeconomic and trade effects of this prospective SACU-US FTA while simultaneously reviving the scholarly discourse on the flouted 2003–2007 SACU-US FTA negotiations and contributing to the knowledge base of the extant trade negotiations and agreements literature.

Research method

This section details the standard GTAP model utilised in this article to assess the possible welfare, macroeconomic and trade effects of the potential SACU-US FTA.

The Global Trade Analysis Project model

The GTAP model, initially formulated by Hertel (1997), is the most extensively applied CGE model in trade policy analysis (Plummer, Cheong & Hamanaka 2011).The model's theory is based on the multisectoral model of the Australian economy, the ORANI model, developed by Dixon et al. (1982). Hence, the standard GTAP model is a multi-region, multisectoral CGE model with perfect competition and constant returns to scale (Burfisher 2017).

In the GTAP model, bilateral trade is handled *via* the Armington assumption, which states that products that are manufactured in distinct regions are imperfect substitutes in demand (Armington 1969; Burfisher 2017). In other words, products are differentiated not exclusively by their nature but also by their place of origin. For example, SACU chemicals, US chemicals, SACU machinery and US machinery might be four different products distinguished in the GTAP model.

The GTAP-CGE model, tried and tested by many scholars including Siriwardana (2006), Stenberg and Siriwardana (2015), Hussain and Ali Shah (2017), Itakura (2020), Kitetu, Ko and Sone (2023), is appropriate for analysing the effect of crucial policy transformations, such as the formation of the potential SACU-US FTA (Zeng 2013). It can compute the probable welfare, macroeconomic and trade implications of the prospective SACU-US FTA *ex-ante* by means of mathematical simulation (Rosyadi & Widodo 2018). This simulation method is suitable for the analysis in this article as there is currently no *ex-post* data generated from the likely full liberalisation resulting from the implementation of the potential SACU-US FTA.

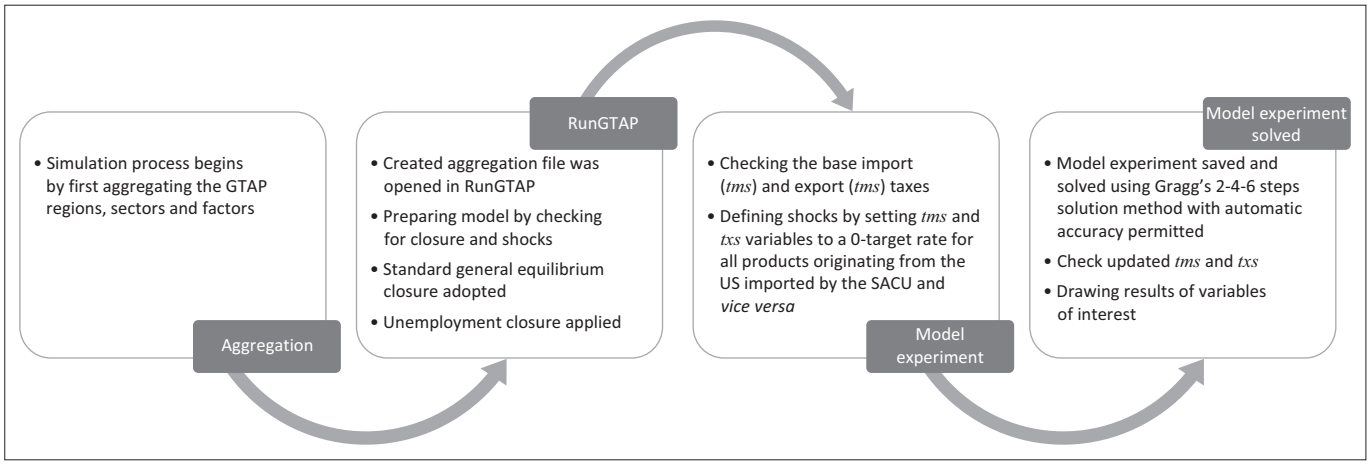
This article, therefore, utilises the static version of the standard GTAP model (Version 10), regarded as the latest version following numerous revisions of the standard GTAP model owing to various modelling concerns (Itakura & Hertel 2001). The GTAP 10 database features four reference years (i.e. 2004, 2007, 2011 and 2014). The latest reference year (i.e. 2014) with 141 GTAP regions for all 65 GTAP sectors and eight factors were selected for aggregation (Aguiar et al. 2019). To test the hypothesis developed and specified in this article, the welfare, macroeconomic and trade of the potential SACU-US FTA are simulated under the following ambitious or full trade liberalisation policy reform scenario: SACU-US full trade liberalisation policy reform in which they eliminate all their import taxes and export subsidies to their bilateral trade. In this regard, the import tariffs and export subsidies applied by SACU and the US on their bilateral trade are eliminated.

The simulation process

A synopsis of the simulation process is visually illustrated in Figure 2. It begins by first aggregating the GTAP regions, sectors and factors as well as creating the aggregation model (SACU_US_13 × 10 model) in the GTAP Aggregation (GTAP-Agg) database. For the model experiment simulated in this article, the 141 GTAP regions are aggregated into 13 new regions, while the 65 GTAP sectors are aggregated into 10 new sectors (see Table 1-A1 in Appendix 1). The eight GTAP factors are aggregated into four new factors, with labour and capital considered mobile. In contrast, land (ETRAE value = -1.000) and natural resources (ETRAE value = -0.001) are considered sluggish (see Table 2-A1 in Appendix. ETRAE is a transformation elasticity for mobile factors. It indicates how easy or difficult it is to transfer a sluggish factor (e.g., capital) from one sector to another.

Besides isolating SACU members and the US as the trading partners of interest in this article, firstly, the regional aggregations were based on global regional classifications. China was isolated because of its vast influence in global trade, which could be of interest, along with being one of the largest trading partners of both SACU countries and the US. The sectoral aggregations follow the default aggregations in the GTAP model database because the foci of the assessments in this article were placed on aggregate welfare, macroeconomic and trade effects of the prospective SACU-US FTA. This also applies to the factor aggregations where all labour skill levels were aggregated into labour.

Secondly, the created aggregation file was opened in RunGTAP, and the model was prepared for the running of



SACU, Southern African Customs Union; GTAP, Global Trade Analysis Project; US, United States.

FIGURE 2: A visual synopsis of the simulation process performed in this article.

the model experiment by checking the closure and shocks. In this regard, the 'standard general equilibrium closure' of the GTAP model was adopted for the simulation performed in this article. According to Hertel (1997), under the standard general equilibrium closure, price elasticity parameters can react to shocks from both the demand and supply sides. Furthermore, unemployment closure was applied in the case of SACU countries. This is sensible because all SACU countries suffer from high unemployment. The shock list was cleared to ensure that there are no shocks lingering in the experiment file other than the ones introduced in the model experiment of this article.

Thirdly, the base import and export tax rates applied by SACU and the US on their bilateral trade were checked (see Table 3-A1 in Appendix 1) before defining the model experiment. The shocks were defined by setting the *tms* (import tariff) and *txs* (export tax) variables to a zero-target rate for all the traded products originating from the US imported by the SACU members (Botswana, Namibia, South Africa and the Rest of SACU) and vice versa. For conciseness' sake, the closure and shock definitions are available upon request.

Fourthly, the model experiment was then saved and solved using Gragg's 2-4-6 steps solution method with the 'automatic accuracy' option permitted to ensure maximum accuracy of the results obtained. The method splits the shock with interpolation into minor increments and iterates the calculation numerous times (Rosyadi & Widodo 2018). The final solutions are obtained from the average values of each iteration's solution. After solving the experiment, the updated GTAP import and export tax rates applied on the bilateral trade between the US and SACU were checked if they were now zero (see Table 3-A1 in Appendix 1).

Illustratively, when running a CGE model experiment such as the one in this article, the modeller is likened to a billiard player who hits the ball initiating a chain of reactions and interactions among all of the balls on the table and who must wait to see where all the balls come to rest (Burfisher 2017). In the same manner, the entire CGE model equations should be resolved to obtain new solution values for the endogenous variables in the model. The new values represent a new equilibrium at which the demand and supply quantities are equal again at some set of prices. The GTAP-CGE model experiment simulated in this article does not show the adjustment process. In other words, we did not watch as the billiard balls knocked against each other as they traverse the table.

Ethical considerations

This article does not contain any studies involving human participants performed by any of the authors.

Results and discussion

The results of the expected welfare, macroeconomic and trade effects of the entire trade liberalisation policy reform scenario under which SACU and the US eliminate all their import taxes and export subsidies to their bilateral trade, are presented and analysed in this section. A visual representation of the main results obtained in this article for SACU and the US in the context of the SACU-US FTA is shown in Figure 3. In the context of welfare effects: the allocative efficiency effect refers to the impact of changes in resource allocation on economic efficiency; the endowment effect is the contributions to welfare arising from changes in the availability of primary factors and the TOT measures the import purchasing power of a country's exports.

In terms of macroeconomic effects: real GDP refers to the total value of all goods and services produced within the borders of a country adjusted for inflation; export volume is the quantity or physical amount of goods and services that a country exports to other countries within a specific period, and trade balance refers to the difference between the value of exports and imports of a country over a specific time period. Trade creation and trade diversion were defined in the literature review section.

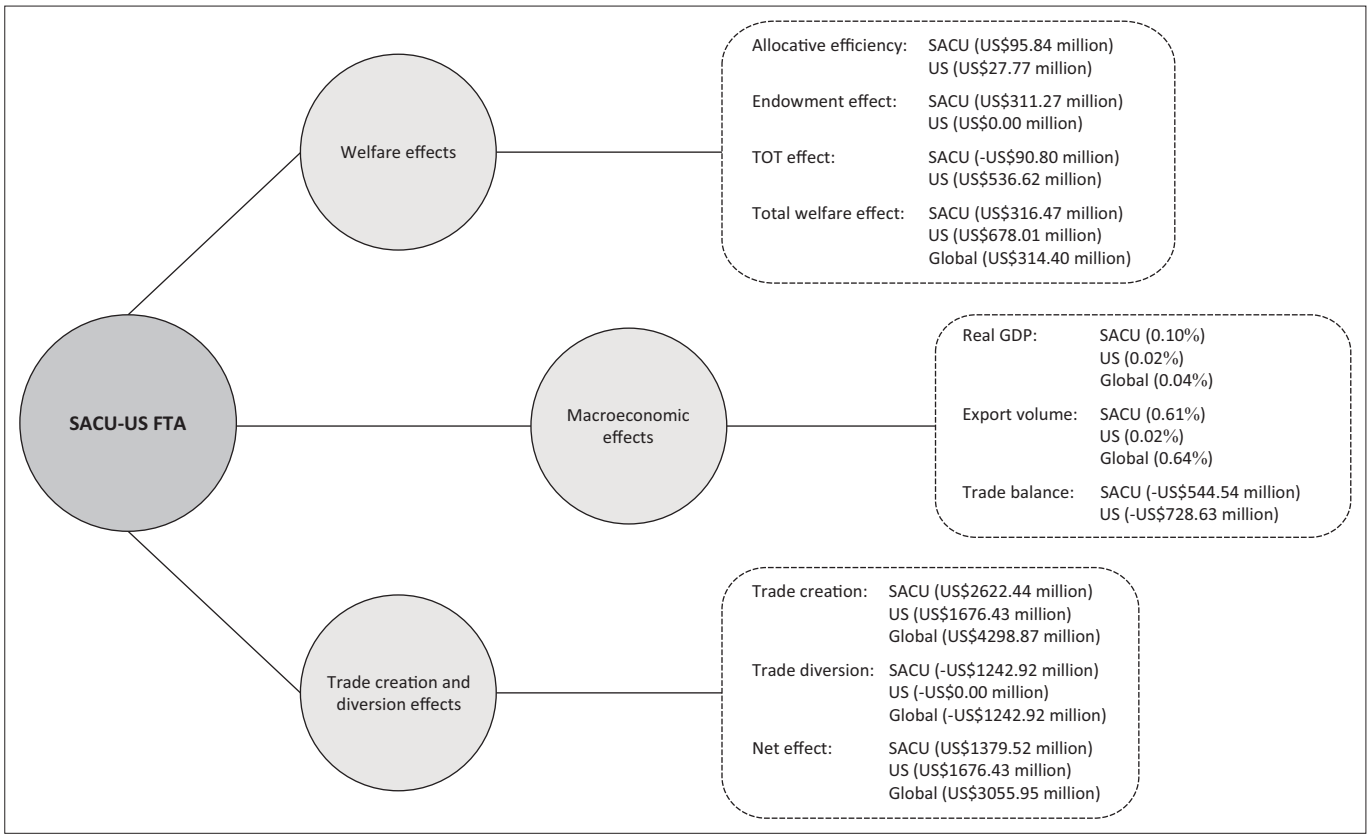
Generally, both SACU and the US experience favourable welfare, macroeconomic and trade gains because of the formation of the potential SACU-US FTA. Detailed results and discussions with respect to each facet follow.

Expected welfare effects of the potential Southern African Customs Union-United States Free Trade Agreement (H_1)

The equivalent variation (EV) was used to measure the net welfare gains originating from the potential SACU-US FTA, simulated under an ambitious or full trade liberalisation policy reform scenario. Equivalent variation is a money-metric measure of the value to the consumer of the price changes because of a shock (Burfisher 2017). The decomposition of the EV of the potential reciprocal trade deal (see Table 1) reveals positive net welfare gains for both SACU (US$316.47 million) and the US (US$678.01 million). This points to an expansion in economic welfare because of the trade creation resulting from the potential reciprocal bilateral trade agreement (BTA).

As expected in the case of SACU, South Africa achieved more significant welfare gains of US$283.74 million compared to the combined welfare gains of US$35.86 million achieved by Lesotho, Namibia and Eswatini. Botswana experienced a welfare loss of US$3.14 million emanating primarily from its TOT and endowment effect. However, the endowment effect is the primary source of welfare gains for SACU, contributing US$311.27 million to its net welfare gains originating from the formation of the potential SACU-US FTA. The endowment effect arises from changes in the availability of primary factors, such as the expansions in the stock of machinery and buildings (Hanslow 2000).

The magnitude of the welfare gains emanating from the potential SACU-US FTA is much larger for the US relative to



TOT, terms of trade; SACU, Southern African Customs Union; US, United States; FTA, free trade agreement; GDP, gross domestic product.

FIGURE 3: A visual representation of the main results obtained in this article.

TABLE 1: Decomposition of the equivalent variation of the potential Southern African Customs Union-United States Free Trade Agreement (2014 US$ million).

Variable	Allocative efficiency effect	Endowment effect	Terms of trade effect	TOT in investment and savings	Total
SACU	95.84	311.27	-90.80	0.15	316.47
Botswana	0.58	-1.40	-2.22	-0.10	-3.14
Namibia	6.41	11.19	3.85	-2.00	19.45
South Africa	82.11	291.09	-91.22	1.76	283.74
Rest of SACU	6.74	10.39	-1.21	0.49	16.41
US	27.77	0.00	536.62	113.62	678.01
China	-43.96	0.00	-81.90	-39.67	-165.53
Africa	-6.40	-10.18	4.14	-4.18	-16.62
America	0.58	0.00	-101.59	-5.19	-106.20
Asia	-18.65	0.00	-95.71	-22.68	-137.04
European Union	-54.17	0.00	-145.64	-17.07	-216.89
Middle-East	-1.71	0.00	-6.59	-8.92	-17.22
Oceania	-2.20	0.00	-4.77	-3.29	-10.27
Rest of World	-0.07	0.00	-0.15	-10.09	-10.31
Total (World)	**-2.97**	**301.09**	**13.61**	**2.68**	**314.40**

Note: GTAP 10 model simulation used.

TOT, terms of trade; SACU, Southern African Customs Union; US, United States; GTAP, Global Trade Analysis Project.

SACU. Unlike SACU, the endowment effect contributes nothing to the net welfare of the US. However, the TOT effect is the primary source of the US's welfare gains. In this regard, the TOT effect contributes US$536.62 million towards the net welfare gains of the country resulting from the formation of the potential SACU-US FTA.

At a global level, the formation of the potential SACU-US reciprocal trade agreement improves global welfare by US$314.40 million. This is despite only SACU and the US achieving positive welfare gains. At the same time, all the other regions are expected to attain negative welfare gains because of the formation of the potential reciprocal trade agreement. The most affected regions are the EU and China with a net welfare loss of US$216.89 million and US$165.53 million, respectively. This might be partially attributable to the diversion of trade from the EU and China, which are also important longstanding trading partners of SACU and the US.

The positive welfare gains revealed in the assessments of this article receive empirical support from the findings of Kiyota and Stern (2005) who showed a significant increase in welfare

gains for both SACU and the US as an outcome of the likely formation of an FTA between SACU and the US. Makochekanwa (2014) also estimated a positive net welfare gain of US$205.5 million in the Common Market for Eastern and Southern Africa (COMESA)-East Africa Community (EAC)-Southern African Development Community (SADC) tripartite FTA, while Abrego et al. (2019) find significant welfare gains from the formation of the AfCFTA, and Wei et al. (2019) achieve similar findings in the case of the South Korea-US FTA.

Expected macroeconomic effects of the potential Southern African Customs Union-United States Free Trade Agreement (H_2)

The GTAP simulation results of the macroeconomic effects of the potential fully liberalised SACU-US FTA are shown in Table 2. The formation of the FTA is expected to improve the real GDP of SACU by 0.10%, while that of the US will increase by 0.02%. Comparably, a study by Zhang et al. (2015) that evaluated the macroeconomic effects of the Canada-US FTA showed a positive and permanent effect of 1.86% on Canada's real GDP growth. However, the scale of real GDP growth achieved in the present article is lower. Within SACU, the combined real GDP of Lesotho and Eswatini increases by 0.52%, while that of Namibia and South Africa increases by 0.19% and 0.02%, respectively. The real GDP of Botswana, however, declines by 0.03% and that of other regions declines by very small magnitudes. For Botswana, the decline in the GDP may be because of sectoral shifts expected from the potential SACU-US FTA and the economic structure of the country that may be vulnerable to competitive pressure from the US and South Africa, SACU's largest economy.

In terms of export volume, the potential trade deal is expected to improve the export volumes of SACU, the US and China by 0.61%, 0.02% and 0.01%, respectively. The export volumes of all the other regions are expected to remain unchanged, while their import volumes (including that of China) deteriorate by smaller magnitudes. The import volumes of SACU and the US improved correspondingly by 0.90% and 0.07%. Within SACU, South Africa's export and import volumes increased by 0.68% and 1.05%, while Botswana saw a decline in its export and import volumes by 0.01% and 0.04%, correspondingly. For both SACU and the US, the improvement in their import volumes is greater than the improvement in their export volumes. This is partially the reason for the expected deterioration of the SACU (except for Botswana, whose trade balance improves by US$0.33 million) and the US trade balances by US$544.54 million and US$728.63 million, respectively. In contrast, the trade balances of all the other regions are expected to improve.

Only the TOT for the US improves by 0.02% because of the formation of the potential SACU-US FTA. However, the TOT for SACU deteriorates by 0.08%, while that of America deteriorates by 0.01% and that of all the other regions remains unaffected. The potential trade deal also improves the regional household income of SACU and the US by 0.04% and 0.02%, respectively. Nevertheless, the household income of all the other regions is expected to deteriorate by very small magnitudes.

Trade creation and diversion effects of the potential Southern African Customs Union-United States Free Trade Agreement (H_3)

The real import (quantity) changes, which indicate trade creation and trade diversion effects of the potential SACU-US FTA, are presented in Table 3. The potential trade deal is expected to be significantly net trade creating in all the sectors for both SACU and the US. This is because the increase in the quantities of their bilateral imports in those sectors exceeds the diversion of their imports of those sectors from other regions. For instance, the increase in SACU's light manufacturing imports from the US by US$1.47 billion diverts only US$793.89 million worth of light manufacturing imports from all the other regions.

Similarly, except for the mining and extraction sector where SACU members enjoy considerable export supply sustainability, with a net trade diversion of US$2.34 million,

TABLE 2: Macroeconomic effects of the potential Southern African Customs Union-United States Free Trade Agreement.

Variable	Real GDP (%)	Export volume (%)	Import volume (%)	Terms of trade (%)	Trade balance (2014 US$ million)	Equivalent variation (2014 US$ million)	Regional household income (%)
SACU	0.10	0.61	0.90	-0.08	-544.54	316.47	0.04
Botswana	-0.03	-0.01	-0.04	-2.22	0.33	-3.14	-0.04
Namibia	0.19	0.36	0.55	3.85	-26.72	19.45	0.23
South Africa	0.02	0.68	1.05	-91.22	-498.85	283.74	0.05
Rest of SACU	0.52	0.52	0.95	-1.21	-19.30	16.41	0.56
US	0.02	0.02	0.07	0.02	-728.63	678.01	0.02
China	-0.01	0.01	-0.01	0.00	237.53	-165.53	-0.01
Africa	-0.01	0.00	0.00	0.00	37.51	-16.62	-0.01
America	-0.01	0.00	-0.01	-0.01	193.41	-106.20	-0.01
Asia	-0.01	0.00	-0.01	0.00	248.27	-137.04	-0.01
European Union	-0.01	0.00	0.00	0.00	394.81	-216.89	-0.01
Middle-East	-0.01	0.00	0.00	0.00	45.70	-17.22	-0.01
Oceania	-0.01	0.00	-0.01	0.00	32.65	10.27	-0.01
Rest of World	-0.01	0.00	0.00	0.00	45.24	-10.31	-0.01

Note: GTAP 10 model simulation used.

GDP, Gross Domestic Product; SACU, Southern African Customs Union; US, United States; GTAP, Global Trade Analysis Project.

TABLE 3: Trade creation and trade diversion effects of the potential Southern African Customs Union-United States Free Trade Agreement (2014 US$ million).

Sector	Change in real SACU imports		Change in real US imports	
	From the US	From other regions	From SACU	From other regions
Grains and crops	5.32	-1.45	0.08	6.88
Livestock and meat products	5.23	-1.65	2.42	8.33
Mining and extraction	0.47	56.30	96.10	-98.44
Processed food	39.34	-12.85	36.81	15.92
Textiles and clothing	232.49	-112	127.79	7.90
Light manufacturing	1465.85	-793.89	328.79	215.21
Heavy manufacturing	873.47	-392.05	380.01	329.40
Utilities and construction	0.01	2.00	0.07	6.99
Transport and communication	0.05	8.04	0.41	84.21
Other services	0.21	4.63	0.53	127.02
Total	**2622.44**	**-1242.92**	**973.01**	**703.42**

Note: GTAP 10 model simulation used.
SACU, Southern African Customs Union; US, United States; GTAP, Global Trade Analysis Project.

the increase in the US imports from SACU does not divert any trade from other regions in all the sectors. Instead, US imports from other regions increase most noticeably in the heavy and light manufacturing sectors, where the real imports of the US increase by US$329.40 million and US$215.21 million, respectively. Overall, the formation of the potential SACU-US FTA is welfare improving as it creates a net trade of US$3.06 billion. This is in line with the findings of studies such as Cernat (2001), Trefler (2004) and Uzair and Nawaz (2018) that revealed evidence in favour of trade creation in the respective trade agreements assessed.

Conclusion and recommendations

This article utilises the standard GTAP-CGE model to simulate the welfare, macroeconomic and trade effects of the potential SACU-US FTA, which is an ambitious or full trade liberalisation policy reform in which SACU and the US eliminate all the import taxes and export subsidies to their bilateral trade. The results obtained in this article suggest favourable welfare, macroeconomic and trade effects because of the formation of the hypothetical SACU-US FTA. While the results seem smaller in absolute terms, given the size of the US market and its inherent competitiveness, the elimination of US tariffs by a minimal magnitude significantly enhances the competitiveness of SACU exporters already pursuing and contemplating pursuing the US market. Hence, the US interest in the potential SACU-US FTA rests in enhanced access to a smaller, but highly protected market where the EU has already concluded preferential arrangements. Correspondingly, the interest of SACU rests in enriched access to a much larger, though less protected, market.

Considering the importance of exports in SACU countries' economic growth prospects, together with the significance of the US market in their export accomplishments, freer trade with the country opens up benefits for both SACU and US exporters and importers alike. Therefore, the results of this article validate the importance of pro-active re-engagement of the US in negotiating a reciprocal FTA within the framework of the lingering uncertainty surrounding the renewal of AGOA after it expires in 2025. The FTA should build on AGOA by consolidating trade and investment relations while addressing AGOA drawbacks and taking reciprocity into account. While SACU and the US attempted to negotiate an FTA between 2003 and 2007, it must be acknowledged that the global as well as domestic political and economic environment within both SACU and the US has significantly transformed since then.

The benefits of FTAs, however, may not be evenly distributed across all sectors of the economy or among different groups within the society. For instance, certain industries or groups may experience job displacement or increased competition as a result of trade liberalisation, leading to potential distributional effects that the SACU and US policymakers may need to address through targeted measures such as adjustment assistance or retraining programmes. Moreover, while FTAs may have significant implications for trade, investment, economic growth and competitiveness, the extent and nature of these implications depend on the specific terms and implementation of the potential SACU-US FTA, as well as broader economic and political factors. Nonetheless, the success of the prospective FTA hinges on effective implementation and complementary policies to address potential challenges such as regulatory divergence, NTBs and disparities in economic development among member states.

The following limitations were encountered: firstly, the results obtained in this article are GTAP model simulations, which are counterfactual and, therefore, may not reflect the actual outcomes in terms of welfare and other macroeconomic and trade effects emanating from the formation of the potential SACU-US FTA; secondly, only export and import taxes were considered in this article. Hence, the removal of NTBs within the prospective SACU-US FTA may be expected to generate additional welfare, macroeconomic and trade benefits within the FTA and globally; thirdly, some dynamic effects of complete trade liberalisation could not be captured because the standard GTAP model used for this article is a comparative static model. A dynamic CGE model may be required to completely capture time-related facets of the trade liberalisation process because the implementation of the

potential SACU-US FTA will likely be asymmetric and progressive over a specified period.

Addressing the limitations highlighted in this article can enlighten new avenues that can be exploited in the interest of future research. We must submit that the results of this article are by no means exhaustive, as the GTAP CGE model captures the economy-wide effects of the potential SACU-US FTA. However, they are valuable in providing insights on the likely macro-level welfare, macroeconomic and trade implications of this prospective FTA. Again, the conclusions reached in this article presuppose the full implementation of the probable trade reforms envisioned within the implementation of the prospective SACU-US FTA.

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Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

G.M. and D.F.M. contributed to the conceptualisation of the study. They also collaborated on the methodology and formal analysis. G.M. was responsible for writing the original draft, while D.F.M. handled project administration. Both G.M. and D.F.M. participated in the validation process and G.M. managed data curation. Additionally, G.M. and D.F.M. worked together on writing, reviewing and editing, with D.F.M. providing supervision.

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Data availability

The GTAP database is accessible at https://www.gtap.agecon.purdue.edu/databases/v10/.

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Appendix 1

TABLE 1-A1: New Global Trade Analysis Project regions and sectors used in the model experiment simulated in this article.

Region	Description	Sector	Description
Oceania	Australia, New Zealand	GrainsCrops	Grains and Crops
Asia	Asian countries excluding China	MeatLstk	Livestock and Meat Products
Botswana	Botswana	Extraction	Mining and Extraction
Namibia	Namibia	ProcFood	Processed Food
South Africa	South Africa	TextWapp	Textiles and Clothing
Rest of SACU	Lesotho and Eswatini	LightMnfc	Light Manufacturing
China	China	HeavyMnfc	Heavy Manufacturing
US	United States of America	Util_Cons	Utilities and Construction
America	American countries excluding the US	TransComm	Transport and Communication
EU_28	28 European Union Member States	OthServices	Other Services
ME	Middle-East countries	-	-
Africa	African countries excluding SACU members	-	-
ROW	Rest of the World	-	-

Note: SACU consists of Botswana, Namibia, South Africa, and the Rest of SACU. GTAPAgg database aggregator used.

SACU, Southern African Customs Union; GTAP, Global Trade Analysis Project; EU, Europian Union; ME, Middle East.

TABLE 2-A1: New Global Trade Analysis Project factors used in the model experiment simulated in this article.

Production factor	Description	Factor mobility
Land	Land	Sluggish (ETRAE = – l.000)
Labour	Labour	Mobile
Capital	Capital	Mobile
NatRes	Natural Resources	Sluggish (ETRAE = – 0.00l)

Note: GTAPAgg database aggregator used.

SACU, Southern African Customs Union; GTAP, Global Trade Analysis Project; ETRAE, transformation elasticity.

TABLE 3-A1: Intra-Southern African Customs Union-United States of America base and updated Global Trade Analysis Project tax rates (%).

Sector	Base Tax Rates				Updated Tax Rates			
	rTMS		*rTXS*		*rTMS*		*rTXS*	
	SACU	US	SACU	US	SACU	US	SACU	US
Grains and crops	1.35	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00
Livestock and meat products	3.01	0.98	-0.66	0.00	0.00	0.00	0.00	0.00
Mining and extraction	0.03	0.00	-1.19	-0.04	0.00	0.00	0.00	0.00
Processed food	5.63	3.60	0.00	0.00	0.00	0.00	0.00	0.00
Textiles and clothing	28.42	0.33	-3.33	-0.08	0.00	0.00	0.00	0.00
Light manufacturing	9.17	0.00	-2.13	-0.32	0.00	0.00	0.00	0.00
Heavy manufacturing	2.48	0.09	-1.05	-0.56	0.00	0.00	0.00	0.00
Utilities and construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transport and communication	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: rTMS, *ad valorem* rate of import taxes by source; rTXS, *ad valorem* rate of export subsidies by destination. GTAP 10 model simulation used.

SACU, Southern African Customs Union; US, United States; GTAP, Global Trade Analysis Project.