Beyond Retaliation: South Africa Can Effectively Counter Trump's Trade Shocks

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Beyond Retaliation: South Africa Can Effectively Counter Trump's Trade Shocks

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Abstract

How should a developing country such as South Africa respond to the USA's "Liberation Day" Tariffs of April 2025 and subsequent shocks? In this paper, we argue that a retaliatory tit-for-tat trade war is futile. Consequently, we identify an alternative strategic policy response beyond retaliation. Combining the GTAP-Dynamic (GDyn) Computable General Equilibrium model with an expanded Decision Support Model (DSM), we simulate five policy response scenarios over the period 2017–2030. Our results demonstrate that a passive response to US protectionism is the least attractive option. However, a comprehensive policy mix comprising expansionary monetary policy (to induce exchange rate depreciation), unilateral tariff reduction (to lower input costs), and targeted export promotion (to diversify exports) can take South Africa's real GDP growth back to rates last seen during 2004 to 2007 (at around 5.51% in compound annualized growth (CAGR) terms) by 2030, resulting in a surge in unskilled employment through an investment-led boom in sectors like construction and metals of around 9.8% CAGR by 2030. The results confirm that, following this path, South Africa can effectively counter Trump's trade shocks.

Key Words: Trade, Exports, Monetary Policy, Trade Policy, CGE modelling, GTAP, South Africa.

JEL Classifications : F13, E52, C68, O55

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1. Introduction

Trump's Liberation Day Tariffs[1], announced on 2 April 2025, amounting to a trade war declaration against much of the world, has significantly increased global trade uncertainty. The World Uncertainty Index[2] (WUI) for instance, reached a record high of 275 index points in the third quarter of 2025.

While much media and scholarly attention have so far focused on the USA-China trade war and its escalation after April 2025 (e.g. Feingold and Botwright, 2025;), and the impacts on and reactions of the EU and UK (e.g. Piserà *et al*., 2025; Bloom *et al*., 2025), there has been relatively less attention on the consequences for and responses of developing countries. Here, Africa is particularly vulnerable, finding "itself in the crosshairs" (Manchishi, 2025) and facing tariffs that "are particularly severe" (Andreoni *et al*. 2025:1). Indeed, with the 2025 Liberation Day Tariffs, Trump continues and intensifies the economic assault against African countries that he started in his first term in 2018, when he referred to these as "shitholes" (Kohnert, 2018:451).

In this paper we deal with the case of an African country that has been one of the most aggressively targeted by the Trump Presidency, not only in terms of punitive tariffs, which, at around a generalised[3] 30%, are around three times higher for South Africa than for other African countries, but also in terms of broader political and diplomatic pressures, for instance freezing all foreign assistance to the country and barring it from the 2026 G20 summit (Matisonn, 2025; Mark, 2025).

We ask in this paper what the best strategic policy response for South Africa to the tariff imposition should be. Using a novel combination of an extended Decision-Support Model (DSM) and the GTAP-Dynamic (GDyn) model to simulate five scenarios, the short answer is that South Africa should use an expansionary monetary policy with tariff liberalization to stimulate the local economy and increase the competitiveness of its exports and promote the diversification of its export basket.

The rest of the paper proceeds as follows. Section 2 reviews the theoretical and empirical literature to evaluate potential policy responses. Section 3 details the quantitative frameworks used in the empirical simulations, which include a novel application of both the GTAP-Dynamic Model and the expanded DSM Methodology.

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[1] Bown's (2025) "Trump's trade war timeline 2.0" provides an overview of all of the tariff measures implemented and or proposed by the Trump administration. Available at https://www.piie.com/blogs/realtime-economics/2025/trumps-trade-war-timeline-20-date-guide.

[2] The WUI data can be downloaded from: https://worlduncertaintyindex.com/data/

[3] We refer to the USA tariffs as a generalized 30% increase, while in fact the effective tariff levels will be different due to different rates applicable to e.g. steel, aluminum and various other products.

The scenarios simulated, ranging from the direct tariff shock and domestic policy responses to global retaliation and active export opportunity realisation, are also explained. Section 4 contains the findings from our simulations. Section 5 concludes by summarising the argument against retaliation and reiterating the recommendation for a two-pronged response consisting of monetary expansion and unilateral liberalisation, complemented by trade facilitation.

2. Background and Relevant Literature

2.1. Context

For South Africa, the Liberation Day Tariff shock amounts to the USA raising[4] tariffs on imports from the country by a generalised 30%. These *ad valorem* 'blanket' tariffs, effective as of 7 August 2025 based on the latest information at the time of writing, are applicable 'in addition' to any pre-existing general rates of duty applicable 'before' the 5 April 2025 announcement[5].

As an open economy, with around 8% of exports (average over the period 2019 to June 2025) destined for the USA, and whose major trade partners in Europe and China face declining trade and demand, the increased trade barriers and uncertainty carry significant economic downsides.

Various studies and modelling scenarios report global contractions in trade, employment, and GDP growth as a result of the Liberation Day Tariffs (see, e.g., McKibbin *et al*., 2025). Ignatenko *et al*. (2025) estimate that if the USA's trade partners all retaliate, global trade will decline by almost 5% relative to world GDP. And even without retaliation, the tariffs will have negative repercussions on the US economy (Koopman and Tsigas, 2025) and will exert recessionary pressures globally, disrupting supply chains and generating profound policy uncertainty (Caldara *et al*., 2020; Caliendo and Parro, 2022).

For South Africa, these impacts are coming at a time when the country is reeling after a decade of paltry growth and the more recent negative fallout from the COVID

[4] The USA has excluded certain commodity groups, valued at close to 58% of the average (2023-2024) export value from South Africa to the US. These include platinum group metals (PGMs), gold, copper, pharmaceuticals, semiconductors, lumber articles, certain critical minerals, and energy and energy products.

[5] See US Customs and Border Protection: CSMS # 64649265 - GUIDANCE – Reciprocal Tariffs, April 5, 2025 Effective Date, excluding products specified in Annex II of "Regulating Imports with a Reciprocal Tariff to Rectify Trade Practices that Contribute to Large and Persistent Annual United States Goods Trade Deficits" on the White House website, dated April 2, 2025 & HTS.USITC.GOV (April 7 2025).

pandemic. It therefore cannot afford a passive response nor delay putting a comprehensive export strategy in place.

The current USA administration's new trade policy direction, signalled by the Liberation Day Tariffs, is unlikely to be reversed soon, even under a different administration.[6] This is because the motivations behind the USA's protectionist shift are deep-seated, rooted in concerns about USA-dollar overvaluation, persistent trade deficits, and a desire to reassert economic dominance in a changing global order (Miran, 2024; Pettis and Hogan, 2024; Landau, 2025; Varoufakis, 2025). Moreover, as Auray *et al*. (2025:11) point out, it is not only the USA's tariffs that will be higher after Liberation Day, but that "*it is likely that tariffs will rise globally in the aftermath of Liberation Day*."

Thus, countries such as South Africa should expect and prepare for higher trade protection measures against its exports for an extended period, and potentially not just from the USA. An appropriate and considered strategic policy response is therefore required. In the rest of the paper we derive and describe what such a strategic response could look like. We begin in the following sub-section by asking whether South Africa should reciprocate by levying tariffs on imports from the USA, which means asking whether the country can win a trade war against the USA.

2.2. Can South Africa Win a Trade War?

The first question is whether, in the face of the USA imposing a 30% tariff on South African imports, South Africa should reciprocate, i.e. engage in a *tit-for-tat* trade war with the USA? The critical literature that deals with such considerations include Johnson (1953); Binmore *et al*. (1986), Gros (1987), Grossman and Helpman (1995); Gawande and Hansen (1999) and Felbermayr *et al*. (2013).

Johnson's (1953) showed that, theoretically at least, a country with significant monopoly or monopsony (i.e. market) power in international trade could be better off by strategically implementing an import tariff to shift the terms of trade so much in its favor that the gains from this improvement will outweigh losses from lower trade - this would hold even in the face of retaliatory tariffs. i.e. a tariff war. The crucial condition according to Johnson (1953) is that for a country to win a tariff war, it would need to have a larger price elasticity of demand for its imports as compared to the

[6] China's experience in bearing the brunt of US tariffs is a cautionary tale: as Bergin and Corsetti (2023) note, the US has increased tariffs on China under Trump's first presidency, 2018-2020 sevenfold. These were not reversed after a change of administration, and moreover under Trump's second presidency were further increased.

retaliating country's elasticity for its imports. In other words, if it is less dependent on the country that retaliates than *vice versa*.

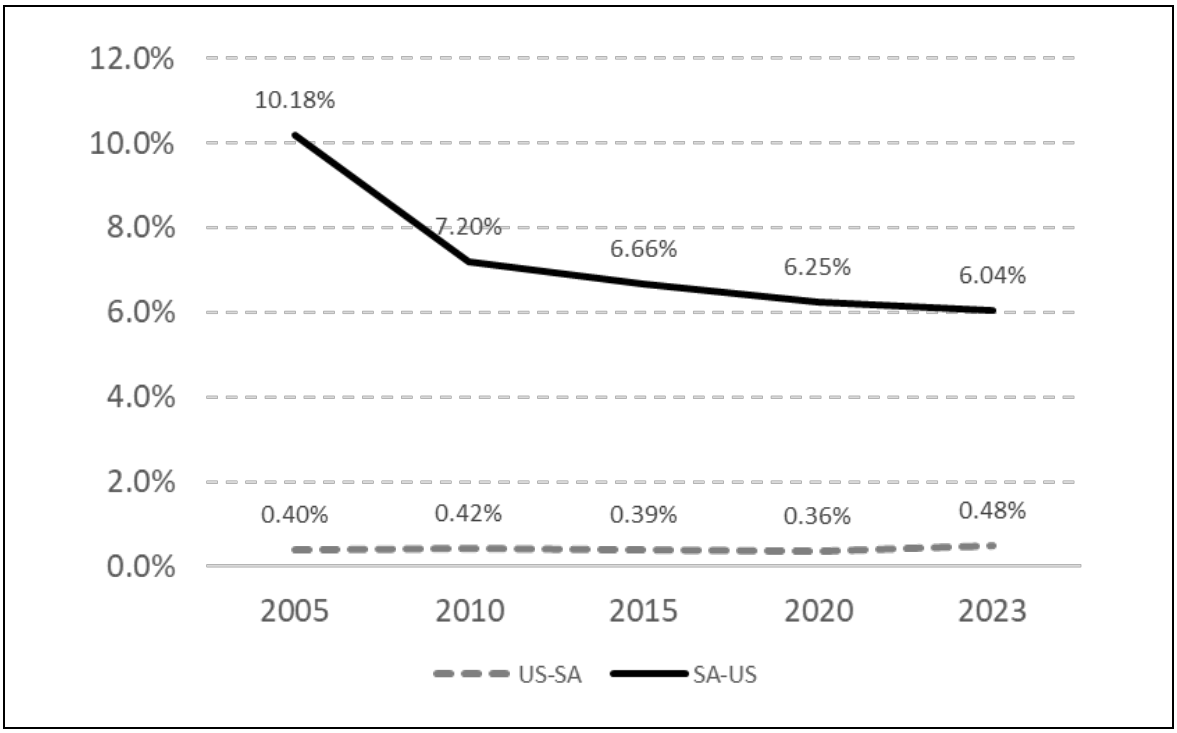
Subsequent work has extended, refined, and qualified Johnson's (1953) result - a review of subsequent work on optimal tariffs is provided by Caliendo and Parro (2022). Relevant for present purposes, Gros (1987), Kennan and Riezman (1988) and Syropoulos (2002) confirmed the importance of market power, illustrating that countries most likely to win a tariff war are those that are the largest in terms of economic size relative to the world economy[7]. Broda *et al*. (2008) reported empirical evidence that countries not bound by World Trade Organization (WTO) agreements do, in fact, set higher tariffs on goods over which they have more market power. The USA is one of the largest economies in the world, clearly ahead of South Africa in economic size and market power, and it has escalation dominance in a trade war.

Moreover, in an escalatory trade war, the USA will not be limited to simply matching tariff for tariff, and to impose tariffs on a larger volume of South African goods than *vice versa*, but is in a stronger position impose non-tariff barriers, restricting investment, limiting access to technologies, or even leveraging its influence in international financial systems to exclude the country.

Figure 1 shows that the dependency ratio at the total level of the USA on imports from South Africa has remained relatively constant over the period 2000 to 2023 (as indicated in 5-year intervals), and that South Africa is relatively more dependent on goods from the USA than the other way round. The figure also shows that, from South Africa's perspective, as the basket of trading partners and relative value of imports diversified over time, South Africa's dependency ratio on imports from the USA has continuously decreased over the past two decades.

[7] Gros (1987) shows that even in case of a tariff war between countries of equal size, imposing their optimal tariffs, both will experience substantial welfare losses.

Figure 1: USA-SA and SA-USA total goods import dependency ratios (2000-2023, 5-year increments)



Source: Authors calculated from CEPII BACI[8] (Feb 2025 HS1992 revision)

At a more granular level, the sector where the USA exhibits the highest and increasing dependency on imports from South Africa is coal mining (ISIC 21), which from a relative perspective only accounts for 2.8% of imports by sector from South Africa (ranked in position 14 in 2023 US$ terms), but represents 3.46% of all imports into the USA for this sector over the period 2000 – 2023. The USA dependency on imports in this sector from South Africa has increased by 6.74 percentage points (as it increased its contribution from average 1.4% 2000-2005 to around 8.1% average by 2018-2023).

In terms of further sectoral dependencies, after coal mining (ISIC 21), the USA is most dependent on *basic iron & steel* (ISIC 351) (only ranked at position 31 in terms of relative contribution, however the USA dependency on this group has declined by 0.69 percentage points over the period), *other mining* (ISIC 22, 24, 25, 29, 39), this group

[8] This analysis uses the "Base Analytique du Commerce International" (BACI) data set from CEPII, a reconciled 'balanced' version of the UN COMTRADE merchandise trade database. This dataset is advantageous because it excludes re-exports and uses partner or mirror reporting to supplement global flows, providing a more realistic view of global trade flows. The study uses both the 1992 and 2017 revision of the Harmonized System (HS) codes for classifying goods, mapping newly created or changed codes in the HS 2022 revision back to HS 2017 (period 2019 - 2023) and 1992 (period 2000 - 2023) for consistent historical data. For more details on this approach see Gaulier & Zignago, 2010.

only ranked at position 32 in terms of relative contribution to imports from South Africa.

Products associated with *agriculture, forestry & fishing* (ISIC 11-13) and *motor vehicles, parts & accessories* (ISIC 381-383) contributed only 3.11% (ranked 12th) and 1.01% (ranked 20th) to overall imports into the US from South Africa in 2023 US$ terms. These sectors are often cited as extremely important for South Africa in its relationship with the USA. The USA dependency on these two sectors is relatively low, with *agriculture, forestry & fishing* (ISIC 11-13) representing only 0.38% and *motor vehicles, parts & accessories* (ISIC 381-383) only 0.45% of the US imports of these sectors from all partners over the period 2000 – 2023.

As Figure 1 shows, South Africa's imports are relatively more dependent on goods from the USA than the other way round. At the sectoral level, South Africa is most dependent on imports of *other transport equipment* (ISIC 384-387), with a dependence ratio of 29%. While South Africa's sectoral dependencies are much larger comparatively with those of the USA, except for *coal mining* (ISIC 21) and *glass & glass products*[9] (ISIC 341), all other South African sectors have shown a decrease in their dependency on imports from the USA over the period.

There are two further considerations in this regard which suggest that South Africa will not prevail in a trade war with the USA.

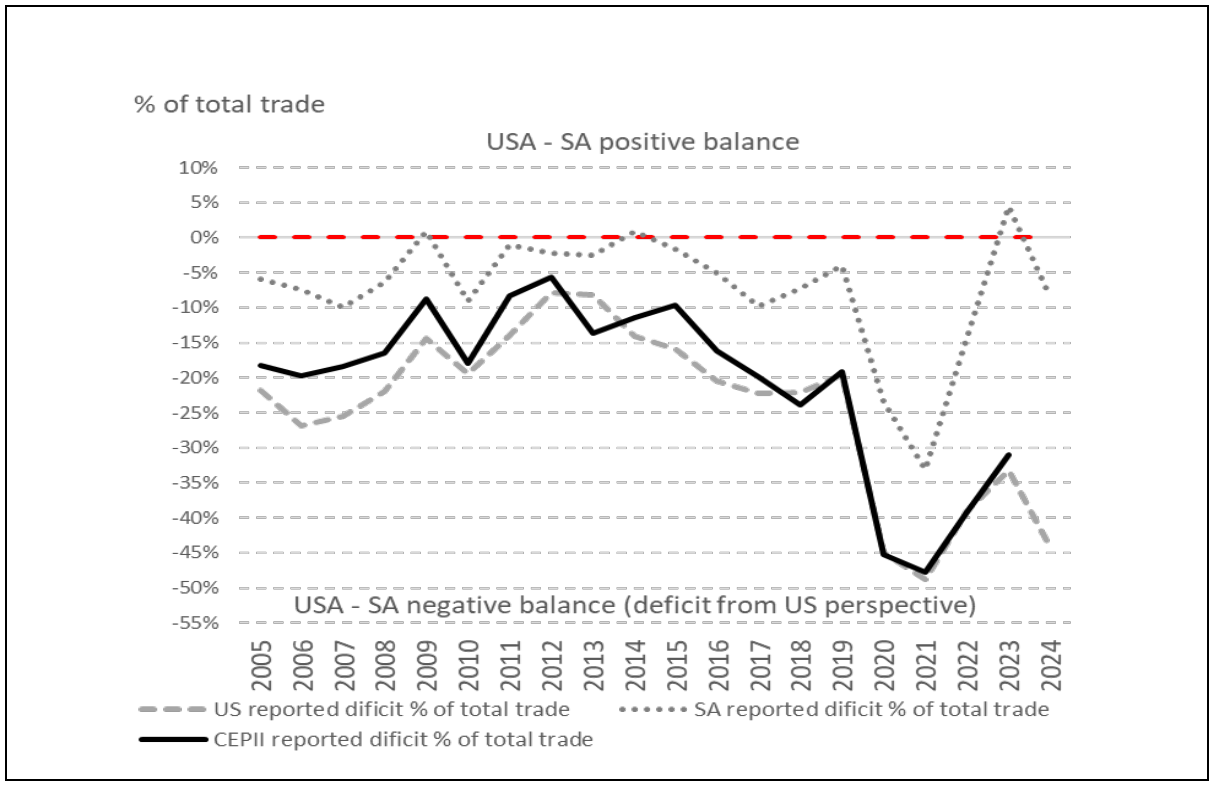
The first is that the USA has a trade deficit with South Africa. As illustrated in Figure 2, the sustained relatively large USA-SA trade deficit (from levels of a USA-SA deficit of around 18% of total bilateral trade around 2005, worsening to around 30% by 2023-24) is confirmed when considering bilateral data reported from both parties, as well as from the globally adjusted CEPII BACI data. The USA trade deficit with South Africa is relevant here in light of the finding of Pujolas and Rossbach (2024:39) that "*countries with significant trade deficits are better positioned to gain from trade wars*" - essentially because importers and exporters share the cost of the import tariff, but only the importing countries obtain the benefit (tariff revenue).

The second consideration is that the USA is the issuer of the world's reserve currency, the US $. Issuing the world's reserve currency provides the USA government with a liquid market for debt at lower interest rates, giving it fiscal resources to support domestic industries impacted by retaliatory tariffs. It also insulates the American economy from currency fluctuations that typically affect most other countries in a

[9] Mainly related to automotive and tempered glass (windscreens, mirrors, safety glass, fibre glass and light fittings).

tariff war, and provides it with geopolitical leverage and a stronger bargaining position, for instance, by excluding other countries from parts of the global financial system where the dollar is dominant (Eichengreen, 2011; Landau, 2025; Choi *et al.*, 2024).

Figure 2: USA – South Africa goods trade balance (2005 – 2024)



Source: Authors' calculation from ITC TradeMap and CEPII BACI (Feb 2025, HS1992 revision)

As Naudé and Cameron (2025) point out, retaliatory tariffs by South Africa have a chance to deter the USA from its tariff plans only if they can significantly raise the cost for the USA and simultaneously contain economic damages from the USA's import tariffs. Raising the costs for the USA for levying import tariffs on South Africa depends on many country and industry-specific characteristics. For instance, when the USA imposed import tariffs on EU steel and aluminium in 2018, the EU responded by levying finely targeted tariffs on imports manufactured in specific counties in the USA that politically supported Trump (Fetzer and Schwarz, 2021).

It is not clear, however, that South Africa imports significantly large enough volumes of products from such countries, or that South Africa can identify and target such imports in the first place. However, the preceding import demand elasticity analysis and dependency analysis point to the fact that the USA may only be somewhat sensitive to *coal mining* (ISIC 21) imports from South Africa (at 2.8% of total USA

imports), but this may change in the bigger scheme of things with the recent about-turn of the US on coal mining policies (see the White House Executive orders[10], 8 April 2025).

One could in fact argue, based on insights from Costinot *et al*. (2015) that such attempted targeting to cause political damages to Trump's supporters, could entail not only the higher import costs to the South African economy, but also the costs and losses that can arise as a result of lobbying and rent-seeking that differential import tariffs may encourage, hence reducing the credibility of retaliatory tariffs. Instead, as Costinot *et al*. (2015:659-660) find from using a simple canonical Ricardian model of trade, a better option may be "a zero-import tariff accompanied by export taxes that are weakly increasing with comparative advantage."

The fact that reciprocal tariffs are not a policy option for South Africa does not, however, mean that it cannot do anything or should do nothing - try to ride out the storm, or hope the tariff shock is akin to a once-off terms-of-trade shock. There are several useful policy options, starting with an expansionary monetary policy, and, as per Costinot *et al* (2015), a unilateral import tariff reduction. In the remainder of this section, we explore the literature on these two complementary policy responses.

2.1. Can an Expansionary Monetary Policy Cushion the South African Economy?

An expansionary monetary policy is a response that can be used to manage the macroeconomic fallout from the imposition of the USA tariff. By stimulating aggregate income and depreciating the South African exchange rate, it can sustain a more efficient level of trade and potentially cushion the economy from the Liberation Day tariff's global contractionary effects.

The use of monetary policy simultaneously with, or as a response to tariffs, has been examined by, amongst others, Auray *et al*. (2021; 2025a), Jeanne (2021), Bergin and Corsetti (2023) and Bianchi and Coulibaly (2025). In most of this literature, the point of view has been that of the country unilaterally imposing an import tariff, and then responding to the higher import prices (a cost-push shock) through monetary policy - either contracting, expanding or keeping monetary policy unchanged. Bergin and Corsetti (2023) and Bianchi and Coulibaly (2025) argued for an expansionary monetary

[10] https://www.whitehouse.gov/presidential-actions/2025/04/reinvigorating-americas-beautiful-clean-coal-industry-and-amending-executive-order-14241/

policy for the country implementing the import tariff, as a way to limit a contraction in imports to inefficient levels.

The basic argument can also be applied to a country facing the prospect of a unilateral tariff on its exports, as in the case of the USA imposing a 30% tariff on South African goods. These tariffs may reduce demand for South African goods in the USA, thereby negatively affecting South African exporters and, in turn, GDP growth.

The South African Reserve Bank can counter this trade distortion and macro-economic deflationary shock through an expansionary monetary policy - for instance, by lowering interest rates (and *relaxing* its inflation target). This will stimulate domestic GDP growth and raise aggregate demand, including for goods exported to the USA. Bergin and Corsetti (2023) argue that this will affect firms' investment and market entry decisions, thereby increasing the competitiveness of a country's industry. Moreover, lower interest rates and higher aggregate demand - also for imports - will cause the exchange rate to depreciate, thereby further improving the competitiveness of South African exports by making local production cheaper.

2.2. How can a Unilateral Tariff Reduction Complement Expansionary Monetary Policy?

Such an expansionary monetary policy can address the aggregate income effects of the USA's tariffs, but cannot fix the underlying resource misallocation and supply-side inefficiencies created by the USA tariffs. For this reason, it is recommended that monetary policy be complemented by a unilateral tariff reduction (Costinot *et al*., 2015).

Such a unilateral tariff reduction will directly lower the costs for domestic consumers and producers, boosting economic efficiency - and boosting export competitiveness even further. Lowering input prices would, to some extent, reduce any inflationary pressure from the expansionary monetary policy. And by reducing import protection, it will raise the average productivity of domestic firms, also vis-à-vis foreign competitors, as less productive local producers and less productive foreign producers supplying the domestic market may exit (Felbermayr *et al*., 2013).

It can also be argued that by unilaterally decreasing tariffs - a surprise move, seeing that most observers may expect a retaliation - South Africa will send a signal of de-escalation, a signal that the country is unwilling to play the retaliatory game.

In Section 3 of this paper, we use a Computable General Equilibrium model to simulate the use of these policy measures.

2.3. Is there Scope for South Africa to Diversify its Export Basket?

The two-pronged approach consisting of an expansionary monetary policy and unilateral tariff reduction will improve the competitiveness of, and demand for South African exports. This window of opportunity should be used to support industrial-policy-like focused trade promotion measures to diversify South Africa's exports, in other words, increasing exports on both the intensive and extensive margins. A more diversified export basket will help make the country more resilient in a global environment characterised by growing volatility and uncertainty.

Indeed, as Naudé and Cameron (2021) discuss, there is a body of literature that confirms that export diversification is associated with reduced export and GDP volatility (Bennett *et al*., 2019; Cadot *et al*., 2013; Del Rosal (2018) and associated with higher economic growth (Herzer and Felicitas Nowak-Lehnmann, 2006; Naudé and Rossouw, 2011; Agosin, 2012; and Kaitila, 2018). Moreover, it is not only what a country exports that may matter, but also the destination of its exports (Bastos and Silva, 2010).

A first step could be to identify realistic export opportunities that the country can exploit over the short term[11]. Here, the role of the South African government can be to help overcome the informational frictions in export opportunity identification - see e.g. Chaney (2014) who discusses how informational frictions explain the geography of French trade.

Reducing informational frictions is especially relevant for growing exports at the extensive margin (diversification), not only by helping to match individual exporting/importing firms, but also by expanding the export possibility or opportunity set that a country face (Naudé and Cameron, 2021). In this respect, an intriguing perspective is provided by the "balls-and-bins" model of trade of Armenter and Koren (2014).

Armenter and Koren (2014) model products as balls and destinations as bins. At any point in time, the total number of product-destination combinations that can be filled depends on the number of products traded and the number of countries as destinations. From South Africa's perspective, some bins (destinations) are empty, while others contain more balls than others. Armenter and Koren (2014) show that

[11] The subsequent paragraph in this section draws on Naudé and Cameron (2021).

the number of firms that will export on the extensive margin depends on the number of available bins. As they put it "*By shutting down no more than one-fifth of the exporting bins the share of exporters drops below 70 percent*" (Armenter and Koren, 2014:2150).

This leads us to propose using an expanded Decision Support Model (DSM) to "open" more export bins for South African exporters, as it can help reduce informational frictions.

However, the failure of many nations to diversify sustainably reflects institutional weaknesses and inadequate policy reforms at home (Dadush *et al.*, 2020). The research also supported the view that countries with higher quality export products, together with more robust institutions and financial markets, and higher levels of human capital, are in a better position to derive benefits from trade integration and economic policies than countries with low skill- and technology-intensive products, weak institutions, low levels of human capital and a lack of financial resources.

In this context, while our scenarios focus on the potential upside of intensified export diversification for South Africa, the implicit underlying assumption is that deficiencies and challenges related to governance, infrastructure maintenance, expansion and efficiencies and related factors such as sustainable, accessible and cost-effective energy and other resources are resolved to support such an export diversification drive. It is beyond the scope of this analysis to look into the impact of these enabling economic infrastructures and related factors.

In conclusion, in this section we reviewed the core literature on responses to tariff impositions, arguing that the literature supports the use of an expansionary monetary policy and unilateral tariff reduction as complementary tools, and to accompany this by focused trade promotion to expand and diversify the country's exports, making use of the higher export competitiveness that an expansionary monetary policy combined with reduce tariffs will provide.

In the remainder of this paper, we will model the impacts of such policies. Before this, however, it is necessary to point out that both an expansionary monetary policy and a unilateral tariff reduction have weaknesses. The main weakness of an expansionary monetary policy is that it is a blunt instrument, incapable of resolving the underlying microeconomic resource misallocation caused by tariffs, and that it carries the real-world risk of fuelling inflation and damaging central bank credibility. In the case of a unilateral tariff reduction, the main weakness is the potential for short-term political backlash from newly exposed domestic industries. Considering these weaknesses is left for future research.

3. Methodology

To evaluate the macroeconomic and sectoral impacts of the proposed USA tariff shock and South Africa's potential policy responses, we employ the Global Trade Analysis Project's (GTAP) quantitative framework. We also use an expanded Decision Support Model (DSM) methodology to inform a final scenario for consideration in the CGE modelling, incorporating realistic export opportunities for South Africa, informed by detailed product-market evaluations that consider more practical trade-specific factors, including tariffs, logistics, competition, and demand.

This section details the modelling approach (both the GTAP-Dynamic Model and the expanded DSM methodology and outcomes informing the scenarios), the underlying database, and the specific experimental design used to address our research questions.

3.1. The GTAP-Dynamic Model and Experimental Design

The analysis is conducted using the GTAP-Dynamic (GDyn) model[12], a recursive dynamic, multi-region, multi-sector computable general equilibrium (CGE) model. The choice of a dynamic CGE model is crucial, as it allows for the analysis of not only the immediate allocative efficiency effects of policy shocks but also the medium- to long-term impacts on capital accumulation, investment, and economic growth. The theoretical structure of the dynamic model is based on the foundational work by Ianchovichina and McDougall (2000). It has been applied in contemporary analyses of trade policy shocks (Anderson *et al.*, 2023).

The GDyn model is an extension of the standard static GTAP model, a framework pioneered by Hertel (1997) for trade policy analysis. Our simulations use the GTAP 11 Database, which provides a consistent representation of the global economy across multiple reference years (2004-2017), including 141 regions and 65 sectors (Aguiar *et al.*, 2023). This database reconciles global value flows and tax instruments, enabling granular analysis of trade policies (Ivanic *et al.*, 2023).

Our experimental design consists of three components: (1) regional/sectoral aggregation, (2) model closure rules reflecting South Africa's structural constraints, and (3) scenario specification.

[12] The GTAP-Dynamic (GDyn) model is a dynamic version of the standard GTAP model, which is used for global economic analysis. It's documented in GTAP Technical Paper No. 17, and the core concepts are detailed in Chapter 2 of "Dynamic Modeling and Applications for Global Economic Analysis" (see Ianchovichina and McDougall 2000 and 2012).

3.1.1. Regional and Sectoral Aggregation

The GTAP 11 database's 141 regions and 65 sectors are aggregated to focus on key economic relationships. The sectoral aggregation, detailed in Table 1, highlights high-tariff-exposure sectors (e.g., automotive, mining/metals), labour-intensive industries (e.g., textiles/apparel, relevant for job creation), and diversification candidates (e.g., machinery, business services) aligned with the African Continental Free Trade Area (AfCFTA)[13] opportunities (World Bank, 2025a).

Table 1: Regional Aggregation

Aggregated Region	Aggregated Code	Description
South Africa	ZAF	Focus economy
United States	USA	Source of tariff shock
SACU/SADC	SACU-SADC	Key regional partners (Botswana, Namibia, Eswatini, Lesotho*, Mozambique)
China	CHN	Key market for trade diversion
European Union	EU27	Major trading bloc (27 member states)
United Kingdom	GBR	Independent post-Brexit partner
Rest of World	ROW	Residual aggregate (all other countries)

Notes:
**Lesotho is included via the "Rest of Southern African Customs Union" (xsc) region in GTAP 11.*
Source: Authors' aggregation.

The sectoral aggregation is designed to highlight South Africa's key export sectors, industries vulnerable to USA tariffs, and those with potential for diversification and job creation. The 15-sector aggregation is detailed in Table 2.

[13] The African Continental Free Trade Area (AfCFTA) constitutes the 54 African Union member states (Eritrea to date has not signed up for the AfCFTA). Main aspiration is to create a single continental market for goods and services, with free movement of businesspersons and investments.

Table 2: Sectoral Aggregation and Constituent GTAP 11 Sectors

Aggregate Sector	Aggregated Code	GTAP 11 Sectors (Code)	Rationale
Grains & Crops	GrainCrop	pdr, wht, gro, v_f, osd, c_b, pfb, ocr	Important for food security and employment
Livestock & Meat	LiveMeat	ctl, oap, rmk, wol, cmt, omt	Key agricultural export sub-sector
Other Agri-food	OthAgFood	vol, mil, pcr, sgr, ofd, b_t	Beverages, wine, processed foods
Coal	Coal	coa	Major primary export
Mining	Mining	oil, gas, oxt	Includes Energy products (oil/gas) and Critical Minerals (oxt), which are largely exempt from USA tariffs.
Metals	Metals	i_s, nfm, nmm	Includes processed goods such as steel (often subject to high tariffs) and Refined Metals.
Automotive	Auto	mvh	A vital, policy-supported manufacturing export sector (High USA tariff exposure)
Machinery & Equipment	MachEquip	ele, eeq, ome, otn, omf	Diversification potential, capital goods
Chemicals & Plastics	ChemPlast	chm, bph, rpp	Important industrial sector
Textiles & Apparel	TexApp	tex, wap, lea	Labour-intensive, relevant for job creation goals
Other Manufacturing	OthManuf	frs, fsh, lum, ppp, p_c, fmp	Other key manufacturing industries
Utilities	Utilities	ely, gdt, wtr	Electricity, gas manufacture/distribution, water
Construction	Construct	cns	Important for domestic investment and jobs
Trade & Transport	TradeTran	trd, otp, wtp, atp, whs	Trade-enabling services
Business Services	BusSvc	cmn, ofi, ins, rsa, obs, ros	Growing services export sector
Public & Other Services	PubOthSvc	osg, edu, hht, dwe, afs	Government and social services

Source: Authors' aggregation based on GTAP 11 sector definitions (Aguiar et al., 2023).

3.1.2. Model Closure

The model's closure rules—the set of assumptions that specify which variables are exogenous and which are endogenous—are designed to capture the structural features of the South African economy. A standard neoclassical closure, assuming full employment, is inappropriate given South Africa's persistently high structural unemployment, a long-standing feature of the economy (Kingdon & Knight, 2007) that remains among the highest in the world today (World Bank, 2025b).

Instead, a neo-Keynesian closure is adopted. The use of non-standard closures to reflect labour market imperfections is a well-established practice in CGE modelling for developing countries (Ianchovichina & McDougall, 2000). The model's closure rules reflect South Africa's structural realities:

- **Labour market:** The labour market is segmented. For unskilled labour, the real wage is held fixed, reflecting downward wage rigidity and allowing employment levels to adjust in response to policy shocks. This is crucial for evaluating the job-creation impact of the proposed policies. For skilled labour, full employment is assumed, with the real wage adjusting to clear the market, reflecting its relative scarcity. This captures persistent unemployment (31.9% in 2024; World Bank, 2025b) and aligns with CGE practices for developing economies (Ianchovichina & McDougall, 2000).
- **Capital and investment:** Consistent with the GDyn framework, the capital stock is fixed within each period but accumulates over time through investment. Investment decisions are endogenously driven by the expected rate of return on capital, making investment sensitive to changes in the policy environment and "economic confidence".
- **Government and external balance:** The government budget deficit is assumed to be variable, with tax rates fixed, reflecting the short-term reality that the fiscus absorbs initial revenue shocks from changes in trade. Crucially, the trade balance is flexible, allowing it to adjust endogenously. This is necessary because the policy experiment involves inducing a real exchange rate depreciation, which is achieved by exogenously shocking the model's numeraire for South Africa.

3.1.3. Modelling Trade Substitution

To accurately evaluate the trade diversion effects resulting from the tariff scenarios, it is necessary to explain the underlying theoretical structure of trade substitution within the GDyn framework. Following the standard GTAP model structure outlined by Hertel and Tsigas (1996), trade substitution is governed by the Armington assumption, which differentiates goods by their country of origin.

In the GDyn model, this substitution is operationalised through a nested Constant Elasticity of Substitution (CES) functional form. At the top level of the nest, economic agents allocate expenditure between domestic goods and a composite of aggregated imported goods, a decision governed by the elasticity of substitution parameter. $ESUBD(i)$. At the second level, agents allocate import demand across different source regions. Crucially, the model employs a region-generic elasticity of substitution among imports, denoted theoretically as $\sigma_M(i)$ and represented in the model as the parameter $ESUBM(i)$.

This specification implies that the degree of substitutability between imported varieties depends solely on the specific commodity i, rather than on the specific bilateral trading pair (r, s). The bilateral demand for exports of a commodity i from the source region r to the destination region s, denoted as $qxs_{i,r,s}$, is determined by the following behavioural equation:

$$qxs_{i,r,s} = qim_{i,s} - \sigma_M(i) \times [pms_{i,r,s} - pim_{i,s}]$$

Where:

- $qim_{i,s}$ is the aggregate demand for imports of the commodity i in region s.
- $pms_{i,r,s}$ is the domestic price for the good i supplied from the source r to destination s.
- $pim_{i,s}$ is the market price of the composite import i in region s.

Data constraints necessitate this parsimonious approach; estimating a fully bilateral elasticity matrix with unique parameters for every pair of trading partners would require estimating millions of parameters for which sufficient econometric data is currently unavailable. Consequently, the model assumes that if the price of a commodity from one source rises relative to the average import price, the magnitude of the resulting substitution away from that source is uniform across all foreign competitors, determined by the magnitude of $ESUBM(i)$. This parameter is, therefore, the primary mechanism driving the trade diversion effects reported in our

results, as it determines importers' sensitivity to the relative price changes induced by the tariff shocks.

3.2. Expanded DSM Methodology

The CGE methodology that we will use, as explained in the preceding section, aims to simulate the consequences of the tariff war on the South African economy. While this includes the monetary and trade policy (unilateral liberalisation) responses of South Africa and their impacts, the CGE modelling cannot assess whether realistic export opportunities for South Africa exist and how these may change as a result of these global trade policy developments.

Hence, we complement our CGE modelling with application of the Decision Support Model (DSM) approach first proposed by Cuyvers *et al.* (1995) for the case of Belgium and subsequently improved and expanded by, among others, Pearson *et al.* (2010), Cuyvers *et al.* (2012), Cameron and Viviers (2015), Cameron (2020) and Naudé and Cameron (2021, 2025). The expanded methodology considers actual point-to-point logistics factors like maritime routing and duration, border posts and port transits, and modal switches (maritime and land only[14]), and relative time and cost implications in *ad valorem* equivalent terms of such logistics options - see also Cameron and Naudé (2026).

The expanded DSM model aims to bridge the information gap and identify realistic export opportunities through a data filtering process. It aims to address the big data challenge by reducing potential options using well-researched filters relevant to specific questions. The approach evaluates worldwide product (HS 6-digit) and market combinations through four major filter categories, systematically eliminating less-promising markets.

As detailed in Pearson *et al.* (2010) and Cuyvers, Steenkamp and Viviers (2012), Filter 1 assesses broad market potential through economic indicators and risk factors. It comprises two sub-filters: sub-filter 1.1 eliminates markets with high political/commercial risk, while sub-filter 1.2 evaluates macro-economic size and growth. The purpose is to reduce the country set for subsequent analysis.

[14] While typically high-value-low-weight ratio products are transported progressively more via air cargo, the international trade data available for all countries and detailed products are not sufficiently mature yet to accurately and in detail distinguish this mode from land and sea at this point in time.

Filter 2 analyses import demand characteristics for all potential product-market combinations. It evaluates three key metrics: short-term import growth (2 years), long-term import growth (5 years), and relative import market size.

Filter 3 evaluates product-country market access conditions through two main categories of trade barriers. Filter 3.1 examines the degree of import procurement supplier concentration, while Filter 3.2 assesses trade restrictions (Cuyvers *et al*., 1995:180; Cuyvers, 1997:7; 2004:261). Based on Hoekman and Nicita's (2008:17) findings, Filter 3.2 incorporates transport and logistics costs using the World Bank's Logistics Performance Index (LPI), import costs, and actual tariff levels. This filter is expanded in the point-to-point logistics dimension, which was briefly discussed previously. These components form a *logistics market cost accessibility index* that scores each product-country combination relative to the others.

In Filter 4, the final step, each product-market combination is categorised based on the home market's current exports, target market characteristics, and comparative advantages (reflected through the RCA[15] and RTA[16] indicators) (Cuyvers, *et al*. 1995, Cuyvers, 1997 and Cuyvers, *et al*. 2012). Markets are further classified by comparing the home market's export performance against the top six competitors in each market (Pisa *et al*., 2017).

A monetary value indicator assesses the relative size of 'unconstrained' and 'untapped' potential export value to prioritise shortlisted opportunities. The 'untapped' potential is calculated using the average import value from the top six competitors, excluding the home market. The 'unconstrained' qualifier indicates 'potential' unrestricted by production constraints. These variables all make use of time-weighted indexing to manage volatility (Naudé & Cameron, 2025).

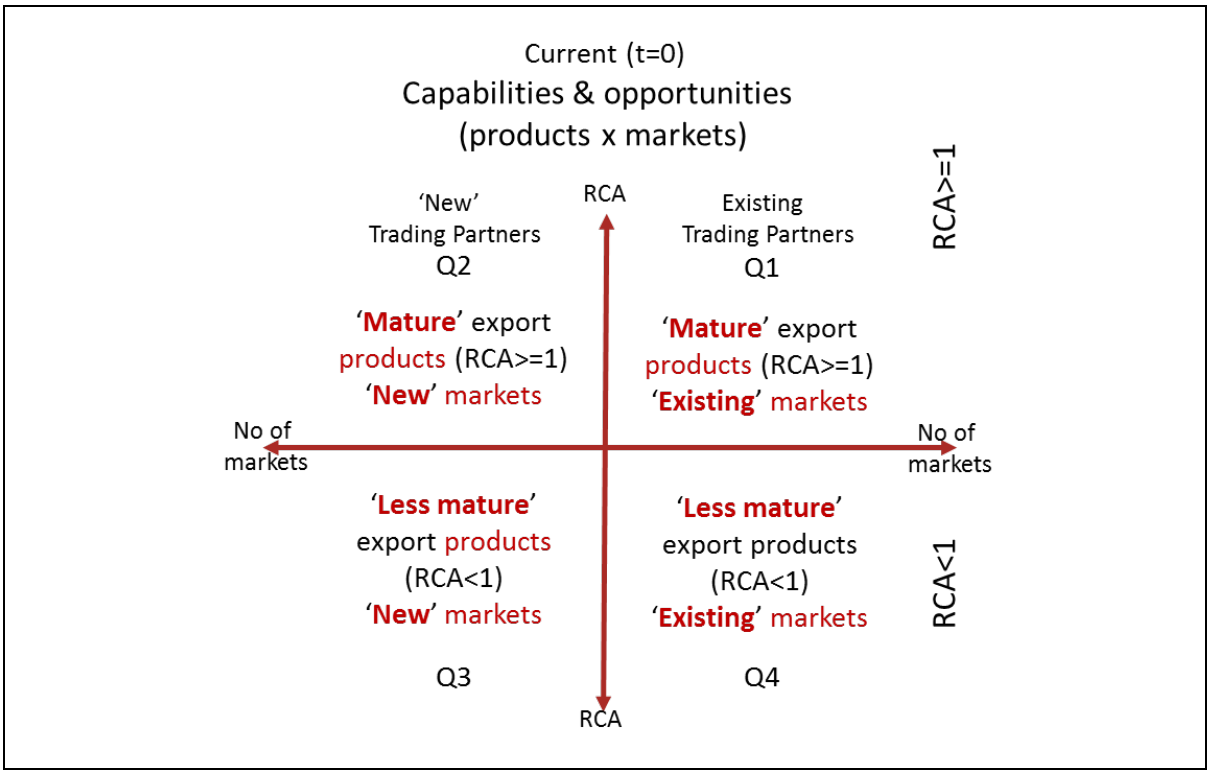
As Carrère *et al*. (2011) note, policies for product diversification differ from market diversification. Brenton and Newfarmer (2007) define existing product-market growth as intensive margin, while new products and markets represent extensive margin growth.

Our methodology addresses both margins in export promotion. It identifies alternative markets for exporters facing saturation in traditional markets and suggests new products to inform investment and industrial policy decisions.

[15] Revealed comparative advantage of Balassa (see Balassa, 1965).
[16] Revealed trade advantage index of Vollrath (1991).

The results from the DSM method can be categorised and summarised into 4 quadrants to inform discussions on export strategy input. These are depicted in Figure 3.

Figure 3: Strategic context of identified realistic outcomes



Source: Cameron and Viviers (2015).

The following characteristics describe results categorised into Quadrant 1 (Q1):

- Products are 'mature', so have a revealed comparative advantage (RCA >= 1);
- The home market (South Africa) seems to have some productive capacity for exports, as indicated by the revealed trade advantage (RTA > 0); and
- Markets are existing trading partners where the home market already provides intermediate to large shares of the target market's total import demand.

This quadrant can also be described as informing the intensive margin from both product and market perspectives. For ease of reference, this quadrant is referred to as the 'brown fields' quadrant (analogous to engineering or investment projects that expand on existing facilities). So, in summary, existing exports to existing markets for which the home market already supplies a relatively significant share of import demand.

The following characteristics describe results categorised into Q2:

- Products are 'mature', so have a revealed comparative advantage (RCA >= 1);
- South Africa seems to have some productive capacity for exports, as indicated by the revealed trade advantage (RTA > 0); and
- Markets are 'new' or 'small' trading partners where South Africa provides zero or a relatively small share of the target market's total import demand.

This quadrant can be described as informing the intensive margin from a product perspective and the extensive margin from a market perspective. This quadrant is called the 'green fields' quadrant (analogous to engineering or investment projects that create new facilities). So, in summary, existing products are being taken to new or previously underserved markets.

The following characteristics describe results categorised into Q3:

- Products are 'less mature', so have a revealed comparative advantage (RCA < 1 and > 0);
- The home market appears to have some productive capacity for exports, as indicated by the revealed trade advantage (RTA > 0); and
- Markets are 'new' or 'small' trading partners where South Africa provides zero or a relatively small share of the target market's total import demand.

This quadrant can be described as informing the extensive margin from both product and market perspectives. This quadrant is referred to as the 'blue sky' quadrant (analogous to engineering or investment projects that create totally new concepts). So, in summary, 'immature/new' products to previously under-serviced markets or totally new markets.

The following characteristics describe results categorised into Q4:

- Products are 'less mature', so have a revealed comparative advantage (RCA < 1 and > 0);
- The home market seems to have some productive capacity for exports, as indicated by the revealed trade advantage (RTA > 0); and
- Markets are existing trading partners where the home market already provides intermediate to large shares of the target market's total import demand.

This quadrant can be described as informing the extensive margin from a product perspective and the intensive margin from a market perspective. For ease of reference, this quadrant is called the 'grey fields' quadrant. In this case, 'immature/new' products to existing markets for which the home market already supplies a relatively significant share of import demand. Such markets typically have insufficient demand to help the home market's exports to grow, or there are other

currently 'unknown' factors inhibiting further growth into these markets – hence the reference to 'grey'.

While conceptually export opportunities for all HS 6-digit products can be conducted based on this approach, we do recognise that certain groups of products cannot be generalised in this fashion, for different reasons. These include, e.g. product groups that are minerals and mining related (gold, diamonds, copper, platinum group metals (PGMs) and other mining related); energy related (petroleum, crude oils, coal and gas), manufacturing related (fully built-up automotives and arms & ammunition), and lastly live animals & fish and art, household items & unclassified.

Further assumptions that influence the outcomes from this approach include:

For Filter 3.1 – competition/target market supply concentration, we assume that, as a result of the Ukraine – Russia conflict, markets x products where Ukraine and Russia were dominant suppliers and would otherwise be excluded, are now categorised as potential opportunities irrespective of the concentration index outcomes.

For Filter 3.2 – logistics cost index, Africa's transport logistics developments, e.g. Trans-Africa Highway developments, as well as various port developments, are not considered unless already operational, given the analysis time frame of only 5 years (see more details on scenario design in section 3.3). For Rest of World transport logistics – longer-term developments given global environmental (e.g. water shortage in Panama, Arctic sea ice melt and potential opening of the Arctic Sea Routes (ASR)), geopolitical and regional (Yemen, Suez) are not considered currently.

For Filter 3.2 – tariff cost index, the USA reciprocal tariffs are applied, excluding the 14 November 2025 modification to Annex II of Executive Order 14257 (see footnote 19 for more details). For the AfCFTA, in practice, the SACU and SADC-FTA rates apply to South African products for member countries of these two agreements. The AfCFTA tariffs will therefore only have a noticeable change for South African exports to Africa in countries not part of the SACU and SADC-FTA agreements.

Based on the latest gazetted information from the South African Revenue Services[17], 13 countries[18] have been recognised by South Africa to be implementing AfCFTA proposed rates with regard to South Africa's exports. Of these 13 markets, Egypt, Morocco and Tunisia apply schedule 2 phase-down rates against South Africa,

[17] South African Revenue Service, Schedules to the Customs and Excise Act, 1964. General notes to Schedule No 1, section O - DUTIES ON GOODS TO WHICH THE AFRICAN CONTINENTAL FREE TRADE AREA RELATES, 24 October 2025.

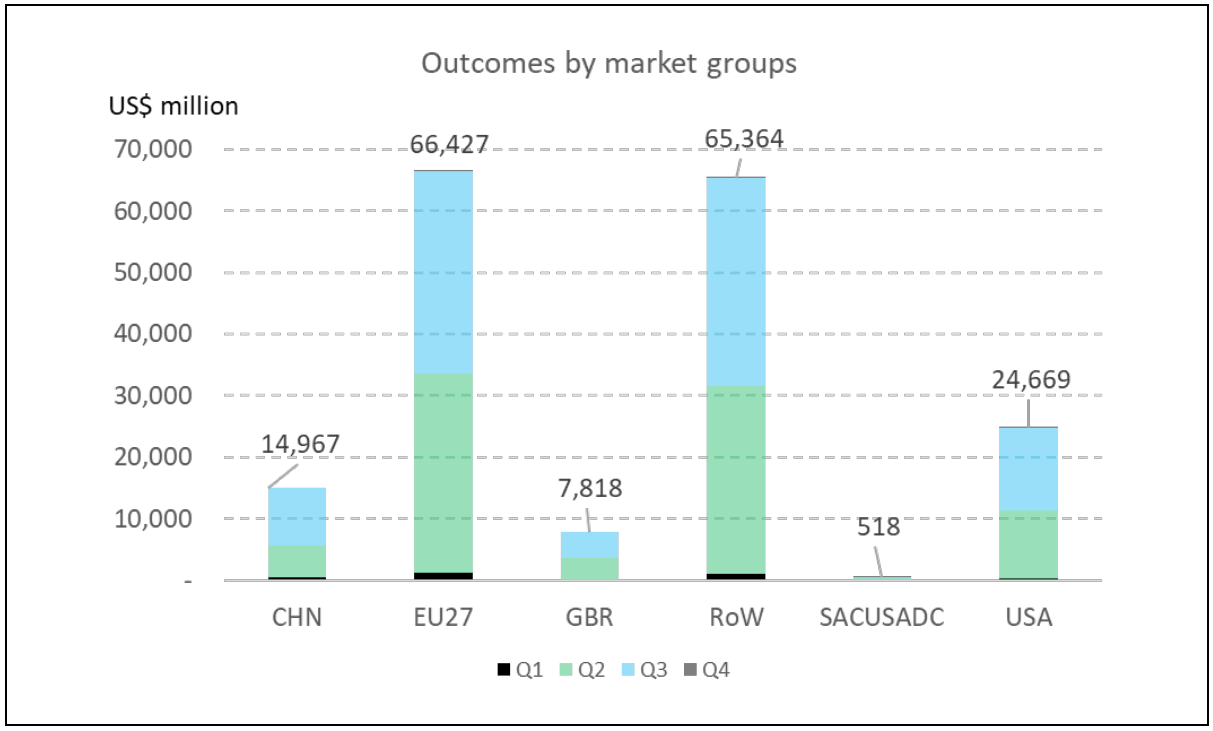
[18] These non-SADC and non-SACU members are Algeria, Burundi, Cameroon, Egypt, Ethiopia, Gambia (The), Ghana, Kenya, Morocco, Nigeria, Rwanda, Tunisia and Uganda.

meaning the AfCFTA end-state will only be reached in 10 years for South Africa as opposed to 5 years for other less developed AfCFTA members. The AfCFTA rates applied in this analysis therefore reflect these formally recognised countries, while the rest are based on current 'as-is' applied rates,

3.2.1. Export Opportunity Identification Results

A high-level summary of export opportunities for South Africa, as explained in the preceding section, is presented in Figure 4.

Figure 4: Summary Outcomes by Aggregated Region



Source: Authors

When considering the different regional aggregations as previously described in section 3.1.1, Figure 4 shows the contribution to realistic future export potential for South Africa across these groupings, as well as different opportunity characteristics as represented by the different quadrants.

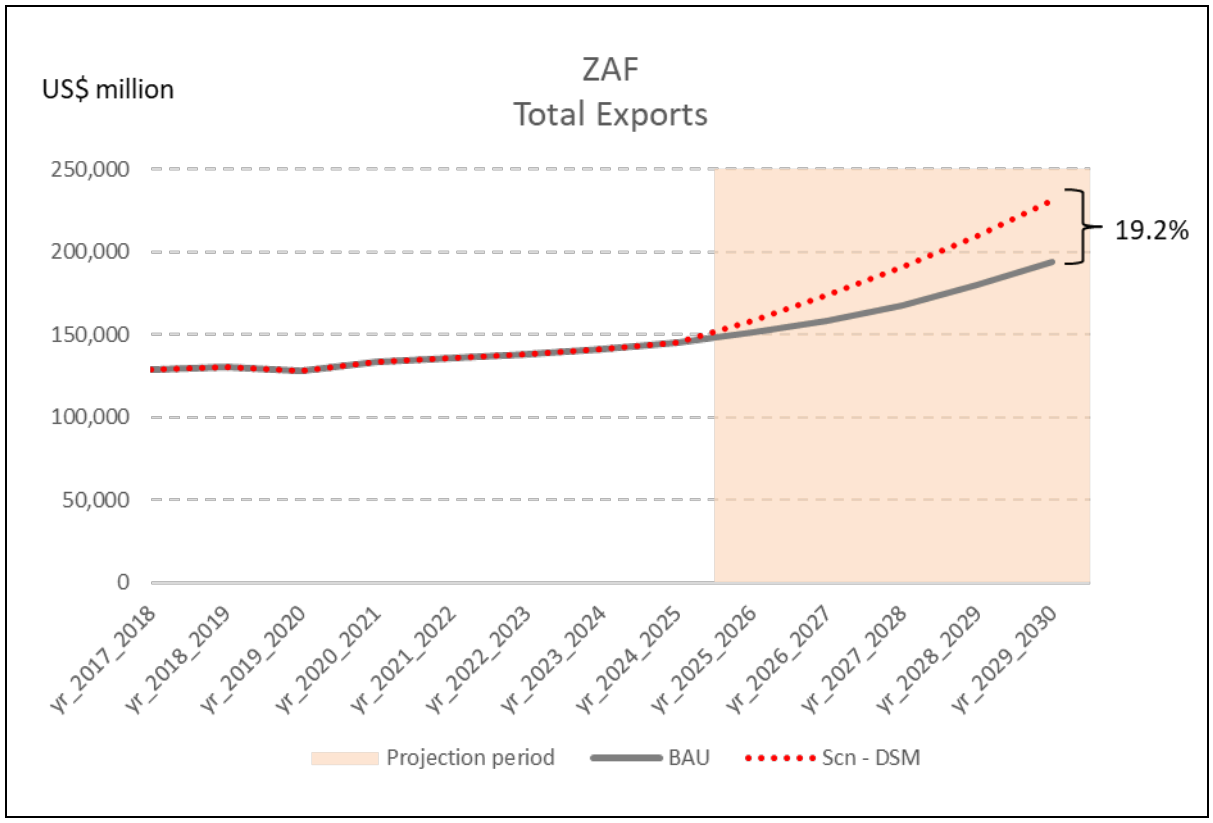
The largest concentration of opportunities are found in Q2 and Q3 groupings (so both extensive in markets, while a combination of intensive (Q2) and extensive (Q3) for products), of which, in relative terms, the EU-27 group, combined with the Rest of World (excluding China, SACU-SADC, and the USA), holds the largest monetary potential in the foreseeable future, as shown in Figure 4.

This outcome emphasises that South Africa needs to focus on export *diversification* rather than intensifying efforts in export promotion, development, and investment attraction.

To translate these outcomes into assumptions for CGE modelling purposes, some basic simplifying assumptions have to be made.

The first assumption is that the export growth under the business as usual (BAU) scenario (described in more detail in section 3.3) forms the basis for comparison as depicted in Figure 5.

Figure 5: Illustrative Impact of Selected Opportunities to Total Exports



Source: Authors

The second assumption is that, for the Q2 opportunities (products for which South Africa has a proven track record in exports, or relatively 'mature' export products), entering new markets can achieve the full potential of this group over a 20-year window.

The third assumption is that, since our approach does not explicitly consider production dynamics, we realise only 10% of the indicated potential associated with Q3 (less-mature/'new' products from a production perspective) over a 20-year window. The fourth assumption is that for purposes of highlighting the growth potential for South Africa, given sensible macro assumptions (described in more

detail in section 3.3) as well as focused and effective trade promotion and development, paired with enhanced trading partner access and alignment, we ignore the identified opportunities associated with the USA in this scenario. So, engaging in a 'neutral' stance *vis-à-vis* the USA's chosen path by assuming no additional potential and associated initiatives targeted at further increasing exports to the USA, beyond that implied by the BAU scenario, is considered. Lastly, a reminder of the initial assumption of exclusion of certain types of products described in the preceding section.

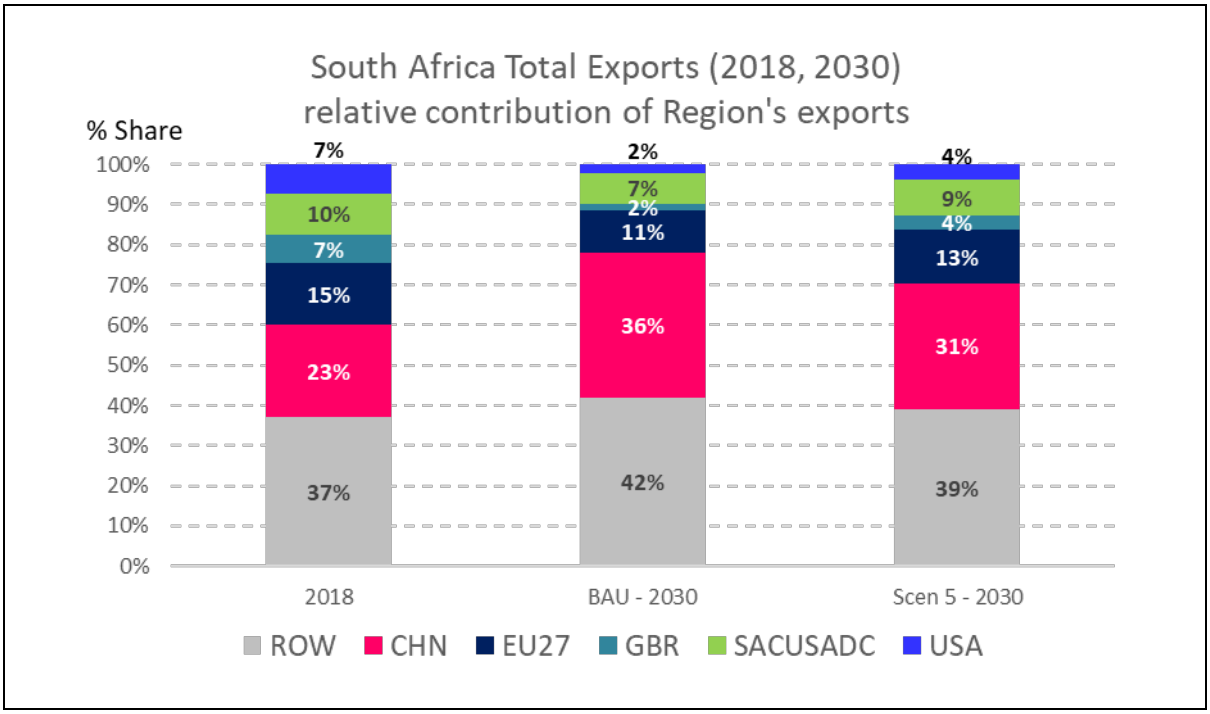
The combined effect of the identified opportunities (and their characteristics) and the assumptions as described here, yields an alternative path as depicted in Figure 5 for potential total South African exports (including both products and services).

In nominal dollar value terms, the detailed assumptions translate to a 19.2 per cent higher value for South Africa's total exports in 2030 than would have been the case under the BAU scenario.

Figure 6 illustrates the effect of these assumptions on South Africa's relative export share by the end period, compared with the BAU scenario. The USA (even with zero 'additional' focused exports assumed), the SACU-SADC region, the United Kingdom (GBR in the graph) and the EU all gain relative share in South Africa's exports, while China and the rest of the world relinquish relative market share under these assumptions.

Note that these assumptions are then translated into detailed shocks for each sector by region and time period for purposes of CGE modelling of scenarios.

Figure 6: Change in relative share of South Africa's exports by region



Source: Authors

3.3. Scenario Design

To comprehensively evaluate the economic ramifications of the USA tariff shock and the strategic policy space available to South Africa, a five-scenario experimental design is implemented (over and above the baseline scenario). This design allows for the systematic isolation of the direct tariff impact, the potential efficacy of South Africa's domestic policy response, and the crucial general equilibrium effects stemming from the ensuing global trade conflict.

All scenarios are simulated using the GDyn model from a 2017 baseline to a terminal year of 2030.

Scenario 0: Baseline or Business-as-Usual (BAU) Scenario:

This is the counterfactual scenario, representing the projected evolution of the global and South African economies in the absence of any tariff shocks. It is generated by running the GDyn model forward with standard macroeconomic growth projections for all regions, sourced from the International Monetary Fund's World Economic Outlook (IMF, April 2025). We specifically use the April 2025 release rather than subsequent updates to ensure the baseline remains uncontaminated by the announcement and implementation effects of the "Liberation Day" tariffs, thereby

serving as a pure counterfactual. This “business-as-usual” path, with results up to 2030, serves as the essential benchmark against which all subsequent policy and shock scenarios are measured (see Table 3).

Table 3: Baseline Macroeconomic Growth Projections (2025 - 2030)

Region	2025	2026	2027	2028	2029	2030
South Africa (ZAF)	1.2%	1.4%	1.5%	1.5%	1.5%	1.5%
United States (USA)	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%
China (CHN)	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%
European Union (EU27)	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
United Kingdom (GBR)	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%
Sub-Saharan Africa (SACU-SADC)	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%
Rest of World (ROW)	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%

Notes: The baseline relies on the April 2025 WEO projections. South Africa's growth gradually recovers to a steady state of 1.5%, while the USA and China are projected at 1.8% and 3.7% respectively, reflecting the outlook prior to the trade war escalation.
Source: International Monetary Fund (IMF) (April 2025); Model assumptions.

Scenario 1: USA Tariff Shock (Unilateral USA Action):

This scenario simulates the direct impact of the "Liberation Day Tariffs" on South Africa. A 30% *ad valorem* tariff is imposed on merchandise imports by the USA from South Africa. To accurately reflect the policy implementation, which includes exemptions for certain strategic commodities, the tariff shock is not applied uniformly across the aggregated sectors. Instead, the shock is scaled for each relevant sector based on the trade-weighted share of tariff-eligible products within that sector's exports to the USA. Specifically:

- Energy products (Coal sector) receive a 0% shock due to complete exemption.
- Mining & Metals sector receives a reduced shock (~15%) reflecting exemptions for critical minerals, including certain refined metals.
- Chemicals & Plastics sector receives a reduced shock (~24%) accounting for pharmaceutical exemptions.

- Other sectors receive the full 30% shock or near-full shock with minor adjustments for specific product exemptions[19].

This approach ensures that the simulated impact correctly accounts for the product-level exemptions while quantifying the direct economic damage to the South African economy, assuming both South Africa and the rest of the world remain passive.

Scenario 2: South Africa Proactive Policy Response (Domestic Mitigation):

Building upon Scenario 1, this simulation models South Africa's proposed two-pronged strategic response, implemented concurrently with the USA tariff. This scenario is designed to test the potential effectiveness of South Africa's domestic policy instruments, independent of broader global repercussions. The policy response consists of a depreciation of the real exchange rate and a unilateral 50% reduction in South Africa's import tariffs.

Scenario 3: USA Tariff Shock + World Response:

This scenario assesses the impact on South Africa if it remains passive in a broader global trade conflict. It includes the initial USA tariff shock on South Africa from Scenario 1. Also, it adds the broader general equilibrium effects of a global trade war, in which other major economies retaliate against the USA. This scenario isolates the "contagion" effect of a global trade slowdown on South Africa.

Scenario 4: South African Policy Response + World Response (Full General Equilibrium):

This scenario situates South Africa's proactive policy response (from Scenario 2) within the realistic context of the broader global trade conflict (from Scenario 3). It provides the most realistic assessment of the net effect of South Africa's policy strategy amidst global economic turmoil.

The retaliatory tariffs modelled in Scenarios 3 and 4 are based on an analysis of the global response to the 2025 USA tariffs, reflecting the varying degrees of retaliation

[19] Note that these assumptions exclude the 14 November 2025 modification to Annex II of Executive Order 14257 (see https://www.whitehouse.gov/fact-sheets/2025/11/fact-sheet-following-trade-deal-announcements-president-donald-j-trump-modifies-the-scope-of-the-reciprocal-tariffs-with-respect-to-certain-agricultural-products/ and https://www.whitehouse.gov/wp-content/uploads/2025/11/annex.pdf) due to the fact that this modification was published after the analysis contained in this report.

enacted by key trading partners against the USA (available at the time of writing). These are summarised in Table 4.

Table 4: Assumed Retaliatory Tariffs on USA Goods in Global Response Scenarios

Retaliating Region	Average Tariff Rate on USA Imports	Notes
China (CHN)	32%	Under 90-day pause agreement (expires Nov 10, 2025)
European Union (EU27)	20%	Phased implementation
Great Britain (GBR)	20%	Aligned with the EU response
South Africa (ZAF)	10%	Measured response
SACU/SADC	10%	Regional alignment
Rest of World (ROW)	10%	General response

Source: Authors' compilation based on current trade policy developments as of September 2025 and based on analysis from Ignatenko et al. (2025).

Scenario 5: Additional Export Opportunity Realisation under South African Policy Response + World Response (Full General Equilibrium) conditions:

This final and most comprehensive scenario simulates the "best-case" outcome of the proposed strategy. It situates the South African policy response and the global trade environment (Scenario 4) within an active export promotion framework. We model an export promotion effort here as a reasonable response seeking to find alternative export markets, and also because it is one of the responses already signalled by the South African government in its so-called "Butterfly export strategy" (Creamer, 2025).

To simulate this scenario, we introduce exogenous shocks to the model representing the realisation of the realistic export opportunities identified by the expanded DSM methodology described in Section 3.2.1. Specifically, we shock the *Import-Augmenting Technical Change* (ams) variable to improve the efficiency and competitiveness of South African exports into the "Green fields" (Q2) and "Blue sky" (Q3) markets identified in Figure 3.

This scenario assumes that through targeted trade facilitation and the removal of informational frictions, as emphasised by Chaney (2014) and Naudé and Cameron (2021), South Africa can successfully capture the extensive margin opportunities in non-USA markets (EU, China, UK, and ROW), thereby partly compensating for the loss of the USA market.

4. Results

In this section, we present the simulation results. We begin with the macroeconomic consequences, distinguishing between the impacts of the USA tariff shock, the domestic policy response, the global retaliation, and the final realisation of alternative export opportunities. We then delve into the sectoral reallocations of output and employment, addressing the structural shifts engineered by the policy mix. Finally, we analyse the trade diversion effects, demonstrating how the proposed strategy realigns South Africa's global trade integration.

4.1. Macroeconomic Consequences of the Trade Shock and Policy Responses

The aggregate, economy-wide impacts of the five scenarios on South Africa are summarised in Table 5. The results reveal that while the USA tariff shock is contractionary, the proposed policy mix, especially when complemented by active export diversification (Scenario 5), fundamentally alters South Africa's growth trajectory.

Table 5: Macroeconomic Impacts: (2017-2030)

Macroeconomic Variable (Cumulative % change unless otherwise stated)	Baseline (BAU)	Scenario 1: Trump Tariff	Sc vs BAU	Scenario 2: SA Policy Response	Sc vs BAU	Scenario 3: Trump Tariff (incl. World Response)	Sc vs BAU	Scenario 4: SA Policy Response (incl. World Response)	Sc vs BAU	Scenario 5: Scenario 4 + Additional Export Opportunity Realisation	Sc vs BAU
Nominal GDP (vgdp)	52.41	37.15	↓	55.72	↑	36.53	↓	57.64	↑	125.16	↑
Real GDP (qgdp)	8.90	8.03	↓	23.58	↑	8.63	↓	25.17	↑	30.73	↑
Real Investment (qva (cgds))	22.95	19.92	↓	158.17	↑	23.04	↑	169.87	↑	234.72	↑
Unskilled Labour Supply (qfactsup (UnSkLab))	6.83	5.25	↓	17.56	↑	5.15	↓	20.16	↑	59.77	↑
Real Exports (qxwreg)	-10.83	-11.50	↓	15.30	↑	-10.81	↑	14.71	↑	28.51	↑
Real Imports (qiwreg)	50.28	35.11	↓	143.63	↑	35.77	↓	148.90	↑	243.09	↑
Welfare (EV, US$ millions)	135 905	103 045	↓	220 338	↑	102 887	↓	229 735	↑	352 653	↑

Source: Authors' GDyn model simulations.

Under the Baseline projection, the South African economy follows a modest growth trajectory, with Real GDP expanding by a cumulative 8.90% by 2030 (around 1.72% in compound annualised growth rate (CAGR) over the period terms). The unilateral USA tariff shock (Scenario 1) acts as a drag on this already tepid growth, reducing the cumulative expansion to 8.03% (~ 1.56% CAGR). This contraction is driven by a sharp decline in real exports (-11.50%) and a dampening of investment. Critically, this translates into "real-world" pain: cumulative growth in unskilled employment slows from the baseline's 6.83% to just 5.25%, and overall welfare[20] (Equivalent Variation) drops by over US$32 billion compared to the baseline.

Scenario 3 confirms that if South Africa remains passive, the global contagion from a broader trade war will exacerbate the situation. However, the marginal damage is contained relative to the initial direct shock. However, the true divergence appears in the policy-active scenarios.

In Scenario 2, the domestic policy response (monetary expansion and unilateral liberalisation) triggers a potent stimulus. Cumulative Real GDP growth more than doubles the baseline projection to 23.58% (increasing real GDP growth to ~ 4.33% in CAGR terms). This suggests that the expansionary monetary policy, by lowering the cost of capital, successfully counteracts the deflationary pressure of the tariffs, aligning with the theoretical arguments of Bergin and Corsetti (2023).

Scenario 4 demonstrates the resilience of this strategy even amid a global trade war, with GDP growth holding firm at 25.17% (or ~4.59% in CAGR terms). However, the most striking outcome is observed in Scenario 5, where the realisation of identified export opportunities turbocharges the recovery. Cumulative Real GDP growth reaches 30.73% by 2030 (taking South Africa back to rates last seen in 2004 to 2007, at around 5.51% CAGR), and real investment surges by a massive 234.72%. This investment boom is critical; it signals that the policy mix not only supports consumption but also actively lowers the user cost of capital, encouraging firms to expand capacity to meet new export demand.

The labour market impacts are equally interesting. In Scenario 5, unskilled employment growth surges to 59.77% cumulatively (9.8% average annual growth). It is important to note that, due to our neo-Keynesian closure rule, aggregate *skilled* employment remains fixed (reflecting the structural scarcity of skilled labour in

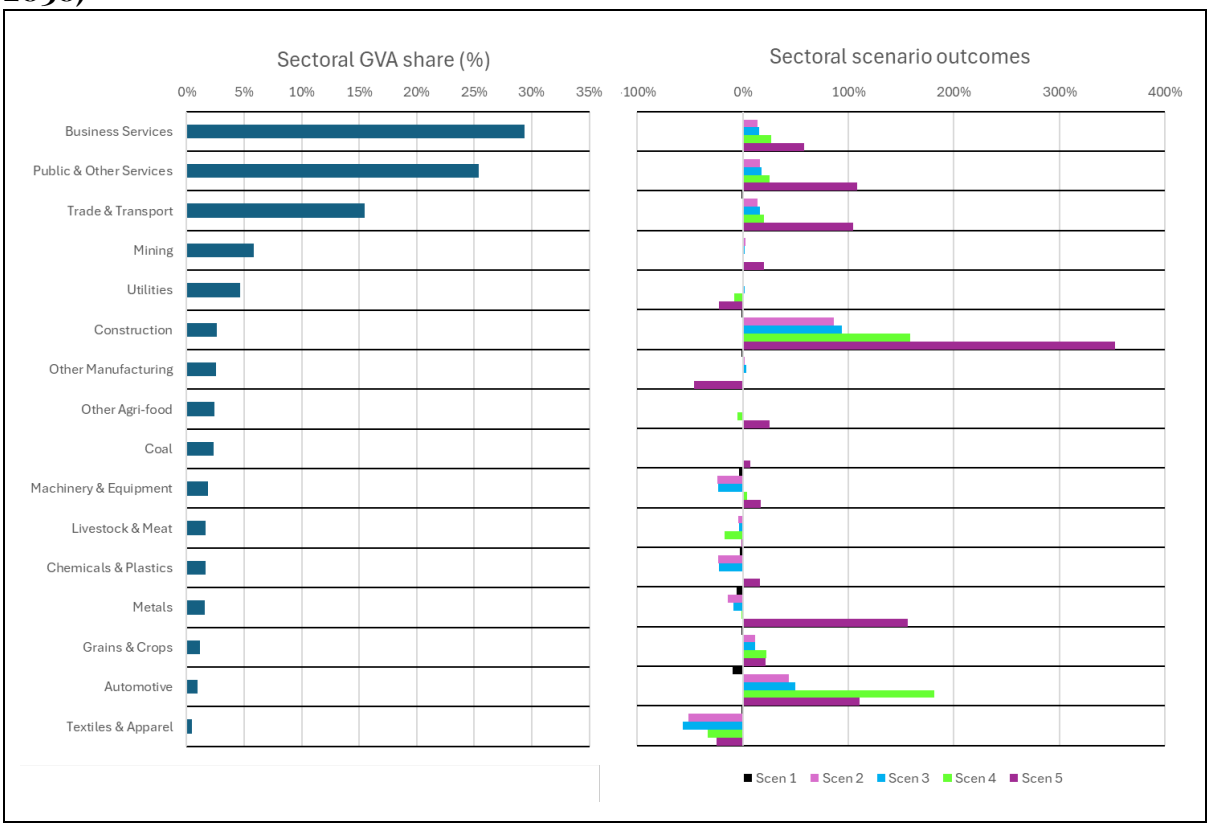
[20] Overall welfare (or Equivalent Variation - EV) is a monetary metric of how much better or worse off an economy is after a policy shock compared to its initial state. EV is not GDP; it's a welfare measure that accounts for consumption possibilities and utility, not just production. For example: If tariffs raise domestic prices, consumers lose welfare even if GDP rises. If export opportunities expand, welfare can increase more than GDP because of improved consumption choices.

South Africa), with market adjustment occurring through rising real wages rather than increased headcount. However, for *unskilled* labour, where we assume a surplus and fixed real wages, the quantity adjustment is massive. This result validates the hypothesis that removing export constraints (including those on imported inputs required for export production) on the extensive margin can serve as a powerful engine for mass job creation if done circumspectly.

4.2. Sectoral Reallocation and Structural Shifts

The macroeconomic aggregates mask a significant, and intended, structural transformation. The policy package does not lift all sectors equally; rather, it actively reallocates capital and labour from protected, import-competing sectors toward export-oriented and investment-driven industries. This divergence is illustrated in Figure 7 (Value Added) and **Error! Reference source not found.**8 (Employment), with detailed data in Table 6 and Table 7.

Figure 7: Comparative Results – Sectoral Value Added (Scenario % Deviation by 2030)



Source: Authors' GDyn model simulations.

Table 6: Sectoral Value Added (Scenario % Deviation by 2030)

Aggregate Sector	GVA* ZAR Million (+% share of total, 2017)	Scenario 1: Trump Tariff	Scenario 2: SA Policy Response	Scenario 3: Trump Tariff (incl. World Response)	Scenario 4: SA Policy Response (incl. World Response)	Scenario 5: Scenario 4 + Additional Export Opportunity Realisation
Grains & Crops	$3,928M (1.1%)	-1.04	11.73	11.47	22.12	21.73
Livestock & Meat	$5,740M (1.7%)	-0.45	-4.36	-3.78	-17.05	-1.02
Other Agri-food	$8,379M (2.4%)	-0.78	-0.48	-0.11	-4.66	25.79
Coal	$8,065M (2.3%)	-0.02	0.31	0.24	0.12	6.92
Mining	$20,059M (5.8%)	-0.01	2.62	2.17	1.09	19.76
Metals	$5,510M (1.6%)	-5.77	-14.46	-9.02	-1.39	156.45
Automotive	**$3,264M (1.0%)**	**-9.34**	**43.42**	**49.50**	**181.02**	**110.34**
Machinery & Equipment	$6,368M (1.9%)	-3.41	-23.84	-23.62	4.32	17.20
Chemicals & Plastics	$5,538M (1.6%)	-2.97	-23.53	-22.75	0.87	16.33
Textiles & Apparel	**$1,555M (0.5%)**	**-1.26**	**-51.67**	**-57.00**	**-33.16**	**-24.62**
Other Manufacturing	$8,682M (2.5%)	-1.09	1.92	3.11	0.49	-45.80
Utilities	$15,847M (4.6%)	-0.79	0.46	1.62	-8.17	-22.72
Construction	$9,082M (2.6%)	-1.40	86.51	93.99	158.24	352.39
Trade & Transport	$53,204M (15.5%)	-0.83	14.38	16.11	20.07	104.37
Business Services	$100,959M (29.4%)	-0.69	14.41	15.90	26.93	57.82
Public & Other Services	$87,262M (25.4%)	-0.63	16.50	18.09	25.38	108.67

Notes:

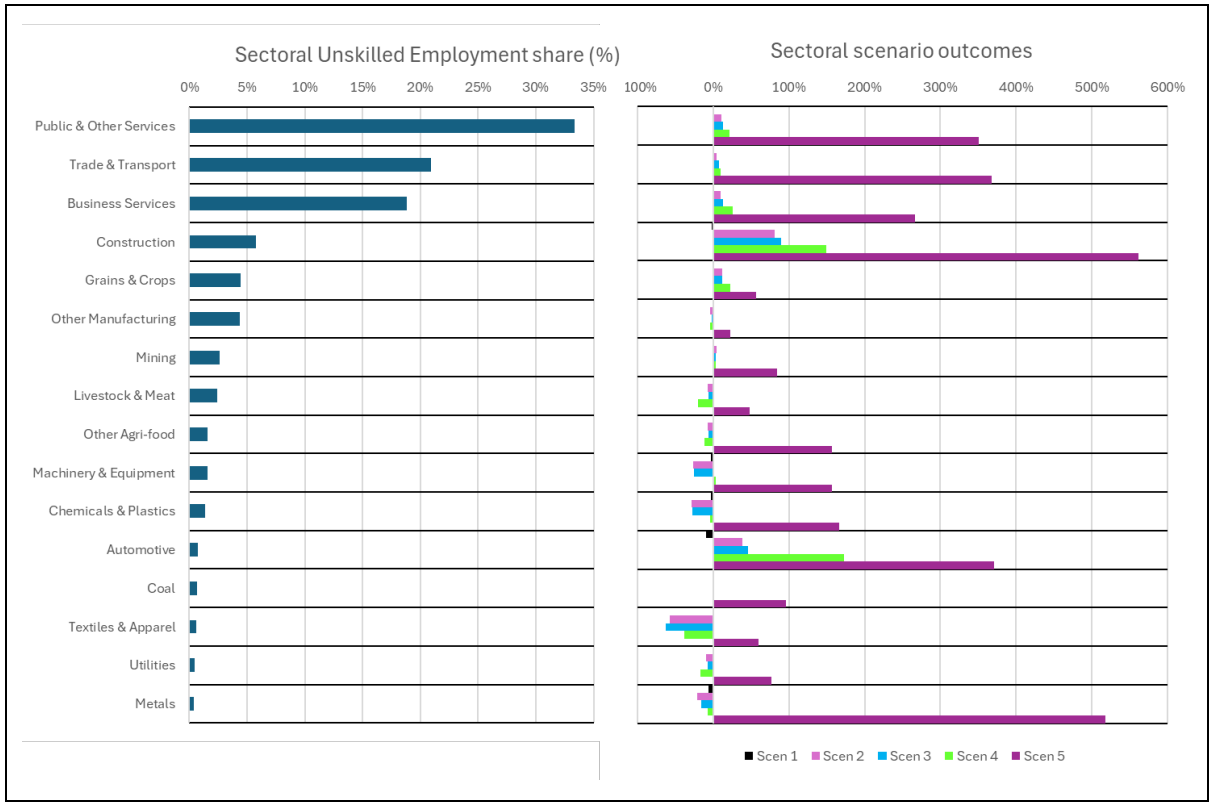
** Calculated using EVFA – Sources of factor income (NETFACTINC + VDEP) by sector in the GTAP 11 database. GVA measured in US$ millions.*

Source: Authors' GDyn model simulations.

The investment-driven winners are construction and metals. The most conspicuous result in Scenario 5 is the explosive growth of the construction sector, with value added rising by a cumulative 352.39% and unskilled employment by 561.54%. While seemingly counterintuitive for a trade shock analysis, this is a logical second-order effect of the model's investment linkage. As noted in the macro results, real investment expands by over 234% in cumulative terms. In the CGE framework, the creation of new capital goods is heavily dependent on the construction sector. Thus, an expansionary monetary policy, which lowers the required rate of return on investment, effectively ignites an infrastructure and capacity-building boom, creating a massive "pull effect" that drags the construction sector up with it.

Similarly, the metals sector (linked to both construction inputs and export demand) sees a turnaround from a contraction in Scenario 1 (-5.77%) to a massive 156.45% expansion in Scenario 5. This validates the "industrial-policy-like" effects of the trade strategy mentioned in Section 2; by lowering input costs (via tariff cuts) and opening new markets, the policy serves to revitalise upstream manufacturing.

Figure 8: Comparative Results – Sectoral Unskilled Employment (Scenario % Deviation by 2030)



Source: Authors' GDyn model simulations.

Table 7: Sectoral Unskilled Employment (Scenario % Deviation by 2030)

Aggregate Sector	Employment Number* (+ % share of total)	Scenario 1: Trump Tariff	Scenario 2: SA Policy Response	Scenario 3: Trump Tariff (incl. World Response)	Scenario 4: SA Policy Response (incl. World Response)	Scenario 5: Scenario 4 + Additional Export Opportunity Realisation
Grains & Crops	697,350 (4.4%)	-1.30	12.12	12.05	22.98	56.88
Livestock & Meat	373,989 (2.4%)	-0.67	-6.95	-6.01	-20.24	48.41
Other Agri-food	**251,566 (1.6%)**	**-0.65**	**-7.51**	**-6.46**	**-10.96**	**156.97**
Coal	109,099 (0.7%)	-0.08	0.92	0.57	0.11	95.68
Mining	407,249 (2.6%)	-0.04	4.44	3.59	2.93	84.42
Metals	59,414 (0.4%)	-5.92	-21.51	-15.42	-7.46	518.31
Automotive	**120,467 (0.8%)**	**-9.52**	**38.86**	**46.14**	**172.99**	**370.53**
Machinery & Equipment	245,101 (1.6%)	-3.45	-26.87	-25.82	2.94	157.28
Chemicals & Plastics	210,595 (1.3%)	-2.87	-28.69	-27.17	-3.73	166.30
Textiles & Apparel	**91,076 (0.6%)**	**-1.01**	**-57.68**	**-62.30**	**-37.69**	**59.75**
Other Manufacturing	684,703 (4.4%)	-1.04	-3.53	-1.63	-4.22	23.03
Utilities	71,577 (0.5%)	-0.63	-8.86	-7.06	-16.70	76.85
Construction	905,247 (5.8%)	-1.41	81.13	89.29	149.11	561.54
Trade & Transport	3276,968 (20.9%)	-0.77	4.43	7.16	9.92	368.11
Business Services	2947,287 (18.8%)	-0.82	10.33	13.06	25.63	266.72
Public & Other Services	5221,783 (33.3%)	-0.70	10.81	13.52	21.44	350.59

Notes:

** South African employment data classified under the Quantec Standardised Industry Classification (QSIC) system were mapped to GTAP 11 sectoral aggregates following standard industry concordances. Where QSIC categories spanned multiple GTAP sectors, allocations were*

made based on the dominant economic activity; notably, agricultural employment (QSIC 11) was distributed between GrainCrop (70%) and LiveMeat (30%) according to relative output shares in South African agriculture. Service sectors were mapped according to their primary function, with hospitality services (QSIC 64) allocated to Public & Other Services rather than Trade & Transport to align with GTAP's service sector definitions.

Sources: Authors' GDyn model simulations; Employment data sourced from Quantec (2025).

The automotive sector (parts and accessories only), a traditional target of USA protectionism, demonstrates remarkable resilience. Despite the 30% USA tariff, the sector successfully pivots in Scenario 5, increasing value added by 110.34%. This confirms the efficacy of reducing informational frictions (Chaney, 2014); when the USA market closes, the combination of a competitive exchange rate and targeted export promotion allows the sector to pivot to the EU and China. Trade and transport services also gain significantly (+104.37%), driven by the increased volume of merchandise trade flows required to service these new markets.

The strategy, however, is not without costs. The textiles and apparel sector contracts significantly, with value added falling by 24.62% in Scenario 5 compared to the baseline. This is a direct consequence of the unilateral 50% tariff liberalisation (the second prong of our proposed strategy). As noted by Felbermayr *et al.* (2013), liberalisation forces less productive domestic firms to exit as they face stiffer import competition. Similarly, other manufacturing contracts by 45.80%.

These results confirm that a structural shift is underway. Resources are being effectively drawn from historically protected, less competitive industries and reallocated to high-growth, investment-linked sectors (construction, metals) and to competitive export industries (automotive parts and accessories). This aligns with standard trade theory, which posits that liberalisation shifts production toward sectors of latent comparative advantage, as identified in our DSM analysis.

4.3. Trade Diversion and Market Realignment

The magnitude of the trade responses is fundamentally governed by the Armington elasticities (Appendix 1), which determine the substitutability between destinations. Table 8 provides the quantitative evidence of South Africa's strategic trade realignment.

Table 8: South African Export Diversion by Partner and Scenario, 2030 (% Change from Baseline)

Sector / Scenario	USA	SACU-SADC	China	European Union (EU27)	Great Britain	Rest of World
Automotive						
Scen 1: Trump Tariff	-172.45	-0.19	-0.47	-0.53	-0.51	-0.47
Scen 2: SA Policy	30.67	94.93	137.88	151.76	152.67	151.12
Scen 3: World Response	-40.54	95.48	143.58	148.72	149.26	145.90
Scen 4: SA Policy + World	175.81	183.47	541.56	574.96	579.77	585.94
Scen 5: Scen 4 + REO	-102.03	66.65	379.05	392.36	403.89	346.11
Mining						
Scen 1: Trump Tariff	0.63	0.41	0.65	0.67	0.68	0.64
Scen 2: SA Policy	5.27	18.18	3.58	4.98	4.31	4.81
Scen 3: World Response	5.66	17.15	5.31	5.66	5.45	5.55
Scen 4: SA Policy + World	5.49	39.48	3.73	4.97	4.63	4.67
Scen 5: Scen 4 + REO	-3 551.65	64.92	56.24	56.83	54.55	56.62
Metals						
Scen 1: Trump Tariff	-259.88	-0.58	-0.96	-1.36	-1.09	-1.09
Scen 2: SA Policy	-103.65	88.64	65.92	80.46	83.16	77.13
Scen 3: World Response	-217.04	84.66	65.07	68.30	68.03	65.90
Scen 4: SA Policy + World	-15.04	229.54	168.09	179.46	184.63	177.91
Scen 5: Scen 4 + REO	-118.05	477.39	992.11	2 937.47	1 385.27	1 547.25
Textiles & Apparel						
Scen 1: Trump Tariff	-204.08	-0.63	-1.89	-1.94	-1.87	-1.89
Scen 2: SA Policy	2.02	139.88	167.65	176.66	172.45	168.28
Scen 3: World Response	-109.60	159.81	184.65	187.71	186.84	185.69
Scen 4: SA Policy + World	92.34	320.02	445.00	463.02	447.08	446.20
Scen 5: Scen 4 + REO	-93.77	195.49	627.24	772.43	750.73	688.31

Source: Authors' GDyn model simulations.

In Scenario 1, the USA tariff decimates exports to the USA market; Automotive exports to the USA collapse by over 172% (in cumulative terms), and metals by 260%. In the

absence of a policy response, there is negligible diversion to other markets; the goods are not produced.

Scenario 5 rewrites this narrative through a "*Great Pivot*." While the USA market remains challenging (-102% for Automotive), the combination of exchange-rate depreciation and efficiency gains (*ams* shocks) creates a boom in alternative markets. Exports of Automotive goods to the European Union (EU27) surge by 392% (in cumulative terms) and to China by 379%. A similar pattern is observed in metals, where exports to China increase by 992% and to the EU by 2,937%.

This confirms the central thesis of our expanded DSM methodology: the opportunities (empty bins) existed, but informational frictions and low price competitiveness prevented their exploitation. The combination of the exchange rate depreciation (price competitiveness) and the simulated removal of non-tariff barriers (DSM integration) allowed South African exporters to bypass the USA's blockade and integrate deeply into alternative value chains.

4.4. Evaluating the Efficacy of South Africa's Strategic Response

Synthesising the results allows for an evaluation of the proposed policy strategy. The findings are threefold and carry significant implications.

First, our proposed strategic response, combining expansionary monetary policy, unilateral tariff liberalisation, and the active realisation of export opportunities (Scenario 5), is efficient. It not only neutralises the negative impact of the USA tariffs but also transforms the shock into a catalyst for growth in investment, employment, and overall welfare. The stark contrast between the stagnation of the policy-off scenarios (1 and 3) and the booming trajectory of the whole strategic pivot (Scenario 5) provides clear quantitative evidence of this.

Second, the policy successfully achieves a strategic realignment of South Africa's trade. The trade diversion results demonstrate a shift of resources towards competitive export sectors and a diversification of markets. While exports to the USA in key sectors such as automotive and metals contract significantly under the new equilibrium, this can be more than offset by increases in exports to the EU27 and China.

Third, while the strategy mitigates losses more effectively than a passive stance, it still entails structural adjustment costs. The contraction of the textiles and apparel sector (-24.62% in value added in Scenario 5) and other manufacturing (-45.80%) highlights that the policy creates winners and losers. One should expect political

pushback and resistance from the latter sectors. While the net effect on the economy—particularly the nearly 60% surge in unskilled employment—is positive, policymakers would need to consider measures to support workers and firms in contracting sectors during the transition.

5. Summary and Conclusions

In this paper we addressed the critical challenge posed by Trump's Liberation Day Tariffs, announced on April 2, 2025, which unilaterally raised tariffs on USA imports from South Africa by 30%. South Africa, as an open economy with 8% of its exports destined for the USA, cannot afford a passive or delayed response, especially given its decade of paltry growth and the deep-seated motivations behind the USA's protectionist shift, which extend beyond simple protectionism to concerns about dollar overvaluation and persistent trade deficits.

We argued against engaging in a *tit-for-tat* tariff war with the USA. Due to significant asymmetries in market power and economic size, the USA has escalation dominance. Furthermore, the USA's status as the issuer of the world's reserve currency confers fiscal and geopolitical advantages that would insulate its economy from retaliatory tariffs, making it highly unlikely that South Africa would prevail in such a conflict.

Instead, we made a case, based on the theoretical and empirical literature, for South Africa to implement a two-pronged strategic response, complemented by a renewed emphasis on trade facilitation and export diversification. The approach we recommended consists firstly of an expansionary monetary policy, aiming to cushion the South African economy by stimulating aggregate income, and inducing a real exchange rate depreciation. Lowering interest rates can counter the deflationary shock of tariffs, stimulate domestic demand, and improve export competitiveness, making South African goods cheaper.

The second prong of the recommended response is for South Africa to engage in a unilateral tariff reduction. This policy directly lowers costs for domestic consumers and producers, boosting economic efficiency, further enhancing export competitiveness, and helping to offset inflationary pressures from monetary expansion. It also signals de-escalation, indicating South Africa's unwillingness to engage in a retaliatory trade war.

We finally recommended that the South African government complement the monetary and exchange rate policies as outlined with stronger trade facilitation

aimed at export diversification. In fact, the increased competitiveness gained from the two-pronged approach creates an opportunity to diversify South Africa's exports across both products and destinations. This strategy aims to build resilience against future global volatility and involves identifying new export opportunities and reducing informational frictions through trade facilitation.

While our focus was on expansionary monetary policy and trade policy and trade promotion to diversify exports by product and destination, these measures would eventually need to be complemented by considering the need to enter into negotiations with the USA on a future trade dispensation. Herein, South Africa will have to formulate a well-grounded position on possibly restricting exports of the critical and excluded minerals to the USA and to consider targeted reciprocal tariffs: in both cases, game theory suggests that on its own, South Africa cannot win a *tit-for-tat* tariff war with the USA due to the asymmetry in the country's exposure to one another. However, if South Africa, together with other countries, can coordinate an export restriction and a reciprocal tariff response, the cost to the USA of maintaining its tariffs will be more significant.

Lastly, while our scenarios focused on the potential upside through intensified export diversification for South Africa, the implicit underlying assumption is that persistent deficiencies and challenges related to e.g. governance, infrastructure maintenance, expansion and -efficiencies and related factors such as sustainable, accessible and cost-effective energy and other resources are resolved in order to support such an export diversification drive. It is beyond the scope of this analysis to look into the impact of these enabling economic infrastructures and related factors and this is left as a topic for future research.

Appendices

Appendix 1: USA – South Africa import demand price elasticity assumptions

The Armington elasticities in the GTAP 11 database capture the degree of substitutability between domestic and imported goods (ESBD/ESUBD parameters) and between imports from different sources (ESBM/ESUBM parameters). These elasticities are critical parameters in CGE modelling as they determine how trade flows respond to relative price changes induced by policy shocks such as tariffs.

Higher elasticity values indicate greater substitutability, implying more responsive trade flows to price changes. As shown in Table 9, sectors such as Mining & Metals and Automotive possess relatively high elasticities of substitution between import sources (ESUBM values of roughly 10.1 and 5.6, respectively).

These high elasticity parameters are the structural mechanism within the model that facilitates the "Great Pivot" observed in the Scenario 5 results (Table 8). They imply that international buyers are highly sensitive to price; therefore, when South Africa's real exchange rate depreciates, and efficiency improves (via the *ams* shocks), global importers in the EU and China can swiftly substitute away from other suppliers and toward South African goods. Conversely, sectors with lower elasticities exhibit more "sticky" trade relationships and less dramatic diversion.

Table 9: GTAP11 Armington Elasticities by Sector and Region

Sector	Domestic/Import Substitution (ESUBD)								Import Source Substitution (ESUBM)							
	ZAF	USA	SACU-SADC	CHN	EU27	GBR	ROW	Global Default	ZAF	USA	SACU-SADC	CHN	EU27	GBR	ROW	Global Default
1. GrainCrop	2.21	2.15	2.11	2.53	2.33	2.33	2.69	16.40	5.96	2.57	5.48	4.71	4.70	4.41	4.99	4.83
2. LiveMeat	3.14	3.30	2.53	2.72	3.43	3.50	3.09	21.70	7.23	3.09	7.37	7.72	7.10	7.89	7.22	7.22
3. OthAgFood	2.39	2.16	2.08	2.04	2.09	1.93	2.21	14.90	4.64	2.14	4.40	4.67	4.24	3.86	4.42	4.30
4. Coal	3.05	3.05	3.05	3.05	3.05	3.05	3.05	21.30	6.10	3.05	6.10	6.10	6.10	6.10	6.10	6.10
5. MinMetal	2.44	4.24	1.87	3.20	4.64	4.73	4.42	25.50	10.10	4.03	3.65	7.75	11.80	11.10	10.80	10.50
6. Auto	2.80	2.80	2.80	2.80	2.80	2.80	2.80	19.60	5.60	2.80	5.60	5.60	5.60	5.60	5.60	5.60
7. MachEquip	4.17	4.11	4.17	4.25	4.17	4.14	4.20	29.20	8.36	4.19	8.35	8.62	8.41	8.37	8.46	8.46
8. ChemPlast	3.30	3.30	3.30	3.30	3.30	3.30	3.30	23.10	6.60	3.30	6.60	6.60	6.60	6.60	6.60	6.60
9. TexApp	3.78	3.79	3.78	3.77	3.79	3.78	3.78	26.50	7.61	3.78	7.59	7.66	7.59	7.57	7.58	7.59
10. OthManuf	2.77	2.93	2.46	2.86	2.89	2.81	2.70	19.40	5.50	2.81	5.25	5.64	5.66	5.34	5.48	5.57
11. Utilities	2.80	2.80	2.80	2.80	2.80	2.80	2.80	19.60	5.60	2.80	5.60	5.60	5.60	5.60	5.60	5.60
12. Construct	1.90	1.90	1.90	1.90	1.90	1.90	1.90	13.30	3.80	1.90	3.80	3.80	3.80	3.80	3.80	3.80
13. TradeTran	1.90	1.90	1.90	1.90	1.90	1.90	1.90	13.30	3.80	1.90	3.80	3.80	3.80	3.80	3.80	3.80
14. BusSvc	1.90	1.90	1.90	1.90	1.90	1.90	1.90	13.30	3.80	1.90	3.80	3.80	3.80	3.80	3.80	3.80
15. PubOthSvc	1.90	1.90	1.90	1.90	1.90	1.90	1.90	13.30	3.80	1.90	3.80	3.80	3.80	3.80	3.80	3.80

Notes:

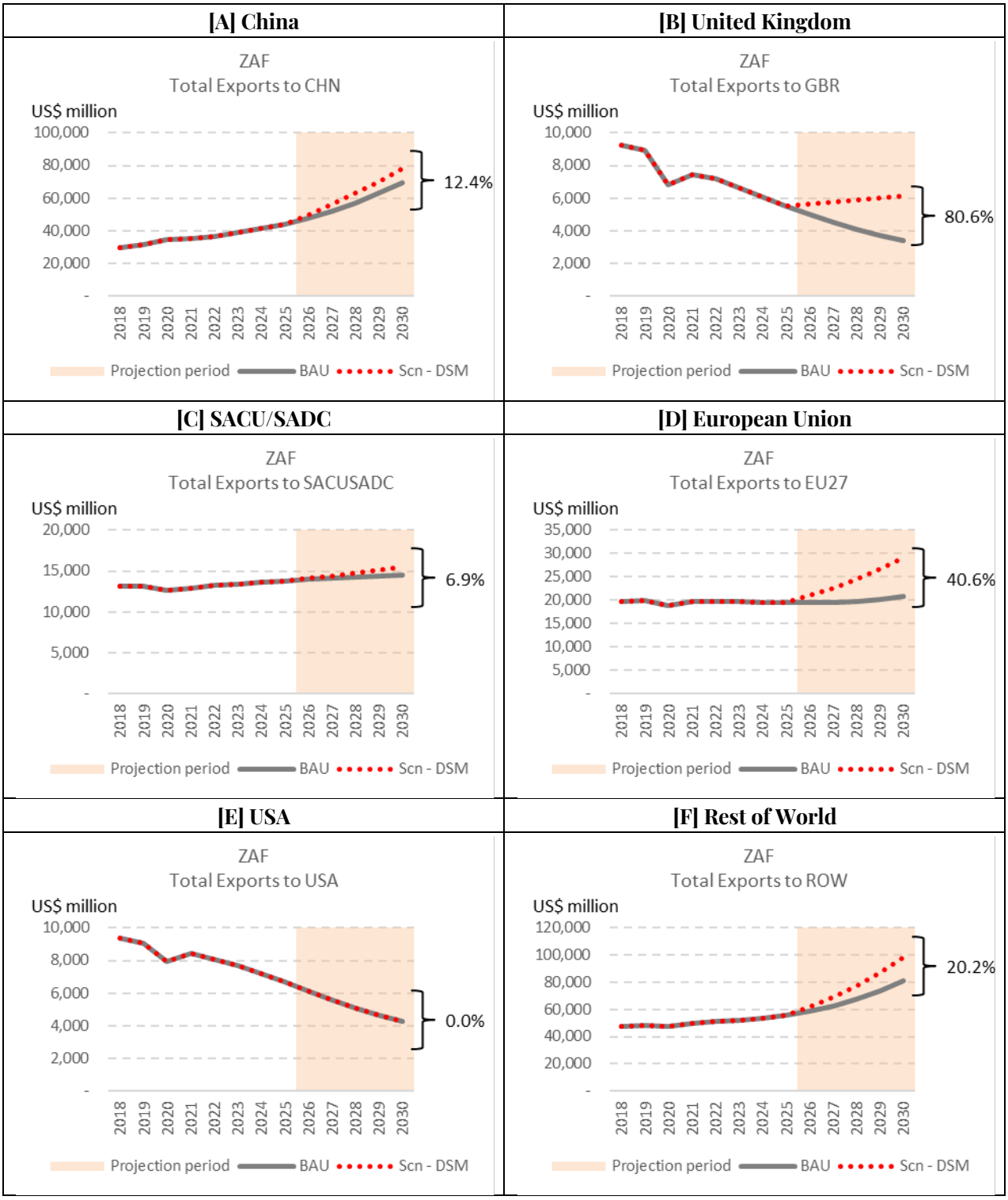
ESUBD (Elasticity of Substitution Between Domestic and Imports): Measures the degree of substitutability between domestically produced goods and imported goods at the regional level. Higher values indicate that domestic and imported goods are more easily substitutable. ESUBM (Elasticity of Substitution Between imports from different sources): Measures the degree of substitutability between imports from different source regions. These values are typically twice the ESUBD values, reflecting the assumption that imports from different sources are more substitutable with each other than with domestic production. Global defaults (ESBD and ESBM) apply when region-specific parameters are not available. Service sectors (Utilities, Construction, Trade & Transport, Business Services, and Public & Other Services) typically have lower elasticities, reflecting their less tradable nature.

Source: GTAP 11 Database (Aguiar et al., 2023); Armington elasticity parameters extracted from GTAP 11 behavioural parameters database.

Appendix 2: South Africa Export Scenario - Total by Regions

A summary of implications of BAU versus scenario 5 assumptions for total exports from South Africa to the different regions are presented in Figure 9, panels [A] to [F].

Figure 9: South Africa Total Exports to regions - BAU vs Scenario 5



Source: Authors

References

Agosin, M.R., Alvarez, R. & C. Bravo-Ortega (2012). Determinants of Export Diversification around the World: 1962–2000, *The World Economy*, 35 (3): 295 -315.

Aguiar, A., Chepeliev, M., Corong, E., & van der Mensbrugghe, D. (2023). The Global Trade Analysis Project (GTAP) Data Base: Version 11. *Journal of Global Economic Analysis*, 7(2), 1–37.

Anderson, K., Corong, E., Strutt, A., & Valenzuela, E. (2023). The Relative Importance of Global Agricultural Subsidies and Tariffs, Revisited. *World Trade Review*, 22(3–4), 382–394.

Andreoni, A., Persenda, A., & Kozul-Wright, R. (2025). Trade Wars: Implications of US tariffs for trade and structural change in the African continent, *Working Paper nr. 010*, SOAS Centre for Sustainable Structural Transformation (CSST).

Armenter, R. & Koren, M. (2014). A Balls-and-Bins Model of Trade, *American Economic Review*, 104 (7): 2127-2151.

Auray, S., Devereux, M.B. & Eyquem, A. (2021). Trade Wars, Currency Wars, *Working Papers 2021-15*, Center for Research in Economics and Statistics.

Auray, S., Devereux, M.B. & Eyquem, A. (2025a). Trade wars and the Optimal Design of Monetary Rules, *Journal of Monetary Economics*, 151: 103726.

Auray, S., Devereux, M.B. & Eyquem, A. (2025b). Tariffs and Retaliation: A Brief, Macroeconomic Analysis, *NBER Working Paper 33739*.

Balassa, B. (1965). Trade liberalisation and "revealed" comparative advantage, The Manchester School, 33(2): 99–123.

Bastos, P. & Silva, J. (2010). The Quality of a Firm's Exports: Where You Export to Matters, *Journal of International Economics*, 82 (2): 99–111.

Bennett, F., Lederman, D., Pienknagura, S. & Rojas, D. (2019). The Volatility of World Trade in the 21st Century: Whose Fault is it Anyway? *The World Economy*, 42 (9): 2508 -2545.

Bergin, P. R. & Corsetti, G. (2023). The Macroeconomic Stabilization of Tariff Shocks: What is the Optimal Monetary Response? *Journal of International Economics*, 143: 103758

Bianchi, J. &Coulibaly, L. (2025). The Optimal Monetary Policy Response to Tariffs, *NBER Working Paper No. 33560*

Binmore, K., Rubinstein, A. & Wolinsky, A. (1986). The Nash Bargaining Solution in Economic Modelling, *Rand Journal of Economics*, 17 (2):176–88.

Bloom, N., Bunn, P., Mizen, P., Sasikaran, V., Shah, K., Thwaites, G. & Yotzov, I. (2025). The impact of the 2025 US tariff announcements on UK firms, *CEPR*, 27 July

Bown, C.P. (2025). Trump's trade war timeline 2.0: An up-to-date guide, 20 November, at: https://www.piie.com/blogs/realtime-economics/2025/trumps-trade-war-timeline-20-date-guide

Brenton, P. & Newfarmer, R. (2007). *Watching more than the discovery channel: Export cycles and diversification in development*. Policy Research Working Paper 4302. International Trade Department. The World Bank. https://openknowledge.worldbank.org/handle/10986/7493, Date of access: 2 Nov. 2020.

Broda, C., Limao, N. & Weinstein, D.E. (2008). Optimal Tariffs and Market Power: The Evidence., *American Economic Review*, 98 (5): 2032-65.

Cadot, O., Carrère, C., & Strauss-Kahn, V. (2013). Trade Diversification, Income, and Growth: What Do We Know? *Journal of Economic Surveys*, 27(4): 790-812.

Caldara, D., Iacoviello, M., Molligo, P., Prestipino, A. & Raffo, A. (2020). The Economic Effects of Trade Policy Uncertainty, *Journal of Monetary Economics,* 109: 38-59

Caliendo, L. & Parro, F. (2022). Trade policy, In: *Handbook of International Economics*, 5: 219-295.

Cameron, M. J. (2020). *Extending the TRADE-DSM (Decision Support Model) approach for land-locked countries: A case study of Rwanda* (Doctoral dissertation, North-West University).

Cameron, M.J. and Naudé, W. (2026). Identifying Export Opportunities from Large International Trade Datasets: A Methodological Note, *IZA Discussion Paper no*. Bonn: IZA Institute for Labor Economics.

Cameron, M.J. and Viviers, W. (2015). Realistic Export Opportunity Analysis for Agricultural Products in the Major Group: HS08 - Edible fruit and nuts; peel of citrus fruit or melons. Study report prepared by TRADE (Trade and Development) research focus area, North-West University, Potchefstroom Campus, for Department of Agriculture, Forestry and Fisheries, South Africa.

Carrère, C., Cadot, O. & Strauss-Kahn, V. (2011). Trade diversification: drivers and impacts. In: Jansen, M., Peters, R. & Salazar-Xirinachs, J.-M. *Trade and Employment:*

From Myths to Facts. Geneva: ILO-EC International Labour Office - European Commission: 253–307.

Chaney, T. (2014). The Network Structure of International Trade, *American Economic Review*, 104 (11): 3600 – 3634.

Choi, J., Dang, D.Q. , Kirpalani, R. & Perez, D. (2024). Exorbitant Privilege and the Sustainability of U.S. Public Debt, *NBER Working Paper No. 32129*.

Costinot, A., Donaldson, D., Vogel, J. & Werning, I. (2015). Comparative Advantage and Optimal Trade Policy, *Quarterly Journal of Economics*, 130(2): 659-702.

Creamer, T. (2025). South Africa reaffirms 'butterfly' export strategy amid rising global trade tensions, *Engineering News*, 4 July.

Cuyvers, L. (1997). Export Opportunities of Thailand: A Decision Support Model Approach. *CAS Discussion Paper, no. 9.*

Cuyvers, L. (2004). Identifying Export Opportunities: The Case of Thailand, *International Marketing Review*, 21 (3):255-278.

Cuyvers, L., De Pelsmacker, P., Rayp, G. & Roozen, I.T.M. (1995). A decision support model for the planning and assessment of export promotion activities by government export promotion institutions: The Belgian case. International Journal of Research in Marketing, 12(2):173–186.

Cuyvers, L., Steenkamp, E.A. & Viviers, W. (2012). The Methodology of the Decision Support Model (DSM). (In Cuyvers, L. and Viviers, W. (Eds.) Export Promotion: A Decision Support Model Approach. Stellenbosch: Sun Media Metro).

Dadush, U., Ali, A.A., Al Doghan, M., Bhatti, M., Braga, C., Darandary, A., Gonzalez, A. and Poitiers, N., (2020). Diversification and the world trading system. G20 Insights. Available from https://www.g20-insights.org/policy_briefs/diversification-and-the-world-trading-system/.

Del Rosal, I. (2018). Power Laws in EU Country Exports, *Empirica*, 45:311- 337.

Eichengreen, B. (2011). *Exorbitant Privilege: The Rise and Fall of the Dollar and the Future of the International Monetary System.* Oxford: Oxford University Press.

Feingold, S. & Botwright, K. (2025). Tracking tariffs: Key moments in the US-China trade dispute, *World Economic Forum*, 26 June.

Felbermayr, G., Jung, B. & Larch, M. (2013). Optimal Tariffs, Retaliation, and the Welfare Loss from Tariff Wars in the Melitz model, *Journal of International Economics*, 89(1): 13-25

Fetzer, T. & Schwarz, C. (2021). Tariffs and Politics: Evidence from Trump's Trade Wars, *The Economic* Journal, 131 (636): 1717- 1774.

Gaulier, G. & Zignago, S. (2010). BACI: International Trade Database at the Product Level. The 1994-2007 Version. CEPII Working Paper, N°2010-23, October 2010. http://www.cepii.fr/CEPII/en/publications/wp/abstract.asp?NoDoc=2726, Date of access: 6 Jun. 2016.

Gawande, K. &Hansen, W.L. (1999). Retaliation, Bargaining, and the Pursuit of "Free and Fair" Trade, *International Organization*, 53(1): 117-59.

Gros, D. (1987). A Note on the Optimal Tariff, Retaliation and the Welfare Loss from Tariff Wars in a Framework with Intra-Industry Trade, *Journal of International Economics*, 23(3-4): 357-367.

Grossman, G. M. & Helpman, E. (1995). Trade Wars and Trade Talks, *Journal of Political Economy*, 103 (4):675-708.

Hertel T.W. & Tsigas M.E. (1996). Structure of GTAP. In: Hertel TW, ed. *Global Trade Analysis: Modeling and Applications*. Cambridge University Press; 1996:13-73.

Hertel, T. W. (Ed.). (1997). *Global Trade Analysis: Modeling and Applications*. Cambridge University Press.

Herzer, D. & Felicitas Nowak-Lehnmann, D. (2006). What Does Export Diversification Do for Growth? An Econometric Analysis, *Applied Economics*, 38(15): 1825-1838.

Hoekman, B. and Nicita, A. (2008). Trade policy, trade costs and developing country trade. (Policy research working paper, 4797.) http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2008/12/18/000158349_20081218090306/Rendered/PDF/WPS4797.pdf

Ianchovichina, E., & McDougall, R. (2000). *Theoretical Structure of Dynamic GTAP* (GTAP Technical Paper No. 17). Purdue University, West Lafayette, IN: Global Trade Analysis Project (GTAP). Retrieved from https://doi.org/10.21642/GTAP.TP17

Ianchovichina E.I., & McDougall R.A. (2012). *Theoretical Structure of Dynamic GTAP*. In: Ianchovichina E, Walmsley TL, eds. Dynamic Modeling and Applications for Global Economic Analysis. Cambridge University Press; 2012:13-70.

Ignatenko, A., Lashkaripour, A., Macedoni, L., & Simonovska, I. (2025). *Making America Great Again? The Economic Impacts of Liberation Day Tariffs* (NBER Working Paper No. 33771). National Bureau of Economic Research. Published: *Journal of International Economics*, 157: 104138,

International Monetary Fund (IMF) (2025). *World Economic Outlook: April 2025*. Washington, D.C.: International Monetary Fund.

Ivanic, M., Beckman, J., & Nava, N. (2023). Estimation of the Value-Added/Intermediate Input Substitution Elasticities Consistent with the GTAP Data. *Journal of Global Economic Analysis*, 8(2), 134–158.

Jeanne, O. (2021). Wars, Trade Wars, and Global Demand, *NBER Working Paper No. 29603.*

Johnson, H. G. (1953). Optimum Tariffs and Retaliation, *Review of Economic Studies* 21:142-53.

Kaitila, V. (2018). Export Product Range and Economic Growth in the EU Countries, *The World Economy*, 42 (3): 711-737.

Kennan, J., & Riezman, R. (1988). Do Big Countries Win Tariff Wars? *International Economic Review,* 29(1): 81-85.

Kingdon, G. G., & Knight, J. (2007). Unemployment in South Africa, 1995–2003: Causes, Problems and Policies. *Journal of African Economies*, 16(5), 813–848.

Kohnert, D. (2018). Trump's Tariff Impact on Africa and the Ambiguous Role of African Agency, *Review of African Political Economy,* 45(157):451-466

Koopman, R.B. & Tsigas, M. (2025). US Trade Conflict: Potential Economic Implications for the US and the Global Economy, *Journal of Policy Modeling*, https://doi.org/10.1016/j.jpolmod.2025.06.013.

Landau, J-P. (2025). Tariffs, the dollar and the US economy, *CEPR Policy Insight No. 142*

Manchishi, S. (2025). How Should Africa Respond to Trump's Tariffs? *Project Syndicate*, September 12

Mark, M. (2025). Donald Trump bars South Africa from G20 summit, *Financial Times*, 27 November

Matisonn, J. (2025). Trump and South Africa on collision course, *Responsible Statecraft*, 12 February.

McKibbin, W. J., Noland, M., & Shuetrim, G. (2025). The Global Economic effects of Trump's 2025 tariffs. Working Paper 25-13. Peterson Institute for International Economic

Miran, S. (2024). *A User's Guide to Restructuring the Global Trading System*, Hudson Bay Capital.

Naudé, W. & Cameron, M.J. (2021). Export-Led Growth after COVID-19: The Case of Portugal, *Notas Económica*s, 52: 7-53

Naudé, W. & Cameron, M.J. (2025). Retaliation Against Trump's Trade War: Why and How the EU Should Find Alternative Export Markets, *Global Economy Journal*, Online Ready

Naudé, W. & Rossouw, R. (2011). Export Diversification and Economic Performance: Evidence from Brazil, China, India and South Africa, *Economic Change and Restructuring,* 44**:** 99–134

Pearson, J., Viviers, W., Cuyvers, L. & Naudé, W. (2010). Identifying Export opportunities for South Africa in the Southern Engines: A DSM Approach, *International Business Review,* 19 (4): 345-359.

Pettis, M. & Hogan, E. (2024). *Trade Intervention for Freer Trade*, Carnegie Endowment for International Peace.

Pisa, N., Viviers, W. & Rossouw, R. (2017). Enhancing Industrial Cluster Formation Through the Realistic Export Opportunities of the TRADE-DSM. *South African Journal of Economics*, 85: 386-404.

Piserà, S., Paltrinieri, A., Galletta, S. & Pichler, F. (2025). Trump's Tariffs: Unpacking the EU's Market Reaction, *Economics Letters*, 252: 112380,

Pujolas, P., & Rossbach, J. (2024). Trade Wars with Trade Deficits, *arXiv preprint*: arXiv:2411.15092.

Quantec (2025) SA Standardised Industry Employment and Labour Remuneration (IEMP), Quantec EasyData [Database], Accessed: 9 September 2025, Available from: https://www.easydata.co.za.

Syropoulos, C. (2002). Optimum Tariffs and Retaliation Revisited: How Country Size Matters, *Review of Economic Studies*, 69(3): 707-727

Varoufakis, Y. (2025). Donald Trump's economic masterplan: He is plotting an anti-Nixon shock, *UnHerd*, 12 Feb.

Vollrath, T. (1991). A theoretical evaluation of alternative trade intensity measures of revealed comparative advantage. Weltwirtschaftliches Archiv, 127, 265–280.

World Bank. (2025a). *Unlocking South Africa's Potential: Leveraging Trade for Inclusive Growth and Resilience*. World Bank Group.

World Bank. (2025b). *South Africa Economic Update: Building Skills for Labor Market Resilience*. World Bank Group.