The Role of AfCFTA in Enhancing Capital Accumulation through Vegetables and Fruits Trade: A Case of Tanzania

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Abstract: *Tanzania's ratification of the African Continental Free Trade Area (AfCFTA) presents an opportunity to enhance regional trade and stimulate capital accumulation in the fruits and vegetables sectors. This paper is based on a study that explored how trade liberalization driven by AfCFTA can promote capital accumulation through increased net exports, the reinvestment of trade surpluses, and improved financial linkages. Using the Dynamic Equilibrium Model for Economic Development, Resources, and Agriculture (DEMETRA)—a single-country computable general equilibrium (CGE) model—and the Modular Applied General Equilibrium Tool (MAGNET), a global multiregional CGE model, the study simulated two trade liberalization scenarios: (i) tariff-only reductions and (ii) reductions combining both tariff and non-tariff measures (NTMs). These scenarios were evaluated across four trade schedules: Revenue from Tariff (REV), which focused on optimizing government revenue; Agricultural Trade (AGR), which prioritized food security and market access; Intermediate Inputs Trade (INT), which supported industrialization through supply chain enhancements; and Revealed Comparative Advantage (RCA), which targeted competitive export sectors. The study findings indicate that the Tariff + NTM scenario yielded better trade outcomes, with net exports for fruits projected to reach 115.79 billion TZS and for vegetables 86.26 billion TZS by 2035, compared to 112.25 billion TZS and 83.48 billion TZS, respectively, under the Tariff-only scenario. The RCA and INT schedules generated the most significant trade surpluses, highlighting the importance of strategic tariff reductions and targeted trade facilitation. Key policy recommendations include reducing NTMs through streamlined customs procedures, investing in export-support infrastructure such as cold storage and transport networks, and enhancing competitiveness through value addition and regional market integration. These measures would maximize the benefits of AfCFTA in strengthening Tanzania's agricultural trade, fostering capital reinvestment, and ensuring long-term economic resilience.*

Keywords: AfCFTA, Vegetables and Fruits, Net export, Trade schedules

1.   Introduction

Tanzania's decision to ratify the African Continental Free Trade Area (AfCFTA) marks a significant economic and trade policy milestone. The AfCFTA, which came into force on January 1, 2021, aims to create a single market for goods and services across Africa,

enhancing intra-African trade and boosting the continent's economic integration (Shinyekwa *et al.*, 2021; World Bank, 2020). By reducing tariffs, eliminating non-tariff barriers, and simplifying trade procedures, the AfCFTA is set to transform global trade and significantly increase trade within Africa, with projections indicating an additional $450 billion in economic growth by 2035 (World Bank, 2020). This initiative also addresses historical trade imbalances by promoting local goods and services while fostering economic integration. Furthermore, the AfCFTA is expected to attract substantial foreign direct investment by establishing a unified investment environment and more extensive market, enhancing the competitiveness of African countries. By driving industrialization and manufacturing, the agreement is anticipated to create millions of jobs, reduce poverty, and align with the United Nations Sustainable Development Goals (SDGs) by encouraging sustainable industrial practices and environmental protection (Signè & van der Ven, 2019).

As a key player in East Africa, Tanzania officially ratified the AfCFTA on September 17, 2021, joining a growing number of African nations committed to this ambitious project. The ratification underscores Tanzania's recognition of the potential economic benefits of increased regional trade and integration. AfCFTA enhances Tanzania's agricultural exports by lowering trade barriers, improving market access, and increasing capital accumulation through surplus reinvestment. Under AfCFTA, Tanzania's horticultural products hold significant export potential in 38 African markets, with high potential in 32, many of which were previously excluded from Tanzania's existing Regional Trade Agreements (Ilomo, 2024). Additionally, AfCFTA is projected to increase Tanzania's intra-African exports by 17% to 77%, mainly benefiting the agriculture sector (Agarwal et al., 2022). This expansion allows Tanzanian farmers and exporters to tap into key markets previously excluded from Tanzania's existing Regional Trade Agreements. Tanzania's favourable climatic conditions and varied soil types enable the cultivation of various vegetables and fruits, from staple crops like tomatoes, onions, and bananas to high-value products such as avocados and mangoes. The trade-in of these agricultural products meets local consumption needs and provides a vital source of export revenue, enhancing Tanzania's economic stability (EAC, 2021; George, 2022).

The increased access to regional and international markets, encouraged by Tanzania's ratification of the African Continental Free Trade Area (AfCFTA), can significantly drive capital accumulation within the country's vegetables and fruits sub-sectors. As a net exporter of vegetables and fruits, Tanzania benefits from reduced trade barriers, which can increase export volumes. While the AfCFTA is expected to stimulate trade by reducing barriers, the resulting growth could lead to higher net exports if export revenues exceed import costs. However, a trade surplus would depend on external factors such as exchange rates, global demand, and the competitiveness of Tanzanian products in both regional and international markets. The surplus from increased agricultural trade can be a critical driver of capital accumulation, enabling reinvestment into the agricultural sector and other parts of the economy.

Capital accumulation plays a central role in realizing the benefits of trade liberalization, as highlighted by both Ravikumar *et al.* (2019) and Alvarez (2017). Ravikumar *et al.* (2019) emphasize that: nations leveraging trade imbalances to enhance investment and prioritize tradable-intensive production gain significant dynamic advantages. This

highlights the importance of reducing trade barriers and fostering conditions for efficient capital use in driving investment. Similarly, Alvarez (2017) underscores that trade-facilitating policies enhance capital accumulation, leading to higher steady-state welfare. However, Alvarez (2017) also emphasizes that the transition dynamics and short-term adjustments critically shape the realized gains, suggesting that a refined understanding of these dynamics is necessary to craft policies that maximize long-term benefits while managing short-term costs. These perspectives underline that capital accumulation is intricately linked to free trade, with significant implications for economic growth, income convergence, and policy formulation. The interplay between these elements underscores the necessity for comprehensive trade and economic policy approaches.

While different trade policies may appear distinct in their approach, they can lead to similar economic outcomes, as Calzolari and Lambertini (2001) demonstrated. Trade policies such as tariffs (price-modifying) and quotas (quantity-fixing) have equivalent effects on capital accumulation and domestic price levels. Their study further highlights that both policies result in identical outcomes at the sub-game perfect equilibrium supported by the Nerlove-Arrow and Ramsey capital accumulation models. Whether decision-makers follow open-loop or closed-loop strategies, this equivalence ensures stability across various strategic settings. As a result, tariffs and quotas influence net exports and trade balances similarly, making them interchangeable tools for effective long-term economic planning.

This paper contributes to the available literature by examining the many-sided effects of the African Continental Free Trade Area (AfCFTA) liberalization process on Tanzania's vegetables and fruits sub-sectors. The two liberalization scenarios considered in this paper presents distinct pathways for realizing the benefits of regional integration. By simulating the impact of the AfCFTA's tariff liberalization conditions, aligned with the East African Community's provisional schedule, this study further simulates how different trade policy schedules, namely Revenue from Tariff (REV), Agricultural Trade (AGR), Intermediate Inputs Trade (INT), and Revealed Comparative Advantage (RCA) can influence Tanzania's vegetables and fruits trade, capital accumulation, and long-term economic growth. Each scenario provides valuable insights into optimizing trade policies to ensure sustainable development and enhance Tanzania's competitiveness in the regional market.

Findings from this study highlight the importance of scenario and schedule selection in shaping Tanzania's fruit and vegetable trade policies to enhance capital accumulation and economic growth. The Tariff-only and tariff + NTM scenarios demonstrate positive export growth and trade surpluses, with the tariff + NTM scenario yielding more substantial outcomes due to reduced non-tariff measures. While all schedules significantly contribute, the RCA and INT schedules effectively leverage comparative advantages and input efficiencies. Policymakers are advised to prioritize reducing trade barriers and strategically aligning schedules with sector-specific strengths to sustain export-led growth, promote trade surpluses, and foster long-term capital accumulation. The rest of the paper is arranged as follows: Section 2 provides empirical literature on free trade, net exports, and capital accumulations; Section 3 presents the methodology adopted in this study. Section 4 provides simulated results. Section 5 discusses the simulated results, and Section 6 presents conclusions emerging from the simulated results and offers recommendations.

2. Empirical Literature

2.1 Trade Policies and Capital Accumulation

International trade significantly increases the availability of goods and services worldwide. By leveraging comparative advantage, nations can consume diverse combinations of goods and services that exceed their production capabilities. This principle dictates that a country specializing in goods can produce at lower opportunity costs than others, thereby boosting global production and consumption levels. Conversely, trade restrictions, such as tariffs or quotas, diminish global output and living standards. This establishes the fundamental economic rationale for free trade and emphasizes its role in promoting trade growth and capital accumulation, as Wolff (1995) discusses the effects of technological change and capital intensity on export performance. Likewise, Alvarez (2017) and Ravikumar *et al*. (2019) illustrate how trade liberalization boosts capital accumulation through increased investment in productive assets and enhancements in steady-state welfare.

As global trade has gained significance, exports and imports have become increasingly crucial for nearly every country. Various factors, including trade policies and technology, influence the relationship between trade and capital accumulation. Wolff (1995) examines the relationship between technological change, capital accumulation, and trade performance over the long term, emphasizing that capital intensity—particularly the ratio of modern machinery and equipment to labor—positively influences export performance. High-quality investments in physical capital enhance productivity, which drives competitiveness in international trade. The paper concludes that policies promoting capital accumulation, technological innovation, and productivity growth are essential for improving trade performance and net exports over time.

The relationship between trade, capital accumulation, and structural unemployment in Singapore from the mid-1960s to the late 1990s is highlighted by Kee and Hoon (2005), who emphasize how open trade policies and sustained foreign direct investments (FDI) drove economic transformation. Singapore's export-led growth, facilitated by over 80% of manufacturing investment from multinational corporations (MNCs) and 75% of export-oriented output, began with labour-intensive industries like textiles and electronics assembly and later transitioned to high-value-added sectors such as semiconductors. Massive capital accumulation in the export sector expanded production capacity, reduced structural unemployment, and enabled a shift to higher-productivity industries, avoiding the diminishing returns often associated with prolonged capital stock growth. By incorporating trade and capital accumulation into a model of the natural unemployment rate, the study demonstrates that increases in export prices and capital stock adjusted employment levels and alleviated wage pressures. Structural estimations and regression analyses confirm that capital accumulation in the export sector was the primary factor behind the decline in unemployment, showcasing how open trade and investment policies reduced joblessness while transforming the economy.

Alvarez (2017) explored the relationship between trade, net exports, and capital accumulation through the Eaton–Kortum model with the introduction of capital dynamics. Trade influences net exports, as reductions in trade barriers like tariffs enhance countries' ability to export and import goods, affecting their net export balance. Capital accumulation, such as machinery and infrastructure, plays a crucial role in a country's production capacity, impacting its trade performance. The model shows that tariff reductions yield immediate trade benefits and have long-term effects by stimulating capital accumulation. As countries invest capital to exploit new trade opportunities, their capital stocks converge toward the global average over time, narrowing disparities between nations. This convergence process boosts both trade and economic growth, leading to significant welfare gains in the long run and, at the same time, accumulating capital over time fallouts in much more significant steady-state welfare improvements. Thus, trade and capital accumulation are entangled, with trade liberalization fostering capital investment, which enhances long-term economic outcomes and welfare.

Kalemli-Özcan *et al*. (2020) explore the causal relationship between trade and capital accumulation using a historical quasi-natural experiment from the Ottoman Empire (1859–1913). The study reveals that fluctuations in regional rainfall, which affected agricultural surplus production, directly influenced export volumes to Germany, France, and the UK. When regions of the Empire experienced increased rainfall, surplus crops were exported to countries with higher demand, resulting in more excellent foreign investment. The findings demonstrate that a one standard deviation increase in rainfall led to a 5% rise in exports, which subsequently caused a 3% increase in capital inflows. This provides empirical evidence that trade and capital flows are complementary; reinforcing the argument that export growth stimulates foreign direct investment (FDI). Furthermore, the study emphasizes that regions with higher export-driven capital inflows also experienced increased infrastructure investments and the expansion of financial institutions, strengthening the connection between trade liberalization and long-term capital accumulation. These findings align with broader economic theories suggesting that trade-induced capital accumulation promotes structural economic transformation by facilitating reinvestment in productive sectors.

Using network analysis by constructing an International Trade Network (ITN) and an International Capital Flow Network (ICFN), Ding *et al*. (2019) explore the relationship between international trade, capital flows, and their interconnectedness. It evaluates a country's importance in these networks through centrality indicators based on the number of partners, the strength of connections, and partner quality. Findings reveal that, in the short run, a country's position in the ICFN influences its ITN, but improved trade relationships do not directly enhance capital flows. While trade protectionism can harm trade (e.g., reducing net exports) without immediately affecting capital flows, disruptions in capital flows, such as rising U.S. interest rates or capital controls, can shrink global trade and hinder capital accumulation. A positive equilibrium exists where strong trade performance boosts capital accumulation and further enhances trade.

The study by Akalpler & Shamadeen (2017) indicate that net exports (exports minus imports) significantly correlate with economic growth in the USA. The study mentions gross fixed capital formation (GFCF) as a factor that positively influences economic growth. GFCF

represents investments in physical assets (e.g., machinery and infrastructure), which are key indicators of capital accumulation. The role of GFCF in stimulating economic growth suggests that capital accumulation, conceivably, enhances the productivity of net export activities by enabling the production of higher-value goods for export or improving trade infrastructure. A reasonable interpretation is that revenues from net exports may finance capital accumulation, and investments in infrastructure and production capacity, in turn, enhance export competitiveness, creating a virtuous cycle of growth.

The relationship between trade liberalization and capital accumulation has been thoroughly examined through various theoretical models. The Eaton-Kortum model (Alvarez, 2017) illustrates how reducing trade barriers can boost capital accumulation by reallocating resources to more productive sectors, resulting in long-term improvements in welfare. Likewise, the Nerlove-Arrow and Ramsey growth models (Calzolari & Lambertini, 2001) offer insights into investment dynamics, savings, and long-term economic growth in response to trade expansion. The Nerlove-Arrow framework indicates that investment in productive assets, driven by trade surpluses, contributes to long-term financial stability. At the same time, the Ramsey model analyses how trade revenues affect capital stock accumulation over time.

Though this study does not explicitly use these models in its methodology, it recognizes their significance in clarifying the broader theoretical connections between trade and capital accumulation. Within this study, these models aid in framing the anticipated effects of AfCFTA on Tanzania's vegetables and fruits subsectors, particularly how trade liberalization could enhance net exports, bolster reinvestment in agricultural production, and ultimately foster capital accumulation. Rather than directly applying these models, our study utilizes computable general equilibrium models to simulate the impact of AfCFTA on the net exports of vegetables and fruits in Tanzania. By aligning with the fundamental principles of these theoretical models, our study provides empirical insights into how trade-driven capital accumulation may evolve under AfCFTA.

Reviewed empirical literature reveals a substantial understanding of trade policies' relationship with capital accumulation. They highlight gaps in understanding the long-term impacts of policy frameworks, necessitating further research to refine trade policies for capital accumulation and sustainable growth. While the principles of comparative advantage highlight trade liberalization as a driver of economic development, case studies like Singapore and the Ottoman Empire demonstrate how trade policies, technological innovation, and sectoral shifts amplify these effects. These findings provide a compelling rationale for examining the impacts of Tanzania's trade in vegetables and fruits sector under the AfCFTA, given the sector's potential to drive capital accumulation and economic growth through trade liberalization and regional integration.

2.2 Empirical Evidence on Tanzania's Horticultural Trade under EAC Integration and Case Studies from AfCFTA Member States

A recent study by George (2022) examines the performance of Tanzania's horticultural sector within the context of East African Community (EAC) integration. The study reveals that while Tanzania's horticultural subsector has experienced significant

growth, its export potential remains underutilized due to structural constraints, such as limited access to financing, challenges with export compliance, and inadequate infrastructure. The research also highlights the impact of macroeconomic factors, including exchange rates, agricultural GDP, and foreign income, on horticultural exports. Despite trade agreements within the EAC, exports to regional markets like Kenya and Comoros remain lower than expected, indicating a need for targeted policy interventions to enhance competitiveness. A long-term data analysis from 1988 to 2018 further supports this, identifying strong correlations between horticultural export performance and key economic indicators, particularly the role of favourable exchange rates and agricultural productivity in improving trade outcomes.

Mtuguja *et al*. (2023) emphasize that vegetable farming in Tanzania is crucial for food security and economic growth, profiting from favourable climate conditions and two planting seasons each year. Small-scale farms are the primary producers, while more commercial farmers are beginning to adopt modern techniques. However, challenges such as limited access to quality seeds, fertilizers, modern technology, markets, and pest and disease problems hinder growth. The government and development partners are addressing these issues to enhance productivity. With proper support, the sector could significantly strengthen food security, reduce poverty, and contribute to economic development.

Empirical evidence from other African Continental Free Trade Area (AfCFTA) member states underscores the potential benefits of trade liberalization for agricultural exports. Kenya's experience demonstrates how infrastructure development, policy reforms, and trade facilitation measures have significantly boosted its horticultural exports. Similarly, studies on Egypt's agricultural export patterns under trade agreements highlight the importance of foreign market demand and structural competitiveness in expanding export capacity. Simulations further indicate that implementing AfCFTA could lead to a 41.1% increase in intra-African agri-food trade, reinforcing the need for coordinated policy strategies to maximize trade benefits (Pierre *et al*., 2024). These case studies offer valuable lessons for Tanzania on how strategic trade facilitation and infrastructure investment can enhance horticultural sector performance under AfCFTA.

3.   Methodology

3.1   Modelling

This study employs a hybrid modelling framework to assess the economic impacts of Tanzania's participation in the AfCFTA. It combines a single-country CGE model, the Dynamic Equilibrium Model for Economic Development, Resources, and Agriculture (DEMETRA), with the global multiregional CGE model, a Modular Applied General Equilibrium Tool (MAGNET). The analysis utilizes Tanzania's 2015 Social Accounting Matrix (SAM), developed by the Joint Research Centre (JRC) of the European Commission, as the primary dataset, providing a detailed representation of the country's economic structure. The study covers 2021-2035, aligning with AfCFTA's phased trade liberalization schedule for middle-income member states. These data inputs enable the simulation of two trade liberalization scenarios—(i) tariff-only reductions and (ii) combined tariff and non-

tariff measure (NTM) reductions—across four trade schedules to assess their impact on Tanzania's horticultural sector and capital accumulation.

This study, DEMETRA, designed explicitly for Tanzania, is an evolution of the STAGE_DEV models, building on the STAGE_2 framework. These models incorporate advanced behavioural relationships tailored for developing economies, including semi-subsistent agricultural households, nested consumption functions, and factor market segmentation. DEMETRA extends this foundation by incorporating a recursive dynamic structure to model investment allocation over time. It is particularly suited for studying the economic impacts of policies and shocks on food security and trade. Its key features include CES nesting for production and demand, migration dynamics, and a two-level Armington trade specification, all implemented within the GAMS software framework.

The DEMETRA model is integrated with MAGNET to account for regional and global effects outside Tanzania. This global multiregional CGE model captures trade dynamics under multilateral agreements like the AfCFTA. The integration follows a top-down approach, where MAGNET simulates the effects of trade liberalization, such as tariff reductions and the elimination of non-tariff measures (NTMs) on bilateral trade flows and export prices. These results are then applied as external shocks to DEMETRA, allowing the single-country model to account for changes in global demand and prices. MAGNET determines regional trade responses, while DEMETRA consolidates these inputs into a "rest of the world" trade partner framework for Tanzania. This integrated approach comprehensively analyzes macroeconomic and sector-specific outcomes, highlighting the interplay between global trade dynamics and domestic economic structures.

This study utilizes the DEMETRA and MAGNET CGE models, which are based on several essential assumptions to simulate the impacts of trade liberalization under AfCFTA. The models integrate trade substitution elasticities, constraints on capital mobility, and adjustments in factor markets, ensuring that the analysis accurately reflects real-world trade dynamics. Table 1 summarizes the main assumptions employed in the study.

3.1.1 Trade equations

Trade relationships in the model are governed by the Armington assumption, which postulates imperfect substitutability between domestic and foreign commodities. This framework is implemented through equations divided into two sub-blocks: exports and imports. These equations provide a flexible structure that addresses scenarios typically encountered in single-country CGE models. They accommodate traded and non-traded commodities while allowing for cases where commodities may not be produced or consumed domestically. Additionally, the framework permits a relaxation of the "small country" assumption by declaring the world price of exports and imports as variables, enabling export prices to be influenced by domestic and international factors rather than strictly being price-takers.

Table 1: Summary of key assumptions

Assumption[1]	Description	Source
Trade elasticity	Armington elasticity assumption differentiates imports from domestic goods.	DEMETRA model documentation
Capital mobility	Capital is mobile across sectors in the long run but fixed in the short run	MAGNET model specification
Labour market	Segmented labour markets with skilled and unskilled labour differentiation	Tanzania SAM (2015)
Production function	Nested CES production structure for capturing input substitution	STAGE_DEV model framework
Government policy	Tariff liberalization follows AfCFTA schedules for middle-income countries	AfCFTA liberalization criteria (2021 – 2035)

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[1] These assumptions help ensure the model appropriately captures sectoral responses to trade policy changes.

Total export value TEV is the total monetary value of all goods exported. It is computed as the product of the quantity of exports (QE_c and the price (PER_c) received for those exports [Equations (1) through (2)].

$$TEV = PER_{C,W} * QE_C \tag{1}$$
$$PER_{c,w} = PWE_c \times ER_w \times (1 - TE_{c,w}) - \sum_m(ioqtte_{m,c} \times PTT_m) \tag{2}$$
$$QE = econ_c * \left(\frac{PWE_C}{pwse_c}\right)^{-eta_c} \tag{3}$$

where; subscripts c and w refer to natural commodities and the rest of the world, respectively. The world price of exports is given as PWE_c, the exchange rate is given as ER_w, $TE_{c,w}$ is the export tax rate, PTT_m is the cost of transporting commodities in the form of prices per unit margin services, eta_c is the elasticity of demand, $pwse_c$ is the price for substitutes on the world market.

Total Import Value (TIV) is the monetary value of all goods and services imported into a country. It is computed as the product of the quantity of imports (QM_C), and the price of imported goods or services (PM_C) [Equations (4) through (6)].

$$TIV = PMR_{W,C} * QM_C \tag{4}$$
$$PMR_{w,c} = \left(PWM_c \times (1 + TM_{w,c})\right) \times ER_w \tag{5}$$
$$QM_C = QQ_C - QD_C \tag{6}$$

where; subscripts c and w refer to natural commodities and the rest of the world, respectively. PWM_c is the world price of imports, ER_w is the exchange rate, $TM_{w,c}$ is the import tariff rate, QQ_C is the domestic supply of composite commodities and QD_C is the domestic production supplied to the domestic market.

Net Export (NE) represents the difference between the total export value (TEV) and the total import value (TIV) of a country [Equations (7) and (8)]. It is a key measure of trade performance, indicating whether a country has a trade surplus ($NE > 0$) or a trade deficit ($NE < 0$).

$$NE = TEV - TIV \tag{7}$$
$$NE = \left(PER_{C,W} * QE_C\right) - \left(PMR_{W,C} * QM_C\right) \tag{8}$$

Net Export (NE) plays a crucial role in capital accumulation by generating surplus revenue that can be reinvested into the domestic economy. A positive (NE), when export revenues (TEV) exceed import costs (TIV), signifies a trade surplus. A higher NE means the country earns more from exports than it spends on imports. This surplus creates additional capital that can be reinvested.

Capital accumulation (ΔK) is then considered to be influenced by several factors, including net export (NE), savings rate(δ), and reinvestment efficiency(α) [Equation (9)].

$$\Delta K = \delta * \alpha * NE \tag{9}$$

where; ΔK refers to a change in capital stock (capital accumulation), α is the efficiency of reinvestment (the proportion of NE revenue effectively transformed into productive capital), and δ is the savings rate (the proportion NE saved for reinvestment).

3.2 Statistical Significance Testing

To evaluate the impact of trade liberalization on Tanzania's vegetables and fruits subsectors, t-tests were conducted on mean values of total export value (TEV), total import value (TIV), and net exports (NE) for vegetables and fruits. These tests assess whether observed changes under different liberalization scenarios and schedules are driven by policy shifts or occur due to random variation.

3.3 Data Used

The study relies on Tanzania's 2015 Social Accounting Matrix (SAM), developed by the Joint Research Centre (JRC) of the European Commission's science and knowledge service, as its foundational dataset. (El Meligi *et al.*, 2024). Tanzania's updated SAM (baseline year 2015) includes specialized accounts addressing Home Production for Home Consumption (HPHC) and emphasizes regional nuances. With 99 production factor accounts disaggregated by labor attributes, the SAM encompasses 99 activities and 109 commodities, incorporating diverse economic and institutional sectors such as corporations, government, and international entities. Vegetables and fruits are defined as HPHC and marketed commodities within this comprehensive framework for Tanzania.

While the dataset is from 2015, it remains the most comprehensive and detailed representation of Tanzania's economy. It offers 99 production activities and 109 commodities with disaggregated accounts for labor and capital. Justifying the use of a 2015 SAM for a study projecting up to 2035 is based on the following reasons:
a) Structural Stability: Economic structures, such as sectoral linkages and factor allocations, evolve gradually, making a well-detailed SAM a reliable baseline for long-term simulations.
b) Data Consistency: The 2015 SAM aligns with internationally recognized CGE modelling frameworks (e.g., STAGE_DEV, MAGNET, DEMETRA), ensuring compatibility with global and regional trade projections.
c) Policy Continuity: The AfCFTA trade liberalization schedules (2021-2035) require an economic dataset reflecting pre-liberalization conditions, making 2015 a suitable reference point.
d) Adjustments for Recent Trends: While the SAM is based on 2015 data, model calibration accounts for recent macroeconomic trends by adjusting sectoral growth rates, population projections, and investment patterns.
e) By applying dynamic recursive adjustments, this study ensures that the economic projections up to 2035 accurately reflect policy shifts under AfCFTA.

3.4 Scenario Descriptions

The current study executed two liberalization scenarios consistent with the AfCFTA liberalization conditions for middle-income member states for 2021-2035 by the AfCFTA

harmonization schedule, following the EAC provisional schedule of tariff concessions and the AfCFTA liberalization criteria for middle-income member states. The scenario predicts that:

a) 90% of Harmonized System (HS) tariff lines will be fully liberalized within five years, starting in 2021 and concluding by 2025;

b) an additional 7% of tariff lines will be progressively liberalized over a more extended period of up to 10 years, and

c) 3% of tariff lines will be exempt from liberalization.

The first scenario assumes that in 2021-2035, only tariffs are reduced, while the second scenario assumes a reduction in tariff measures and NTM-related costs in the same period. The reduction in NTMs adopted by this study is consistent with the results obtained by Simola *et al.* (2022) using the MAGNET model. They found that NTMs for all intra-African trade were reduced by 50%, while NTMs for trade between the AfCFTA area and the rest of the world (ROW) were decreased by 25%. Simulations were conducted under four alternative schedules, considering tariff adjustments at the HS6 level, subsequently consolidated into the vegetables and fruits categories.

a) The Revenue from Tariff (REV) schedule is designed to optimize government revenue by focusing on trade liberalization at the HS6 level. This approach prioritizes the expected impact on tariff revenues, disregarding potential shifts in bilateral trade flows resulting from liberalization.

b) The agricultural trade (AGR) schedule reduces trade barriers to farming and food commodities to improve access and food security.

c) The Intermediate inputs trade (INT) schedule is in line with a continental industrialization strategy, aiming to boost the availability of intermediate goods through tariff liberalization.

d) The revealed comparative advantage (RCA) schedule deregulates tariffs in competitive sectors that align with the country's comparative advantages to increase efficiency and enhance government revenue.

3.5 Limitations to the Modelling Approach Adopted

While the hybrid modelling approach used in this study is robust, it has several limitations. Relying on the 2015 Tanzania Social Accounting Matrix (SAM) as baseline data may not fully capture recent economic shifts, potentially affecting the accuracy of projections. The Armington assumption of imperfect substitutability between domestic and foreign goods, though standard in CGE models, may not adequately represent consumer and producer behaviour in sectors such as semi-subsistent agriculture. Despite these challenges, DEMETRA remains a valuable tool for ex-ante impact analyses in economic development, resources, and agriculture, as its analytical capabilities allow it to process and interpret data effectively, providing insightful results that aid in decision-making (Nechifor *et al.*, 2021). To enhance projection accuracy, the study also adopted updated 2015 Tanzania SAM data (El Meligi *et al.*, 2024), reflecting recent economic trends and structural changes.

DEMETRA and MAGNET are chosen over other CGE models because they are suitable for analysing sector-specific trade liberalization. DEMETRA builds on the STAGE_DEV framework and incorporates recursive-dynamic features tailored for

developing economies like Tanzania. It allows for a detailed representation of semi-subsistence agricultural households, nested consumption functions, and segmented labor markets, making it highly relevant for assessing the impact of AfCFTA on Tanzania's vegetables and fruits trade. Equally, MAGNET extends the analysis by capturing global trade flows, regional spillover, and intersectoral linkages, providing a more comprehensive assessment of AfCFTA's impact beyond Tanzania's domestic economy.

By combining these two models, this study ensures detailed country-level insights (through DEMETRA) and global trade linkages (through MAGNET), making them the most appropriate tools for evaluating Tanzania's horticultural sector performance and capital accumulation under AfCFTA.

4. Model Results

4.1 Tariff Revenue Optimization Schedule

For fruits, the total export value (TEV) increases more sharply in the Tariff + NTM scenario compared to the Tariff-only scenario; however, the difference is statistically insignificant (p = 0.7989). By 2035, TEV is expected to reach 136.63 billion TZS under the Tariff + NTM framework, while it stands lower at 128.96 billion TZS in the Tariff-only scenario. The total import value (TIV) also increases more in the Tariff + NTM scenario, reaching 21.3 billion TZS compared to 16.65 billion TZS in the Tariff-only case. Still, this difference is also statistically insignificant (p = 0.2182). As a result, net exports (NE) are higher in the Tariff + NTM scenario, ending at 115.33 billion TZS versus 112.31 billion TZS in the Tariff-only scenario. However, this difference remains statistically insignificant (p = 0.9209) (Table 2).

For vegetables, the Tariff + NTM scenario outperforms the Tariff-only scenario across all metrics, but the differences are statistically insignificant. By 2035, TEV is projected to reach 89.4 billion TZS in the Tariff + NTM scenario, compared to 86.64 billion TZS in the Tariff-only scenario, even though this difference is insignificant (p = 0.862). The TIV is also slightly higher in the Tariff + NTM scenario (3.45 versus 3.41 billion TZS), indicating that imports rise slightly with reductions in NTMs, though this increase is statistically insignificant (p = 0.647). More notably, the NE for vegetables remains consistently higher in the Tariff + NTM case, reaching 85.95 billion TZS by 2035 compared to 83.23 billion TZS in the Tariff-only scenario. Still, this difference is also statistically insignificant (p = 0.870) (Table 2).

The proximity of TEV to NE for vegetables and fruits indicates a robust export-oriented economy with limited dependence on imports. This situation results in a substantial trade surplus, where export revenues significantly exceed import costs. It reflects strong domestic production capabilities and self-sufficiency, allowing more export earnings to be reinvested into the economy and fostering greater capital accumulation and domestic investment (Figure 1). Overall, while the findings demonstrate a positive effect of tariff and NTM reductions on trade values, the variations between the scenarios are statistically insignificant, implying that other structural factors might play a more crucial role in trade performance. The elevated TEV-to-NE ratio for fruits and vegetables underscores a robust

export-oriented economy with minimal import reliance, enhancing capital accumulation and domestic investment.

Table 2: Trade values of vegetables and fruits under the REV schedule

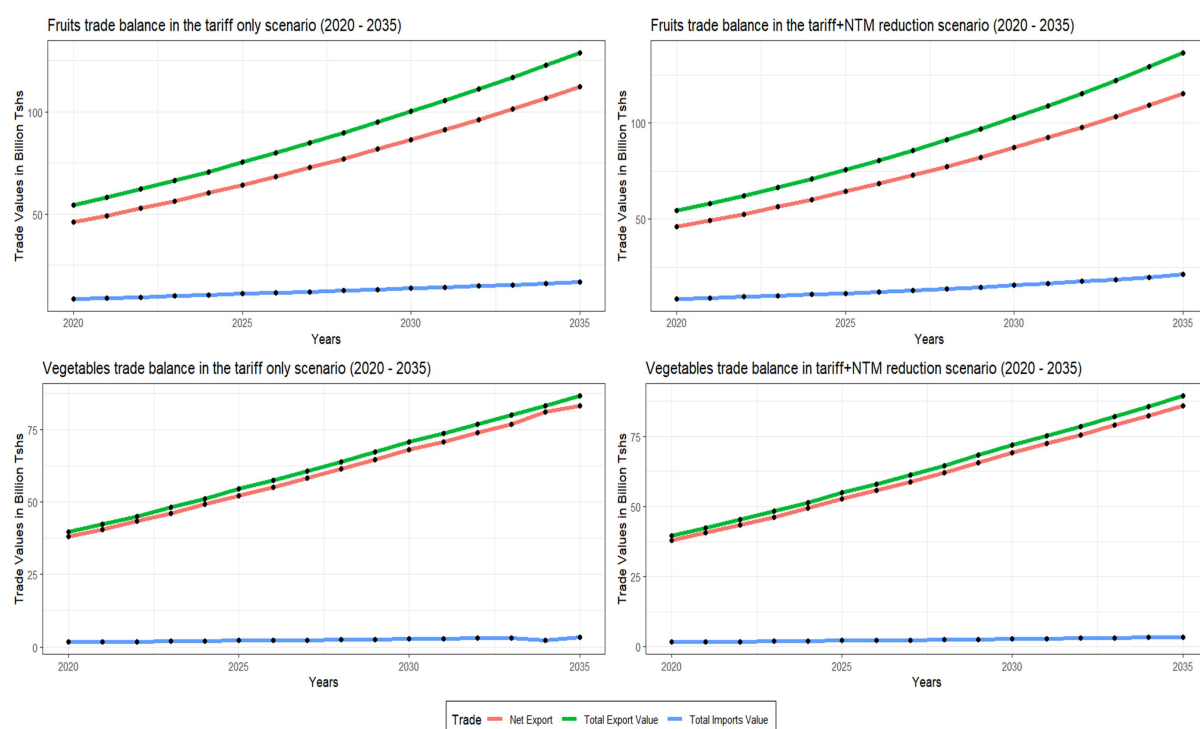| Sched ule	Scenarios	Vegetables mean values	*t* statistic (*p* value)	Fruits mean values	*t* statistic (*p* value)
	TEV (Tariff only)	62.58	-0.175 (0.862)	88.89	-0.255 (0.7989)
	TEV (Tariff + NTM reductions)	63.54		91.15	
REV	TIV (Tariff only)	2.4	-0.462 (0.647)	12.41	-1.257 (0.2182)
	TIV (Tariff + NTM reductions)	2.49		13.91	
	NE (Tariff only)	60.17	-0.164 (0.870)	76.17	-0.1001 (0.9209)
	NE (Tariff + NTM reductions)	61.04		77.23	

Figure 1: Net export of fruits and vegetables under the REV schedule

4.2 Agricultural Trade Schedule

For the fruits sub-sector, both the "Tariff" and "Tariff + NTM" scenarios exhibit a consistent upward trend in total export value (TEV), total import value (TIV), and net exports (NE). In the "Tariff" scenario, TEV increases from 54.55 billion TZS in 2020 to 128.96 billion TZS in 2035, while TIV rises from 8.57 billion TZS to 16.65 billion TZS, leading to a

net export of 112.31 billion TZS. In comparison, under the "Tariff + NTM" scenario, TEV reaches 136.63 billion TZS, TIV increases to 21.3 billion TZS, and net exports grow to 115.33 billion TZS by 2035 (Figure 2). While the "Tariff + NTM" scenario leads to higher TEV and NE compared to the "Tariff" scenario, the differences between the two scenarios are statistically insignificant ($p = 0.875$ for TEV, $p = 0.505$ for NE). However, the increase in TIV is statistically significant ($p = 0.002$), indicating that reducing NTMs significantly impacts fruit imports (Table 3).

The vegetable sub-sector follows a similar pattern but with lower overall values. Under the "Tariff" scenario, TEV grows from 39.67 billion TZS in 2020 to 85.35 billion TZS in 2035, while TIV rises from 1.64 billion TZS to 3.52 billion TZS, resulting in a net export of 81.83 billion TZS. In the "Tariff + NTM" scenario, TEV increases further to 88.08 billion TZS, TIV reaches 3.56 billion TZS, and net exports rise to 84.52 billion TZS (Figure 2). However, the differences between the two scenarios remain statistically insignificant ($p = 0.891$ for TEV, $p = 0.888$ for TIV, $p = 0.891$ for NE), suggesting that reducing NTMs has a minimal impact on vegetable trade (Table 3).

Net exports show an upward trend in both the fruit and vegetable sub-sectors under both scenarios, highlighting their positive contribution to Tanzania's trade balance. While the statistical significance of differences in TEV and NE between the scenarios is low ($p >$ 0.05), the significant increase in fruit imports ($p = 0.002$) suggests that reducing NTMs facilitates greater market access for fruits. The steady rise in net exports across both scenarios suggests expanding production capacity and competitiveness in international markets, reinforcing the importance of continued policy support for trade facilitation. As net exports grow, reinvesting export earnings into infrastructure, production capacity, and technology can create a positive feedback loop, leading to sustained economic expansion.

Table 3: Trade values of vegetables and fruits under the AGR schedule

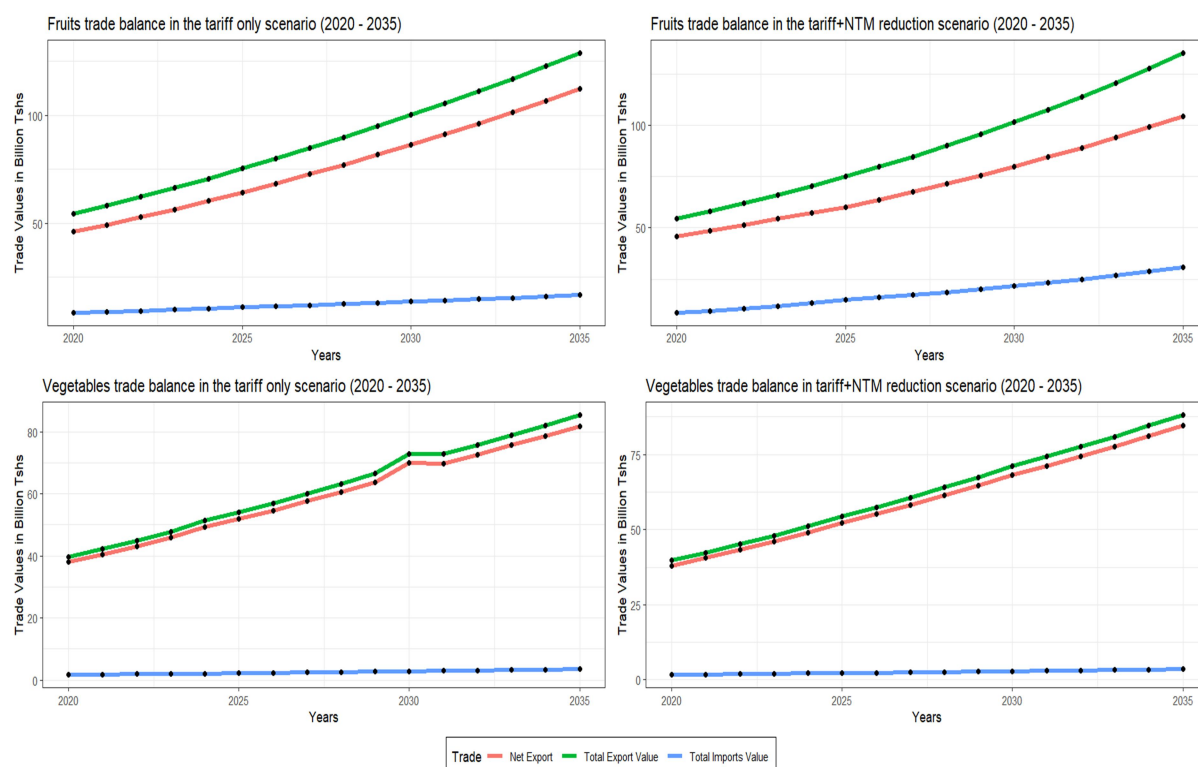| Schedule	Scenarios	Vegetables mean value	*t* statistic (*p* value)	Fruits mean value	*t* statistic (*p* value)
AGR	TEV (Tariff only)	62.16	-0.138	88.88	-0.157
	TEV (Tariff + NTM reductions)	63.90	(0.891)	90.26	(0.875)
	TIV (Tariff only)	2.55	-0.141	12.41	-3.277
	TIV (Tariff + NTM reductions)	2.58	(0.888)	18.54	(0.002*)
	NE (Tariff only)	59.61	-0.138	76.47	-0.673
	NE (Tariff + NTM reductions)	60.32	(0.891)	77.72	(0.505)

* Significant at $p < 0.05$

Figure 2: Net export of fruits and vegetables in the AGR schedule

4.3 Intermediate Inputs Trade Schedule

Under the Tariff-only scenario (2020–2035), fruits' total export value (TEV) steadily increased from 54.55 billion TZS in 2020 to 129.03 billion TZS in 2035. This sustained growth suggests a strong and expanding fruit export market. However, Imports also increase slowly from 8.57 billion TZS in 2020 to 16.48 billion TZS in 2035. As a result, net exports (NE) increase from 45.98 billion TZS to 112.55 billion TZS, reinforcing a favourable trade balance. The latter shows a slightly stronger performance when comparing the Tariff-only and Tariff + NTM scenarios. By 2035, TEV reaches 136.67 billion TZS, while TIV increases to 21.09 billion TZS, resulting in a higher net export value of 115.58 billion TZS (Figure 3). Despite this difference, the increase in TEV between the two scenarios is insignificant (p=0.798). The increase in imports under the Tariff + NTM scenario, from 16.48 billion TZS to 21.09 billion TZS, suggests a notable shift, though the difference remains statistically insignificant ($p = 0.215$) (Table4).

For vegetables, exports also grow under both scenarios, but at a slower pace than fruits. Under the Tariff-only scenario, TEV increases from 39.67 billion TZS in 2020 to 86.71 billion TZS in 2035, while TIV rises from 1.64 billion TZS to 3.41 billion TZS, leading to an increase in net exports from 38.03 billion TZS to 83.3 billion TZS. Under the Tariff + NTM scenario, TEV reaches 89.44 billion TZS by 2035, while TIV rises slightly to 3.44 billion TZS, resulting in a net export value of 86.00 billion TZS (Figure 3). However, the statistical tests show no significant differences between the two scenarios for TEV ($p = 0.862$), TIV ($p = 0.899$), and NE ($p = 0.861$), suggesting that NTM reductions have a minimal impact on vegetable trade flows (Table 4).

Table 4: Trade values of vegetables and fruits under the INT schedule

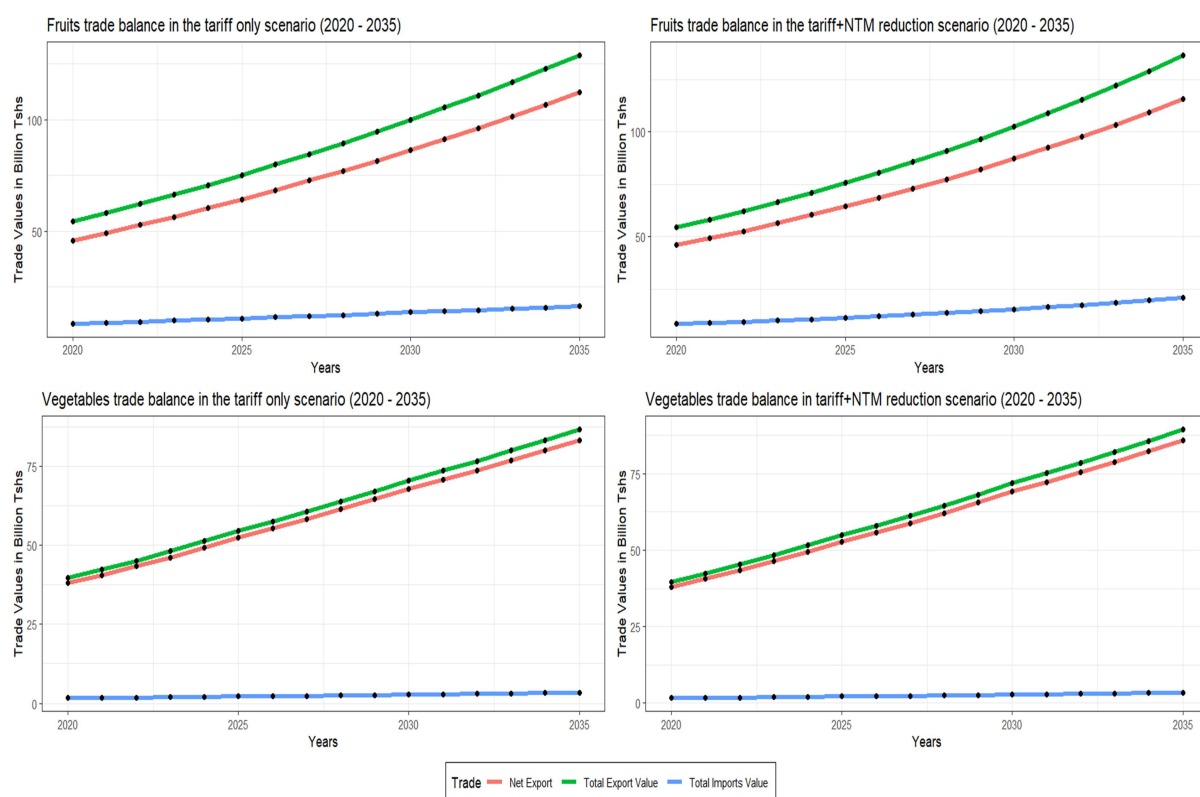| Schedule	Scenarios	Vegetables mean value	*t* statistic (*p* value)	Fruits mean value	*t* statistic (*p* value)
INT	TEV (Tariff only)	62.61	-0.174 (0.862)	88.83	-0.257 (0.798)
	TEV (Tariff + NTM reductions)	63.56		91.10	
	TIV (Tariff only)	2.46	-0.126 (0.899)	12.32	-1.264 (0.215)
	TIV (Tariff + NTM reductions)	2.49		13.81	
	NE (Tariff only)	60.14	-0.176 (0.861)	76.51	-0.101 (0.920)
	NE (Tariff + NTM reductions)	61.07		77.28	

Figure 3: Net export of vegetables and fruits sub-sectors under the INT schedule

Net export values in both sectors steadily increase, with the fruits sub-sector consistently outperforming vegetables, leading to a more favourable trade balance. While the Tariff + NTM scenario results in marginally better outcomes in terms of export growth and net exports, the differences remain statistically insignificant ($p > 0.05$). These results suggest that while trade liberalization and NTM reductions may facilitate trade, their overall effect on net export growth in the vegetable and fruit sectors is not statistically significant. Nonetheless, both sub-sectors maintain a positive trade balance, reinforcing their potential for capital accumulation through export-led growth in the long run.

4.4 Revealed Comparative Advantage (RCA) Schedule

Under the Tariff-only scenario (2020–2035), fruit export values (TEV) increase steadily from 54.55 billion TZS in 2020 to 129.15 billion TZS by 2035, reflecting significant trade expansion. Import values also grow, though slower, rising from 8.57 billion TZS in 2020 to 16.9 billion TZS in 2035. As a result, net exports (NE) climb from 45.98 billion TZS to 112.25 billion TZS, maintaining a sustained trade surplus in the fruit sector. In the Tariff + NTM scenario, export values reach 137.15 billion TZS by 2035, slightly higher than in the Tariff-only case, while imports rise to 21.36 billion TZS. Consequently, net exports amount to 115.79 billion TZS, maintaining a positive trade balance (Figure 4). However, statistical significance tests reveal no significant difference in trade outcomes between the two scenarios, with t-test results showing TEV ($p = 0.792$), TIV ($p = 0.248$), and NE ($p = 0.905$).

In the vegetable sub-sector, the Tariff-only scenario also shows a steady increase in trade. Export values (TEV) grow from 39.67 billion TZS in 2020 to 86.87 billion TZS by 2035, while imports rise from 1.64 billion TZS to 3.39 billion TZS. Consequently, net exports increased from 38.03 billion TZS to 83.48 billion TZS, demonstrating a consistent trade surplus. Under the Tariff + NTM scenario, vegetable exports continue to rise, reaching 89.67 billion TZS by 2035, while imports slightly increase to 3.41 billion TZS. Net exports improved to 86.26 billion TZS, indicating a modest trade balance improvement (Figure 4). However, statistical tests reveal no significant differences between the two scenarios, as shown by the *p*-values for TEV ($p = 0.854$), TIV ($p = 0.917$), and NE ($p = 0.856$). Overall, while reducing NTMs improves trade, the impact remains statistically insignificant ($p > 0.05$) (Table 5).

Table 5: Trade values of vegetables and fruits under the RCA schedule

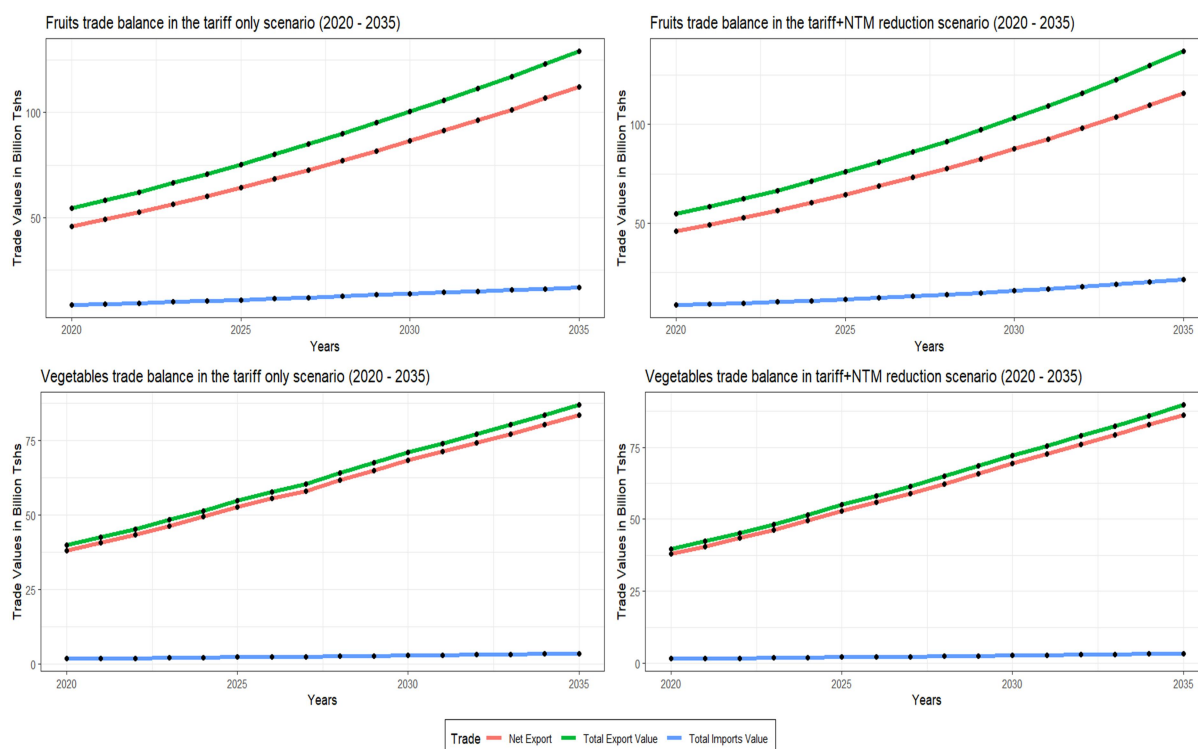| Schedule	Scenarios	Vegetables mean value	*t* statistic (*p* value)	Fruits mean value	*t* statistic (*p* value)
	TEV (Tariff only)	60.26	-0.185	89.00	-0.265
	TEV (Tariff + NTM reductions)	61.25	(0.854)	91.35	(0.792)
RCA	TIV (Tariff only)	2.46	-0.105	12.51	-1.176
	TIV (Tariff + NTM reductions)	2.48	(0.917)	13.92	(0.248)
	NE (Tariff only)	62.73	-0.182	76.48	-0.119
	NE (Tariff + NTM reductions)	63.73	(0.856)	77.39	(0.905)

Figure 4: Net exports of vegetables and fruits sub-sectors under the RCA schedule

4.5   Schedule Comparisons

4.5.1 Fruits sub-sector

Under the tariff-only scenario (2020-235), the fruits sub-sector shows consistent and strong net export growth across all four schedules. The REV and AGR schedules perform identically, with net exports growing to 112.31 billion TZS, reflecting similar trade outcomes. The INT schedule shows slightly higher growth, ending at 112.55 billion TZS, and surpasses the other schedules, particularly in the later stages. This suggests that focusing on INT could improve export growth over time (Figure 5).

Despite these differences in final values, statistical analysis (ANOVA) indicates no significant differences between the schedules under the tariff-only scenario (*p* value = 1), meaning the observed differences between schedules are statistically insignificant. This confirms that all schedules result in comparable trade performance, with any variations in net export growth being too slight to indicate a meaningful distinction. Consequently, while INT shows the best final performance, the similarities across all schedules reinforce that trade growth under any schedule will yield stable and reliable results (Table 6).

The fruits sub-sector under the tariff + NTM reductions scenario (2020-235) reveals a steady increase in net export values across four schedules. REV shows consistent growth, ending at 115.33 billion TZS with increments of 3-6 units per period, while AGR grows more slowly, reaching 104.55 billion TZS with smaller increments of 2.5-5 units. INT demonstrates strong growth, similar to REV, but with slightly more significant increases, finishing at 115.58 billion TZS. RCA mirrors INT's pattern and ends with the highest value of 115.79 billion TZS. All schedules show robust growth, with RCA and INT performing best (Figure 5). Despite these differences, an ANOVA test shows no statistically significant variation

between the schedules, with an F-value of 0.275 and a high *p*-value of 0.843. This indicates that while there are minor differences in growth, they are not meaningful, and all strategies lead to similar export growth outcomes (Table 6).

4.5.2 Vegetable sub-sector

Under the tariff-only scenario (2020-235), the vegetable sub-sector shows consistent net export growth across four schedules. REV demonstrates steady increments of 2.5 to 3 units per period, ending at 83.23 billion TZS, while AGR follows a similar pattern but with slightly slower growth, finishing at 81.83 billion TZS. INT shows larger increments towards the later periods, ending at 83.30 billion TZS, and RCA closely mirrors this pattern, finishing at 83.48 billion TZS, making it the top performer. Despite slight variations in growth rates, the differences between the schedules are minimal (Figure 5). An ANOVA test further confirms this, with an F-value of 0.007 and a *p*-value of 0.999, indicating that the differences in net export growth between the schedules are statistically insignificant. This suggests that no single schedule offers a significant advantage, as all exhibit similar upward trajectories (Table 6).

The vegetables sub-sector under the Tariff + NTM reductions scenario (2020-235) shows steady growth. REV exhibits consistent growth, increasing to 85.95 billion TZS with stable increments, while AGR follows a similar trend but ends slightly lower at 84.52 billion TZS. INT demonstrates more substantial growth, finishing at 86.00 billion TZS, while RCA, with a final value of 86.26 billion TZS, closely mirrors INT, making it the top performer. Generally, RCA and INT outperform REV and AGR, though the differences in growth are minimal (Figure 5). The ANOVA results (F-value = 0.012, *p*-value = 0.998) indicate that the differences between these schedules are statistically insignificant, reinforcing that all schedules offer comparable export growth. Therefore, strategic choice may depend on specific economic objectives rather than substantial performance differences across the schedules (Table 6).

Table 6: Comparisons across schedules and scenarios

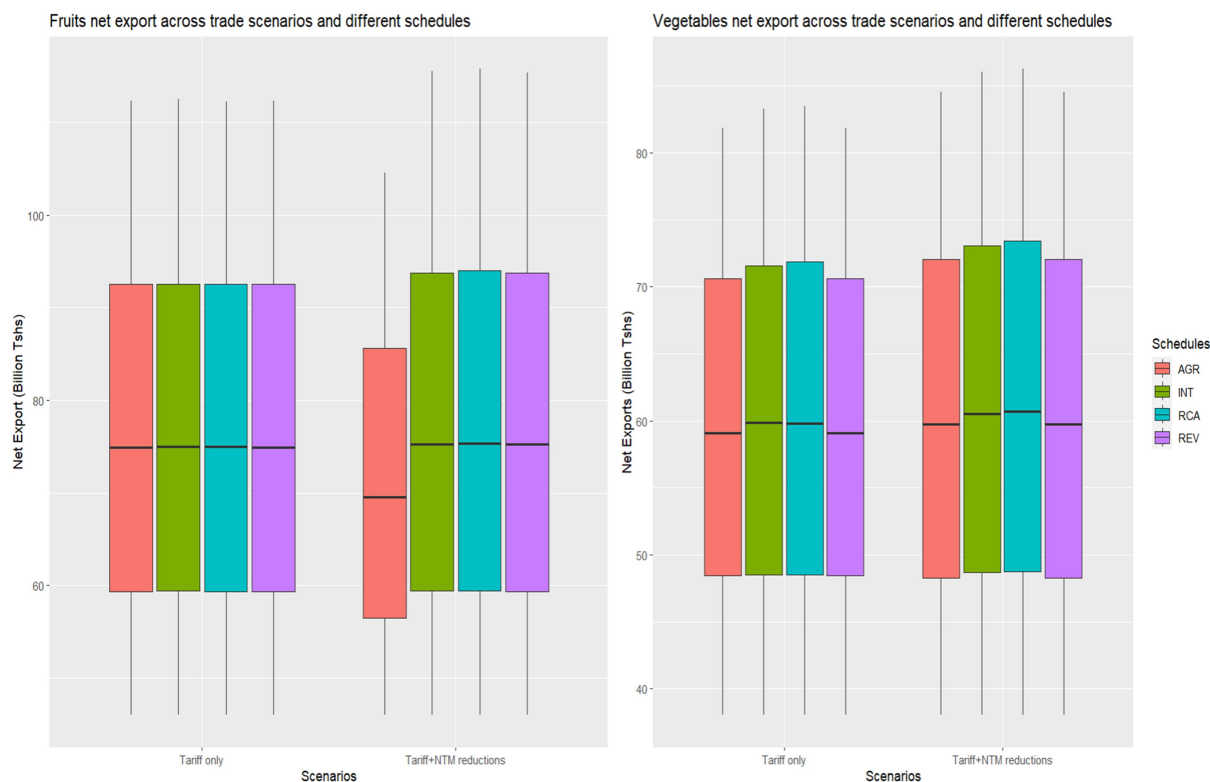|	Scenarios			
Schedules	**Fruit Tariff mean square (*p*-value)**	**Fruit Tariff + NTM reduction mean square (*p*-value)**	**Vegetables Tariff mean square (*p*-value)**	**Vegetables Tariff + NTM reductions mean square (*p*-value)**
REV AGR INT RCA	0.000 (1)	124.6 (0.843)	1.41 (0.999)	2.72 (0.998)
Scenarios mean square (*p*-value)	10.5 (0.876)		24.47 (0.734)	

Figure 5: Comparisons across schedules and scenarios

5.   Discussion

The tariff revenue optimization (REV) schedule illustrates that the net exports (NE) growth under the Tariff + NTM scenario for fruits and vegetables results in a substantial trade surplus by 2035. This increased NE signals a higher inflow of foreign exchange, which is crucial for capital accumulation. The rise in total export value (TEV) and total import value (TIV) for fruits, surpassing the Tariff-only scenario, emphasizes the increased competitiveness due to reduced non-tariff measures (NTMs). The fruits sector, with a higher surplus (115.33 billion TZS) than vegetables (85.95 billion TZS), emerges as a dominant contributor to capital accumulation. This surplus implies a strong export orientation, reducing import dependency and freeing up capital for local investment, which is essential for long-term economic growth.

Similarly, the agricultural trade (AGR) schedule reflects a consistent upward trajectory in NE for fruits and vegetables, contributing to a growing trade surplus supporting Tanzania's ability to accumulate capital. For fruits, the surplus rises from 45.98 billion TZS in 2020 to 112.31 billion TZS by 2035, and a parallel pattern is observed for vegetables. This growing surplus provides essential capital for reinvestment into productivity improvements, agricultural capacity expansion, and adopting newer technologies. Consequently, the agriculture sector's role in capital accumulation strengthens, fostering investments that can stimulate long-term growth and boost Tanzania's competitiveness in global markets.

The intermediate inputs trade (INT) schedule reinforces this trend, highlighting consistent net export growth under the Tariff + NTM scenario. For fruits, net exports grow

from 45.98 billion TZS in 2020 to 115.58 billion TZS by 2035, underscoring the strong export performance that enhances capital accumulation. Although imports rose slightly, the faster growth of exports resulted in a positive net effect. The excess foreign capital generated can be reinvested into intermediate inputs such as seeds and fertilizers, which are essential for improving agricultural productivity. Reinvestment of export earnings into these areas strengthens the agricultural value chain, driving further capital accumulation and economic growth.

The revealed comparative advantage (RCA) schedule further demonstrates the role of net export growth, particularly in fruits, in capital accumulation. By 2035, net exports in the fruits sub-sector under the Tariff + NTM scenario reach 115.79 billion TZS, signaling a strong comparative advantage in international trade. The consistent surplus generated in the fruits sector, supported by robust export performance, facilitates the accumulation of foreign exchange reserves. These reserves are crucial for domestic investment in improving production capacities and maintaining competitiveness. The vegetable sub-sector, although growing more slowly, also contributes positively to capital accumulation through its trade surplus, reinforcing the role of agricultural trade in supporting economic growth.

Comparing the various schedules shows that net export growth is a substantial driver of capital accumulation. The fruits sub-sector, particularly under the RCA and INT schedules, sees robust net export values, ending at 115.79 billion TZS and 115.58 billion TZS by 2035. This strong export performance ensures a steady inflow of capital, which can be reinvested to expand export capacity and enhance productivity. While not as dominant, the vegetables sub-sector still demonstrates consistent net export growth across schedules, reinforcing its contribution to capital accumulation. The overall positive trend in net exports across sectors highlights their critical role in stimulating capital accumulation, providing resources for infrastructure development, and fuelling long-term economic growth.

6.   Conclusion and Recommendations

The analysis of the impact of net exports on capital accumulation across the various trade schedules highlights a consistent growth trend in both the fruits and vegetables sub-sectors under both the Tariff and Tariff + NTM scenarios. Net exports consistently increase over time, with the fruits sub-sector showing a more substantial trade surplus than the vegetables sub-sector. Including non-tariff measures (NTMs) in trade policies contributes slightly better outcomes, particularly in export growth. However, the overall differences between the Tariff-only and Tariff + NTM scenarios are minimal. This indicates that both strategies, regardless of whether NTMs are applied, support positive trade balances and capital accumulation.

The steady growth in net exports shows an expanding production capacity and improved competitiveness, leading to greater capital accumulation and investment. To maintain this growth, policy measures should prioritize reducing non-tariff measures (NTMs) through streamlined trade regulations, investing in export-supportive infrastructure like cold storage and transport networks, and enhancing value addition in vegetables and fruits products. Moreover, regional market integration under AfCFTA should be supported

by targeted financial assistance for small and medium-sized enterprises (SMEs) to facilitate access to regional and international markets (EAC, 2017; World Bank, 2020).

The conclusion aligns with Wolff (1995) findings that emphasize capital accumulation's role in enhancing export performance and competitiveness, as reflected in the steady growth of Tanzania's net exports of fruits and vegetables. This growth and positive trade balances under both scenarios support Wolff's view of the interdependence between trade, capital, and technological advancements. Similarly, it echoes with Alvarez (2017) findings, highlighting the positive relationship between trade liberalization, net exports, and capital accumulation, where reduced trade barriers stimulate immediate trade benefits and long-term capital growth. The minimal differences between strategies further suggest that trade liberalization consistently enhances production capacity and competitiveness, aligning with the welfare improvements identified in the Eaton–Kortum model. Additionally, the complementary relationship between trade and capital accumulation is demonstrated by Kalemli-Özcan *et al*. (2020) is evident, as increased trade volumes seen in Tanzania's exports drive capital inflows and economic development, mirroring the causal link between export growth and capital accumulation observed in the Ottoman Empire study.

Based on the findings, it is recommended that Tanzania continue to prioritize export-oriented growth by focusing on maintaining and enhancing the competitiveness of its fruits and vegetables sectors in international markets. Targeted strategies must be implemented to reduce non-tariff measures (NTMs) and sustain Tanzania's horticultural export growth under AfCFTA. Streamlining customs procedures through a single-window system and risk-based inspections can help reduce delays. Harmonizing Sanitary and Phytosanitary (SPS) measures will enhance trade. The investments in cold storage and transport infrastructure are crucial to maintaining quality and minimizing losses (REPOA, 2021). Additionally, simplifying rules of origin and eliminating unnecessary licensing will further improve market access (MIT, 2024).

Reinvesting capital from export surpluses into infrastructure and technology, such as better storage, transportation, and processing facilities, will increase productivity and reduce post-harvest losses. Encouraging agricultural diversification, particularly in the underperforming vegetables sub-sector, and promoting innovation could expand Tanzania's export base and tap into niche markets. Additionally, improving trade facilitation and regional market integration through initiatives like the African Continental Free Trade Area (AfCFTA) ensures smoother trade flows. Finally, strengthening human capital through capacity building and skills development in modern agricultural practices will boost productivity and long-term growth. These steps will help sustain export growth, drive capital accumulation, and enhance Tanzania's economic development.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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