DEEPENING TRADE RELATIONSHIPS BETWEEN PAKISTAN AND SRI LANKA: AN ANALYSIS USING THE GTAP MODEL

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Abstract

This study examines the economic effects of the deepening trade relationships between Pakistan and Sri Lanka with particular focus on the liberalisation of products in Sri Lanka's negative list under the Pakistan-Sri Lanka Free Trade Agreement. Using the GTAP model and database, the study simulates tariff elimination scenarios for importable agricultural items in the negative list and selected food manufacturing sectors. The results show that tariff liberalisation generates negative welfare effects for Sri Lanka in all scenarios owing to reductions in tariff revenue, terms of trade, and savings and investments. When agricultural products in the negative list are liberalised, the equivalent variation declines by US$ 1.87 million, although allocative efficiency improves by US$ 0.542 million. To further assess likely market responsiveness, a sensitivity analysis was conducted by changing Armington substitution elasticities. The results indicate a marginal improvement in allocative efficiency when the substitutability between the domestic and imported goods is stronger. The findings suggest that liberalising agricultural products currently included in the negative list does not generate significant benefits to the Sri Lankan economy; therefore, these items may be best left unchanged.

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Keywords*: Sensitive agriculture, Trade liberalisation, Tax, Welfare, CGE*

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INTRODUCTION

The Pakistan Sri Lanka Free Trade Agreement (PSFTA) was signed on 1 August 2002 and came into force on 12 June 2005, becoming the second bilateral free trade agreement of Sri Lanka. The agreement was designed to expand bilateral trade by providing preferential market access through reductions in bilateral tariffs. However, trade liberalisation under the PSFTA is not comprehensive since the agreement includes a negative list, which consists of products excluded from tariff concessions. Under the PSFTA framework, Sri Lanka maintains 697 tariff lines as negative list products, meaning that these items are not subject to tariff reductions and continue to face normal protection. Negative lists are commonly used in free trade agreements to protect sensitive sectors, particularly in developing economies, but they may also limit the potential gains from trade liberalisation (Panagariya, 2000; Bhagwati, 2008; Guo, 2019).[1] In the case of the PSFTA, despite expectations that the agreement would enhance export opportunities for Sri Lanka in the Pakistani market, export growth has remained modest, and the trade deficit of Sri Lanka with Pakistan has increased over time. The relatively large number of products included in the negative list, therefore, is considered a significant constraint on trade expansion, which reduces the overall effectiveness of the agreement (Kelegama, 2013; Nizam, 2015). Consequently, ascertaining the economic implications of liberalising tariffs on products in the negative list is essential for evaluating the full potential impact of the PSFTA.

In the broader trade literature, computable general equilibrium (CGE)[2] models have been widely used to evaluate the economy-wide effects of trade agreements as they capture intersectoral linkages, resource allocation effects, and welfare changes across the entire economy (Hertel, 1997; Francois & Reinert, 1997). There are already several applications in the Sri Lankan context. Early evidence by Perera (2008) highlights that the welfare effects of trade agreements between Sri Lanka and India depend critically on the depth of tariff liberalisation and the extent of sectoral coverage, with gains often limited by the presence of sensitive sectors and incomplete liberalisation. Gilbert et al. (2015) used CGE-based analysis for South Asia to ascertain the effects of unilateral trade liberalisation and found that welfare outcomes depend on sectoral protection and trade structure. The results reflect the dual nature of trade liberalisation, where trade creation improves efficiency, while adjustment costs arise in protected sectors. More recently, Wijesinghe and Rathnayake (2023) employed a CGE and Global Trade Analysis Project (GTAP) framework to evaluate the potential trade and welfare impacts of the proposed Sri Lanka–

[1] Sensitive sectors refer to industries or product groups that are given special protection in trade policy, such as through tariffs, quotas, or inclusion in negative lists, due to their economic, social, or political importance**,** including concerns related to employment, food security, or domestic industry stability.

[2] A computable general equilibrium (CGE) model is an economy-wide quantitative framework that simulates how different sectors, households, and governments interact in response to policy changes, capturing the simultaneous adjustments in prices, production, trade, and welfare across the entire economy.

Thailand Free Trade Agreement (FTA). The results indicate that overall welfare outcomes are highly dependent on the degree of sectoral protection, and caution that the presence of sensitive product lists and partial liberalisation can limit potential gains. These papers reflect structural rigidities within the Sri Lankan economy, including limited diversification, capacity constraints, and adjustment challenges faced by local producers.

Existing studies on the PSFTA have mainly focused on trends in trade patterns or partial equilibrium assessments. Work by Ahmed et al. (2010) and Kelegama (2013), which reviewed the first decade of the PSFTA, has found that Sri Lanka experienced relatively stronger export growth to Pakistan, particularly in sectors such as rubber products, tea, and selected manufactured goods. However, the presence of extensive negative lists suggests that the agreement has not significantly contributed to the diversification of exports of Sri Lanka to Pakistan, indicating the need for policy reforms to reduce sensitive product coverage. Similarly, Nizam (2015) found that although certain sectors, particularly textiles, agricultural products, and rubber-based goods, have shown positive export growth, the presence of sensitive product lists has contributed to a persistent bilateral trade deficit for Sri Lanka. Furthermore, Mufti and Ali (2020) argue that while the PSFTA has generated some growth in bilateral trade, especially in sectors such as textiles, agriculture, and light manufacturing, its overall effectiveness remains constrained by structural limitations and the continued presence of negative lists, which restrict trade expansion and associated welfare gains. Hussain and Shah (2022), using the GTAP framework and GTAP 9 database, provide more recent empirical evidence showing that Sri Lanka experiences negative effects in real GDP, trade, and overall welfare under the PSFTA. Their findings suggest that even under tariff liberalisation, countries with weaker export competitiveness or higher dependence on imports may experience limited or negative welfare outcomes. However, the paper does not group negative list products separately and so cannot evaluate the economic impact of liberalisation of this specific set of items.

While the negative list approach has the potential to improve trade liberalisation and policy transparency, its effectiveness depends on the scope of exclusions. There is still a lack of empirical studies that quantitatively evaluate the economic and welfare effects of negative list products in the context of Sri Lanka–Pakistan trade using a GTAP framework. Given the large number of products included in the negative list, a comprehensive quantitative assessment is essential to understand the limitations of the agreement and to identify potential gains from further trade liberalisation.

Therefore, the primary objective of this study is to examine the potential economy-wide effect of widening unilateral tariff cuts covering a large set of products with particular emphasis on macroeconomic indicators and welfare outcomes for Sri Lanka. The analysis employs a CGE framework using the GTAP model with the GTAP 10 database, which uses 2014 as the base year. Specifically, this study addresses two key research questions:

(1) whether unilateral trade liberalisation by Sri Lanka under the PSFTA contributes to improvements in social welfare3 in Sri Lanka, and if not, what factors explain the limited gains; and (2) which sectors have the potential for further liberalisation in order to enhance national welfare. In addition, the study explores whether additional tariff liberalisation alone is sufficient to generate welfare gains, or whether other mechanisms such as substitution effects between domestic and imported goods or among trading partners play a significant role in determining the outcomes of trade policy changes.

To address these questions, the study analyses the structure and dynamics of bilateral trade between Sri Lanka and Pakistan under different concession categories between the two countries, including products subject to tariff reductions and those remaining under restricted treatment. The model simulations evaluate the effects of alternative policy scenarios on key macroeconomic variables (such as output, exports, imports, and prices) and social welfare, especially allocative efficiency. Furthermore, the analysis identifies sectors where additional liberalisation could potentially improve economic performance and welfare outcomes. If further tariff liberalisation does not yield significant welfare gains, the results will help identify deeper structural factors, including substitution patterns and sectoral adjustments that influence trade outcomes. To the best of our knowledge, this study represents one of the first attempts to evaluate the broader economic implications of the unilateral trade liberalisation of Sri Lanka using a global CGE modelling framework. The model captures multiple transmission channels of trade policy shocks, including changes in import taxes, trade volumes, household welfare, prices, exports, imports, factor returns, employment, and government revenues and transfers.

The remainder of the paper is organised as follows. The next section describes the modelling framework, which is based on the standard GTAP model, the database used, and the simulated shocks for the analyses. The results of the study are presented and discussed in the next section, followed by the conclusion and policy recommendations.

METHODOLOGY

The GTAP database provides a globally consistent dataset covering 141 regions[4], 65 sectors[5], and five primary factors of production, namely land, skilled labour, unskilled labour, capital, and natural resources. For the purpose of the analysis, the original GTAP database is aggregated into 10 regions and 5 sectors to strategically reflect the trade

[3] In the GTAP model, social welfare is measured as the aggregate well-being of households, typically represented by equivalent variation (EV). It reflects changes in household utility resulting from policy shocks, such as tariff or trade liberalization, capturing the combined effects of consumption, prices, and income changes across the economy.

[4] In the GTAP model, region**s** refer to the geographical or national groupings used in the database to represent countries or clusters of countries. Each region aggregates economic activity, production, and trade flows, allowing the model to simulate interregional trade, policy impacts, and welfare effects.

[5] In GTAP model, sectors refer to the groupings of industries or economic activities within each region. Each sector represents the production, consumption, and trade of goods and services, allowing the model to analyze sector-specific policy impacts, output changes, and trade effects.

structure and negative list of Sri Lanka and Pakistan (details are available in the Appendix). The regional aggregation includes major trading partners such as the European Union (EU), the United States of America (USA), China, and India, as these economies significantly influence the trade competitiveness and market responses of Sri Lankan and Pakistani industries.

The sectoral aggregation is designed to capture the structure of Sri Lanka's unilateral trade with Pakistan and to reflect the composition of negative list products maintained by both countries. Accordingly, the 65 GTAP sectors are aggregated into five broad sectors: services, non-food manufacturing, food manufacturing, importable agriculture, and sensitive agriculture. The services sector is treated separately because it is not directly subject to tariff measures within the trade framework. Agricultural products that are largely import-oriented are grouped under importable agriculture, as these commodities are primarily sourced from foreign markets and are therefore more directly affected by changes in import tariffs and trade liberalisation. In contrast, many of the products included in the negative list are classified under sensitive agriculture, which consists of commodities considered important for domestic production, rural livelihoods, and food security. This category includes products such as paddy rice, processed rice, fish, vegetables, and other protected agricultural items that are often maintained under tariff protection to shield local producers from external competition. Distinguishing between importable agriculture and sensitive agriculture is important in the analysis because these two groups differ in their trade orientation, policy treatment, and likely response to unilateral tariff liberalisation in Sri Lanka. The food manufacturing sector is separated in order to examine the effects of liberalising food-related imports, which are particularly relevant for bilateral trade between Sri Lanka and Pakistan. In addition, all other manufacturing activities, excluding food processing, are grouped under non-food manufacturing. This aggregation structure enables the model to capture the key policy features of unilateral trade between Sri Lanka and Pakistan and to analyse sectoral adjustments resulting from trade liberalisation and restrictions associated with the negative list.

Adjustment to the GTAP baseline

Within the GTAP model framework, import tariffs are the most direct trade policy instrument and are represented by the variable *tms,* which denotes the ad valorem tax imposed on imports from a specific trading partner.[6] Changes in tariff policy are introduced into the model through shocks to the *tms* variable, representing reductions or eliminations of import duties between countries. These changes affect the effective prices of imported goods relative to domestic products, thereby influencing trade flows, sectoral

[6] Ad valorem tariff rate refers to a tariff expressed as a percentage of the value of an imported good. For example, a 10% ad valorem tariff means that the importer must pay a tax equal to 10% of the product's customs value.

production, and welfare outcomes (Hertel, 1997; Corong et al., 2017). By simulating adjustments to the *tms* variable, the model captures the effects of unilateral tariff liberalisation on trade, domestic production, and consumer welfare. To better understand the substitution between domestically produced and imported goods, this analysis also considers the Armington substitution elasticity, which determines the degree to which consumers and producers substitute between products based on their country of origin within the GTAP framework.

The domestic price of imported goods is given by:

$$P_{mis} = P_{wir} \times (1 + tms_{irs}) \quad (1)$$

where P_{mis} is the domestic price of imported good *i* in country *s,* P_{wir} is the world (export) price of good *i* from country *r*, and tms_{irs} is the ad valorem tariff rate on commodity *i* imported by region *s* from region *r.* A reduction in tariffs (negative *tms* shock) simulates trade liberalisation and reduces domestic prices, while a positive shock captures protective or distortionary effects. This mechanism directly affects the cost of imported food commodities and the competitiveness of domestic producers.

In most CGE models, the Armington assumption is used to represent product differentiation by country of origin, and GTAP follows the same structure. According to this assumption, imported and domestically produced goods are treated as imperfect substitutes, meaning that consumers and producers distinguish between goods based on where they are produced. This approach allows the model to capture realistic trade responses when relative prices change due to policy shocks such as tariff reductions.

The relationship between domestic and imported goods is commonly represented using a Constant Elasticity of Substitution (CES) function. The composite good consumed in a region is defined as a combination of domestically produced goods and imported goods as follows:

$$Q = A\left[\delta X_1^{-\rho} + (1-\delta)X_2^{-\rho}\right]^{\frac{1}{\rho}} \quad (2)$$

where Q = composite output (or utility), A = efficiency or scale parameter, X_1, X_2 = input factors (e.g., domestic goods and imports, or labour and capital), ρ = substitution parameter, and δ = share parameter (distribution parameter).

The Armington substitution elasticity (σ) measures the degree of substitutability between domestic and imported goods and is defined as the following function of the substitution parameter (ρ):

$$\sigma = \frac{1}{1-\rho} \quad (3)$$

A higher value of Armington elasticity indicates that consumers are more willing to substitute between domestic and imported goods when relative prices change. Conversely,

a lower elasticity implies a stronger preference for domestic products and weaker substitution between domestic and foreign goods. In the context of trade policy analysis, tariff reductions lower the price of imported goods relative to domestic products, which encourages substitution toward imports depending on the magnitude of the Armington elasticity.

In the GTAP framework, the Armington structure is implemented in two stages. First, a composite import good is formed by combining imports from different source countries using a CES function. Second, this composite import good is combined with domestically produced goods to form the final composite good used by consumers and firms. This nested structure allows the model to capture substitution both between domestic and imported goods and among imports from different trading partners, which is particularly important when analysing unilateral trade.

Simulation experiments

Endogenous variables are determined within the model and adjust automatically in response to the policy shocks introduced through the exogenous variables. These endogenous variables include key economic indicators such as commodity prices, sectoral output, trade flows, household consumption, wages, investment, and welfare measures.

The policy scenarios considered in the study are described below.

Policy Scenario 1: IMAL - Importable Agriculture Liberalisation

This scenario simulates a reduction of the import tariff variable (*tms*) on importable agricultural products in Sri Lanka within the GTAP model under unilateral tariff liberalisation. Tariffs on these products are reduced by 100% while tariffs on all other sectors remain at their baseline levels.

Policy Scenario 2: SAGL - Sensitive Agriculture Liberalisation

This scenario simulates a reduction of the import tariff variable (*tms*) on sensitive agricultural products (negative list items) in Sri Lanka within the GTAP model. Tariffs on these products, which include staple paddy, processed rice, raw milk, and several other agricultural commodities, are reduced by 100% from an initial ad valorem tariff rate of 11.76%, while tariffs on all other sectors remain at their baseline levels.

Policy Scenario 3: FMAL - Food Manufacturing Liberalisation

This scenario simulates a reduction of the import tariff variable **(***tms***)** on food manufacturing products in Sri Lanka within the GTAP model. Tariffs on the food manufacturing sector are reduced by 100% while tariffs on all other sectors remain at their baseline levels.

Policy Scenario 4: ALLI - All three sectors tariff liberalisation

This scenario simulates a 100% reduction of the import tariff variable (*tms*) on all selected sectors (importable agriculture, sensitive agriculture, and food manufacturing) in Sri Lanka within the GTAP model. Tariffs on these sectors are eliminated while tariffs on other sectors remain at their baseline levels.

Alternative scenarios – All tariff liberalisation with Armington elasticity changes

In a second set of scenarios, the analysis combines tariff liberalisation with changes in substitution behaviour. Specifically, the import tariff variable (*tms*) is shocked at the same level as the four scenarios described previously, while the Armington substitution elasticity for the relevant sectors is simultaneously increased by 100% to examine the effects of stronger substitution between domestic and imported goods within the GTAP model framework. Accordingly, IMAL1 represents the elimination of import tariffs on importable agricultural products in Sri Lanka together with a 100% increase in the substitution elasticity for that sector, SAGLI **s**imulates the removal of tariffs on sensitive agriculture combined with a 100% increase in substitution elasticity, and so on. These scenarios allow the study to evaluate how stronger substitution responses influence trade flows, production adjustments, and welfare outcomes following tariff liberalisation.

All simulations evaluate the effects of tariff liberalisation in the importable agriculture sector on trade flows, sectoral output, prices, and welfare, where welfare is measured by Equivalent Variation (EV)[7]. Table 1 summarises the scenarios simulated in the analysis.

Table 1: Base and simulated values of the parameters by scenario

Scenario	Ad valorem tax rate (tms)		Armington elasticity value(σ)	
	Base rate	Post-simulation rate8	Base Year	Post-simulation rate
IMAL - Total elimination of import tariffs on importable agricultural goods	1.17	0.07	2.93	5.86
SAGL - Total elimination of import tariffs on sensitive agricultural goods	11.76	3.38	2.33	4.66
FMAL - Total elimination of import tariffs on food manufacturing	2.00	0.18	2.31	4.62

[7] Equivalent variation (EV) is a welfare measure that represents the amount of income that would need to be given to or taken from consumers at initial prices to achieve the same change in utility as a policy shock. In the GTAP model, it is used to quantify gains or losses in social welfare resulting from policy changes such as trade liberalisation.

[8] Post-simulation ad valorem tax rate is obtained after applying a -100% policy shock to the base-year tax rate in the model.

RESULTS AND DISCUSSION

Welfare Effects on the Sri Lankan and Pakistani Economies under Different Scenarios

The simulation results indicate that tariff liberalisation across selected sectors leads to a decline in welfare, as measured by Equivalent Variation (EV), in Sri Lanka (Table 2). Under the scenario of complete tariff elimination on importable agricultural products**,** the EV decreases by US$ 0.037 million, indicating a marginal welfare loss. Similarly, the removal of tariffs on food manufacturing products results in a welfare reduction of US$ 0.177 million. However, the largest welfare effect is observed when tariffs on sensitive agricultural products included in the negative list are eliminated, where EV declines by US$ 1.87 million. When tariff elimination is applied simultaneously across all three sectors (importable agriculture, negative list agriculture, and food manufacturing), the overall welfare loss becomes more pronounced, leading to a total EV reduction of US$ 2.09 million. These findings align with existing literature, where limited product coverage and incomplete liberalisation under the PSFTA have been shown to constrain welfare improvements due to negative changes in terms of trade (Hussain & Shah, 2022).

Table 2: Welfare effects on the Sri Lankan Economy

Welfare Factor/ Scenario	IMAL	FMAL	SAGL	ALLI
Total EV	-0.037	-0.177	-1.870	-2.090
AE	-0.023	-0.076	0.542	0.440
TOT	-0.010	-0.078	-1.847	-1.930
IS	-0.003	-0.022	-0.575	-0.600

Source: Author generated

From a theoretical perspective, these results can be explained through the interplay of trade creation and trade diversion effects. Recent studies emphasise that tariff elimination in Sri Lanka's FTAs can increase trade flows but may also reduce tariff revenue and widen trade imbalances, particularly when sensitive sectors are liberalised (Wijesinghe & Rathnayake, 2023). While tariff liberalisation is expected to generate welfare gains through trade creation, where more efficient foreign producers replace higher-cost domestic production, these findings suggest that in the case of negative list products, trade diversion effects may dominate. This implies that imports may shift toward relatively less efficient partner-country sources rather than globally efficient suppliers, leading to a net welfare loss. In addition, the liberalisation of previously protected sensitive sectors may expose domestic producers to increased competition without sufficient efficiency gains, further reinforcing the negative welfare outcome.

These results suggest that tariff protection in sensitive sectors, particularly negative list agricultural products, plays a significant role in supporting domestic welfare in Sri Lanka.

In many developing economies, certain agricultural sectors remain protected under trade agreements because of their importance for rural employment, income stability, and domestic production capacity. Consequently, the removal of tariffs in such sectors may lead to increased import competition, reduced domestic production, and potential welfare losses (Anderson & Martin, 2005; Panagariya, 2000). Similar findings have been reported in previous CGE analyses, where trade liberalisation in highly protected sectors can generate short-term welfare losses due to structural adjustments and resource reallocation across sectors (Hertel, 1997). The welfare outcomes observed in this study are also consistent with CGE-based analyses of trade agreements in Sri Lanka and India, which indicate that the gains from trade liberalisation depend on the extent of tariff reductions and sectoral coverage, with protected sectors limiting overall benefits (Perera, 2008). Therefore, the results of this study highlight that full liberalisation of tariffs on negative list agricultural products under unilateral tariff liberalisation may not necessarily improve social welfare, emphasising the need for a cautious and gradual approach to further tariff reductions in sensitive agricultural sectors.

By contrast, the welfare effects for Pakistan show relatively small, positive changes across most scenarios (see Figure 1). Under the IMAL and FMAL scenarios, the welfare of Pakistan increases only marginally, with EV rising by US$ 0.037 million and US$ 0.23 million, respectively. However, more notable welfare gains are observed when tariffs on negative list agricultural products are eliminated. Under the SAGL scenario, the welfare of Pakistan increases by US$ 3.94 million, while under the ALLI scenario, the welfare gain rises further to US$ 4.21 million. These results indicate that Pakistan benefits more from the liberalisation of negative list agricultural products of Sri Lanka compared to tariff reductions in other sectors under the unilateral tariff liberalisation.

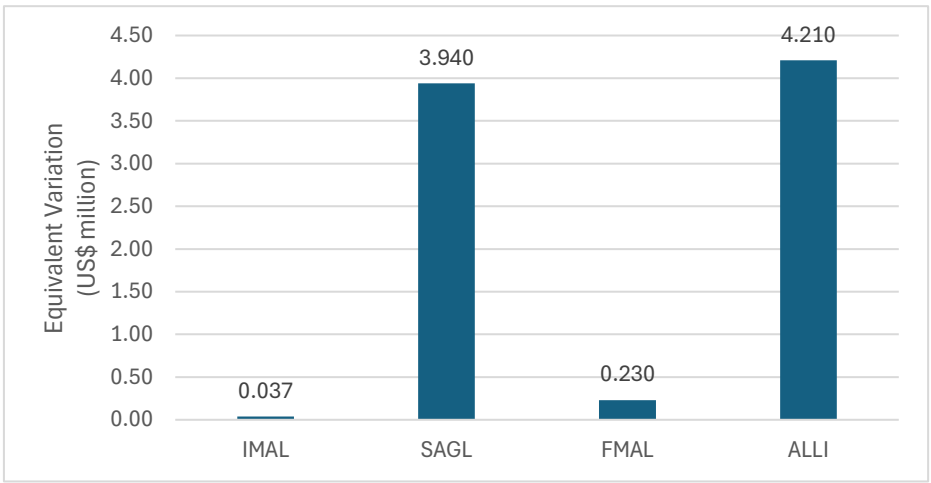

Figure 1: Welfare effect of simulated scenarios on Pakistan

Source: Author generated

Welfare decomposition for Sri Lanka

The decomposition of welfare effects into allocative efficiency (AE), terms-of-trade (TOT), and saving-investment (SI) balance provides further insights into the sources of welfare changes under the considered tariff liberalisation scenarios. The AE effect reflects improvements or losses in resource allocation due to distortions created by taxes or tariffs, while the TOT captures changes in the relative prices of exports and imports. The IS represents changes in the balance between global investment and savings that affect national welfare.

As Table 2 shows, under the IMAL scenario, all welfare components are negative, with the AE effect showing the largest decline. Specifically, AE decreases by US$ 0.0234 million, while the TOT and IS balance decrease by US$ 0.01 million and US$ 0.003 million, respectively. In contrast, when tariffs on negative list agricultural products are eliminated, the results indicate a positive AE effect of US$ 0.542 million, suggesting that removing protection in these sectors improves the allocation of resources within the economy. However, this gain is offset by significant negative TOT (US$ 1.847 million) and IS (US$ 0.575 million) effects, resulting in an overall welfare decline.

A similar pattern is observed in the FMAL scenario, where all welfare components remain negative (AE by US$ 0.076 million, TOT by US$ 0.078 million, and IS by US$ 0.022 million). Under the ALLI scenario, which represents the combined liberalisation of all selected sectors, the AE effect becomes positive (US$ 0.44 million), indicating improved resource allocation following tariff removal. Nevertheless, the TOT (US$ 1.93 million) and IS (US$ 0.6 million) effects remain strongly negative, leading to an overall welfare loss.

These results indicate that although tariff elimination on sensitive agricultural products may generate a positive AE effect, the magnitude of this gain is relatively small and is outweighed by adverse TOT and IS effects. As a result, the overall welfare outcome remains negative. Similar findings have been reported in previous CGE studies, where the benefits from improved resource allocation following trade liberalisation are often offset by unfavourable changes in other welfare components, leading to mixed overall results (Hertel, 1997; Anderson & Martin, 2005). These results therefore emphasise the importance of considering multiple welfare channels when assessing the economic impacts of tariff liberalisation within regional trade agreements. The results are in line with existing CGE literature, suggesting that welfare effects of unilateral trade liberalisation in South Asia are often ambiguous and highly sensitive to sectoral protection patterns and trade structure (Gilbert et al., 2015).

Decomposition of the allocative efficiency effect in Sri Lanka

AE reflects changes in welfare resulting from improvements or distortions in the allocation of resources across sectors following policy shocks. The overall AE outcome,

therefore, depends on the combined effect of separate components, which may either reinforce or offset each other depending on the structure of the economy and the nature of the policy change (Hertel, 1997; Corong et al., 2017). In the GTAP model framework, AE is decomposed into several components, including import tax effects (capturing the change in resource allocation and welfare resulting from changes in the price of imported goods relative to domestic goods) and export tax effects (capturing the change in production incentives, trade flows, resource allocation, and welfare following a change in export taxes).

The simulations indicate that across all scenarios, the import tax effect is negative, reflecting welfare losses associated with the reduction of tariff revenue and the adjustment of domestic industries to increased import competition (Figure 2). In contrast, the export tax effect is positive, suggesting that trade liberalisation improves export competitiveness and reduces distortions affecting export-oriented production. Under the IMAL and FMAL scenarios, the overall AE effect remains negative because the magnitude of the negative components outweighs the positive contributions. However, in the SAGL scenario, the overall AE effect becomes positive, indicating that efficiency gains from improved resource allocation and export performance offset the negative effects associated with import tax changes. These findings are consistent with the broader trade policy literature, which suggests that the net AE impact of trade liberalisation depends on the balance between distortion-removing effects and the adjustment costs associated with removing protection in sensitive sectors (Anderson & Martin, 2005; Hertel, 1997).

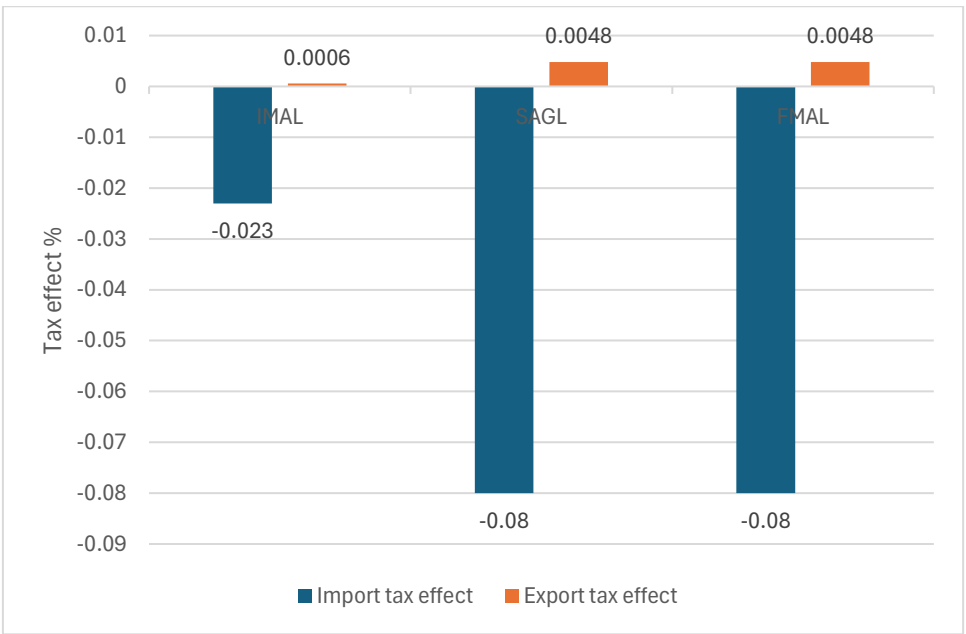

Figure 2: Decomposition of AE effect in Sri Lanka

Source: Author generated

Changes in Aggregate Exports and Imports of Sri Lanka

The results indicate that across all simulation scenarios, aggregate exports increase relatively more than aggregate imports (Figure 3). Under the IMAL scenario, the change in aggregate imports is minimal, mainly due to the low baseline tariff rates on importable agricultural products. A similar pattern is observed in the FMAL scenario, where tariff reductions in the food manufacturing sector result in only marginal changes in overall import flows. In the case of sensitive agricultural product liberalisation (SAGL), aggregate imports increase by 0.03%, while aggregate exports increase by 0.065%. Likewise, under the ALLI scenario, aggregate imports rise by 0.03%, whereas aggregate exports increase by 0.069%.

Although exports show slightly higher growth compared to imports, the overall changes in trade flows remain relatively small. These findings suggest that liberalising sensitive agricultural products does not generate a significant expansion in aggregate trade flows of Sri Lanka, indicating limited gains from further tariff liberalisation in these sectors.

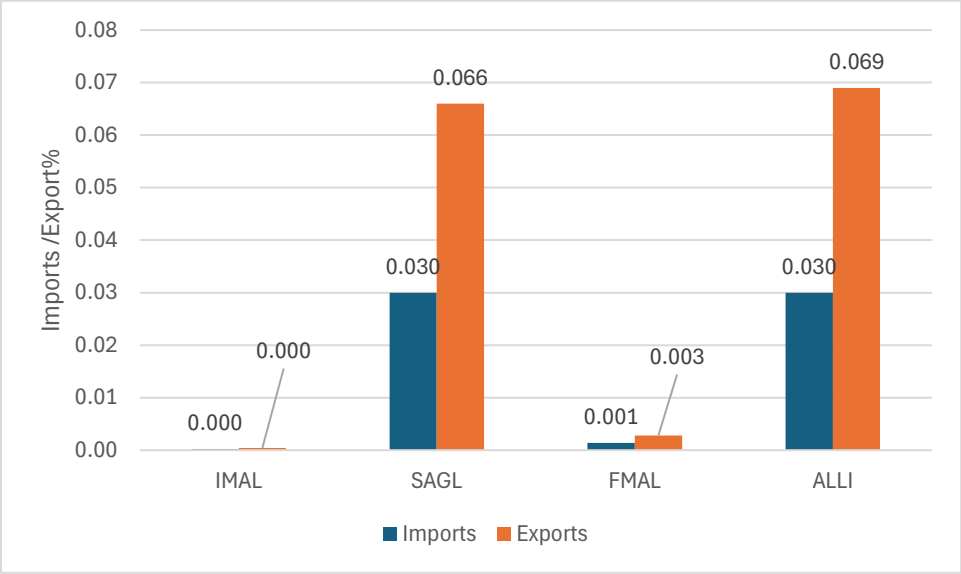

Figure 3: Changes in Aggregate Exports and Aggregate Imports of Sri Lanka

Source: Author generated

Changes in Tax Revenue of Sri Lanka

The simulation results show that tariff liberalisation leads to a reduction in total tax revenue in Sri Lanka (Figure 4). In the base year, total tax revenue amounts to US$ 18,784.81 million. Under the IMAL scenario, government revenue decreases slightly by 0.0004%, while under the FMAL scenario, it declines by 0.002%. More pronounced reductions are observed under the SAGL and ALLI scenarios, where total tax revenue falls by 0.039% and by 0.042%, respectively.

The reduction in tariff revenue is closely related to changes in AE. When tariffs are eliminated, the import tax rate declines, which lowers government revenue, even as import flows increase (Hertel, 1997; Anderson & Martin, 2005). In the SAGL scenario, the decline in tax revenue is relatively larger compared with other scenarios. However, despite this reduction in fiscal revenue, the AE effect remains positive, primarily because aggregate exports increase, generating a positive export tax effect that partially offsets the negative impact of reduced import tax revenue. This finding highlights the complex interaction between trade flows, government revenue, and welfare components in evaluating the economic effects of tariff liberalisation.

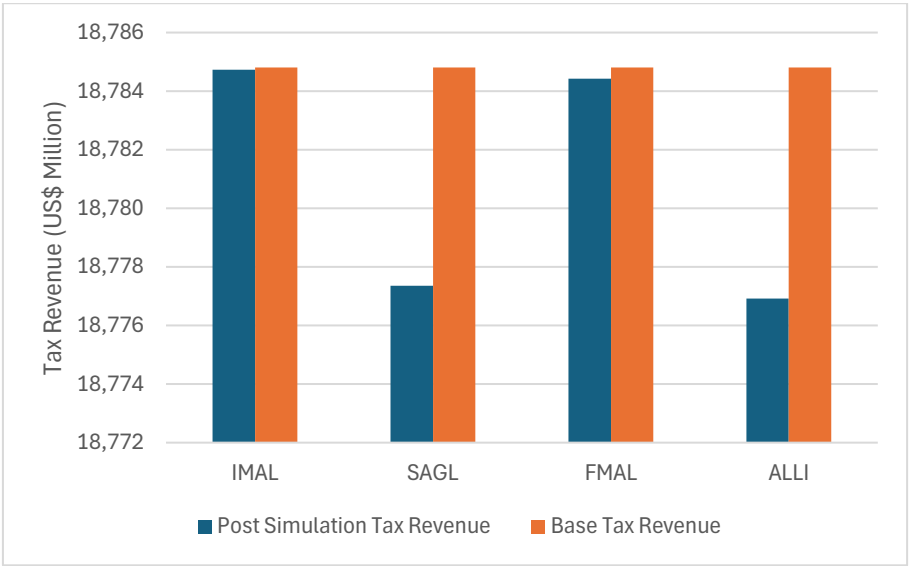

Figure 4: Changes in Base Tax Revenue in Sri Lanka

Source: Author generated

Changes in Market Prices in Sri Lanka

The simulation results indicate that market price changes are relatively small across all liberalisation scenarios, suggesting that tariff reductions generate only limited price adjustments in the Sri Lankan economy. Under the IMAL scenario, the market price declines by 0.0001%, while under the FMAL scenario, the reduction is larger at 0.0007%. A relatively larger, though still modest, price effect is observed under the SAGL scenario, where the liberalisation of sensitive agricultural products reduces market prices by 0.02%. Similarly, under the ALLI scenario, where all selected sectors are liberalised simultaneously, the market price declines by 0.02%. These findings suggest that tariff elimination leads to a reduction in domestic prices, mainly through lower import costs and increased competitive pressure from imported goods.

From a policy perspective, the marginal nature of these price changes implies that further tariff liberalisation alone is unlikely to produce substantial consumer price benefits. In CGE-based trade analysis, price effects often remain limited when the sectors liberalised account for a relatively small share of total domestic expenditure or when existing tariff rates are already low (Hertel, 1997; Anderson & Martin, 2005). The somewhat larger price decline observed under the SAGL scenario may reflect the higher initial protection of sensitive agricultural products, where tariff removal has a stronger direct effect on domestic prices. However, even in this case, the overall market price response remains very small, indicating that the unilateral liberalisation of sensitive agricultural products does not generate a significant reduction in economy-wide prices. Similar evidence from trade policy studies shows that while tariff reductions can lower domestic prices, the magnitude of the effect depends on the initial level of protection, the import share of the affected sectors, and the degree of substitution between domestic and imported goods (Francois & Reinert, 1997; Hertel, 1997). Therefore, the results suggest that the expected gains from unilateral tariff liberalisation in terms of market price reduction are limited.

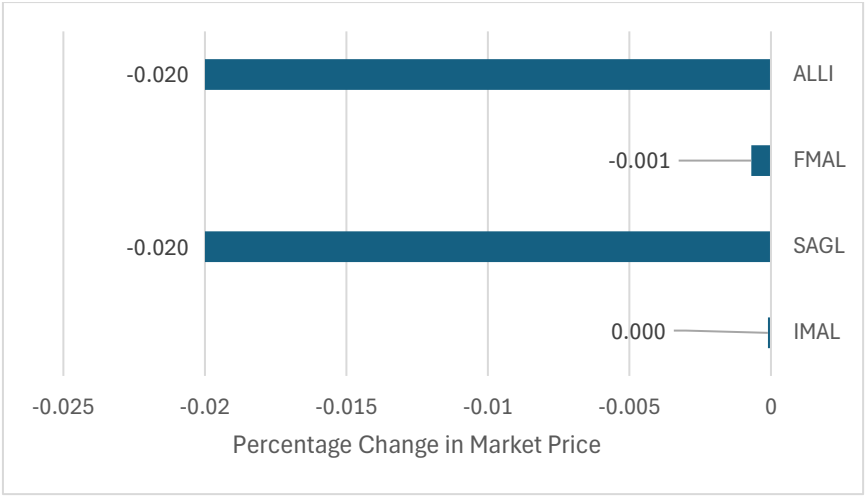

Figure 5: Changes in Aggregate Market Price in Sri Lanka

Source: Author generated

Changes in Industry Output in Sri Lanka

The simulation results show that industrial output changes only marginally across all tariff liberalisation scenarios, indicating that the economy-wide production response to further liberalisation is limited (Figure 6). Under the IMAL scenario, industrial output declines by 0.0017%, while the FMAL scenario records a slightly larger reduction of 0.0036%. The largest decline is observed under the SAGL scenario, where liberalisation of sensitive agricultural products reduces industrial output by 0.1%. Under the ALLI scenario, where all selected sectors are liberalised simultaneously, industrial output falls by 0.0039%. Overall, these results suggest that tariff elimination does not generate a substantial

expansion in industrial production and, in some cases, may contract output due to increased import competition and resource reallocation.

From an analytical perspective, these small output effects are consistent with the broader trade policy literature, which shows that the production response to tariff liberalisation depends on the initial level of protection, sectoral linkages, and the ability of domestic industries to adjust to new competitive conditions (Hertel, 1997; Anderson & Martin, 2005). In sectors where tariff protection is reduced, domestic producers may face lower-cost imports, which can weaken local production if competitiveness is limited. The relatively larger decline under the SAGL scenario suggests that sensitive agricultural sectors remain more vulnerable to import competition and that their liberalisation can indirectly affect industrial activity through upstream and downstream linkages. However, because the overall changes remain very small, the findings imply that sensitive agricultural product liberalisation is unlikely to produce significant industrial gains for Sri Lanka. Similar CGE studies have found that tariff reductions often lead to modest sectoral output adjustments rather than large structural transformations, particularly when the protected sectors represent a limited share of the broader industrial base or when substitution between domestic and imported goods is constrained (Francois & Reinert, 1997; Hertel, 1997). Therefore, the results indicate that unilateral tariff liberalisation alone is insufficient to generate meaningful improvements in industrial output.

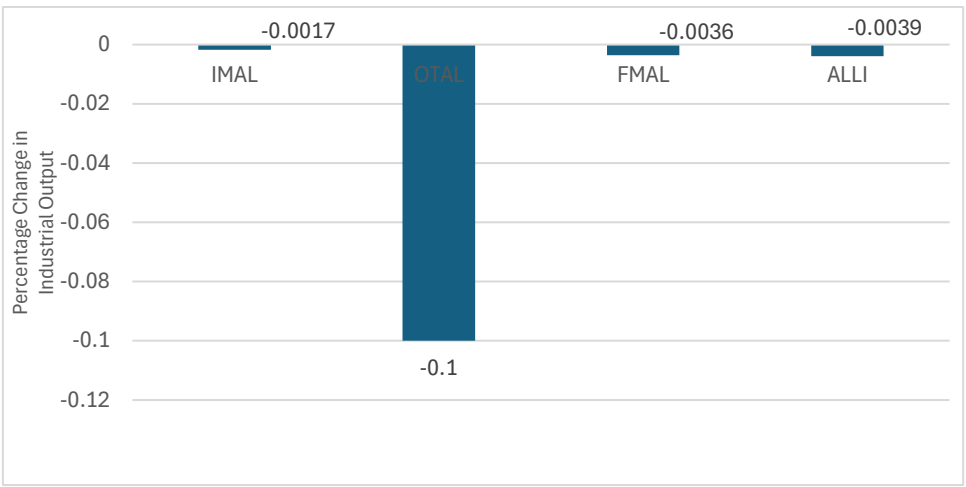

Figure 6: Changes in Industry output of Sri Lanka

Source: Author generated

Effect on the GDP of Sri Lanka

The results show that the effects of tariff liberalisation on GDP are very small across all scenarios, although the direction of change differs by the measure of GDP considered

(Figure 7). In this study, three indicators are used: quantity of GDP (qGDP)[9], value of GDP (vGDP)[10], and price of GDP (pGDP)[11]. The quantity of GDP increases marginally under the SAGL and ALL scenarios by 0.00068% and 0.00055%, respectively, indicating a very small rise in real economic activity when sensitive agricultural products are liberalised. In contrast, qGDP declines slightly under the IMAL and FMAL scenarios by 0.00003% and 0.0001%, suggesting that tariff elimination in importable agriculture and food manufacturing does not generate meaningful expansion in real output. This is consistent with work by Ahamed et al. (2010), who highlighted that the agreement generated positive welfare effects for Pakistan through improved resource allocation and increased export opportunities but that the gains for Sri Lanka were relatively modest, reflecting structural differences and limited export diversification.

By comparison, the value of GDP (vGDP) declines in all scenarios. The reduction is relatively larger under SAGL and ALL, where vGDP falls by 0.02% in both cases, while the decline is much smaller under IMAL and FMAL, at 0.00014% and 0.0008%, respectively. A similar pattern is observed for the price of GDP (pGDP), which also decreases across all scenarios. The decline in pGDP is more noticeable under SAGL and ALL at 0.02%, whereas under IMAL and FMAL, the reductions are smaller, at 0.00011% and 0.0007%, respectively. These findings indicate that although liberalisation of sensitive agricultural products may slightly increase the volume of output, it simultaneously reduces the overall price level and therefore lowers the nominal value of GDP.

This pattern is consistent with CGE trade theory, where tariff reductions can lower domestic prices by reducing import costs and increasing competitive pressure from foreign goods (Hertel, 1997; Anderson & Martin, 2005). In such cases, the fall in prices may outweigh the small increase in production volume, causing vGDP to decline even when qGDP rises. In other words, the economy may produce slightly more in real terms, but that output is valued at lower prices. Similar findings are common in trade liberalisation studies, particularly when the initial tariff structure is concentrated in protected sectors and when the scale of real output adjustment is limited (Francois & Reinert, 1997). Therefore, the results suggest that unilateral liberalisation of sensitive agricultural products of Sri Lanka produces only a marginal improvement in real output, while the associated decline in prices leads to a reduction in GDP measured in value terms. This implies that the gains from further tariff liberalisation are limited and are not sufficiently strong to generate a broad-based expansion in overall economic performance.

[9] **qGDP** refers to the quantity index of gross domestic product, measuring changes in real output volume after removing the effect of price changes. In the GTAP model, it indicates whether the economy's total production has increased or decreased in real terms.
[10] **vGDP** refers to the value of gross domestic product, measuring GDP in monetary terms at prevailing market prices. In the GTAP model, it reflects changes in the nominal value of total economic output.
[11] **pGDP** refers to the price index of gross domestic product, measuring changes in the overall price level of GDP. In the GTAP model, it shows whether the value of output changes due to price movements rather than changes in real production**.**

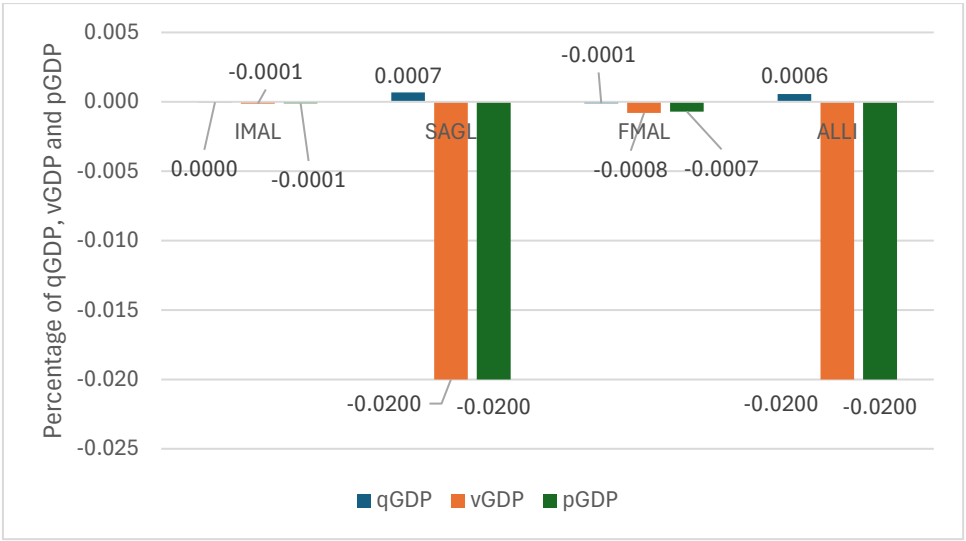

Figure 7: Changes in GDP in Sri Lanka

Source: Author generated

Alternative scenario with a stronger substitution between domestic and imported products

The alternative simulation results evaluate the effects of tariff elimination combined with higher substitution between domestic and imported goods, represented by a 100% increase in Armington substitution elasticity within the GTAP framework (see Table 3).

Table 3: Welfare effects for Sri Lanka with stronger substitution between domestic and imported products

Welfare Factor/ Scenario	IMAL1	FMAL1	SAGL1	ALLI1
Total EV	-0.037	-0.200	-1.400	-1.590
Allocative Efficiency	-0.017	-0.021	2.870	2.660
Terms of Trade	-0.015	-0.140	-3.250	-3.240
Investment and Savings	-0.004	-0.040	-1.010	-1.010

Source: Author generated

The results in Table 3 show that under the IMAL1 and FMAL1 scenarios, changes in substitution elasticity do not produce significant welfare effects. However, under the SAGL1 scenario, which combines tariff elimination with a 100% increase in substitution elasticity for negative list agricultural products, the total welfare effect measured by EV declines by US$ 1.4 million. Although AE increases significantly by US$ 2.87 million, this gain is offset by negative TOT (US$ 3.25 million) and IS (US$ 1.01 million). Similarly, under the ALLI1 scenario, where tariffs are eliminated and substitution elasticities are increased across all selected sectors, the overall EV decreases by US$ 1.59

million. In this case, AE improves by US$ 2.66 million, while the TOT effect declines by US$ 3.24 million and the IS effect decreases by US$ 1.01 million.

These findings suggest that even with higher substitutability between domestic and imported products, the liberalisation of negative list agricultural products generates only limited AE gains, which are insufficient to offset the negative impacts arising from other welfare components. In other words, even if Sri Lanka eliminates tariffs on all sensitive agricultural products and assumes a substantial increase in substitution between domestic and imported goods, the improvement in AE remains marginal, while the adverse TOT and IS effects continue to dominate. Similar outcomes have been observed in previous CGE studies, which highlight that the welfare effects of trade liberalisation depend not only on substitution behaviour but also on broader structural factors such as trade balances, price effects, and global market responses (Anderson & Martin, 2005; Hertel, 1997). These results therefore indicate that greater substitutability alone is insufficient to generate substantial welfare gains from further tariff liberalisation under the PSFTA. Our results are consistent with Hussain and Shah (2022), who find that the simulated welfare effects of the PSFTA are asymmetric, with Pakistan experiencing a net welfare gain while Sri Lanka incurs a net welfare loss. The welfare improvement in Pakistan is largely driven by favourable changes in the terms of trade.

Changes in Aggregate Exports and Imports of Pakistan

Figure 8 presents the changes in aggregate exports and imports of Pakistan under the different liberalisation scenarios. The results indicate that the effects on aggregate exports and imports of Pakistan trade flows are generally limited under the OTALI, FMALI**,** and ALLI scenarios. In contrast, the IMALI scenario generates a relatively stronger response, with a notable increase in aggregate exports of Pakistan compared to the other simulations.

This outcome suggests that Pakistan possesses a comparative advantage in several import-oriented agricultural products and therefore benefits from improved market access following tariff removal by Sri Lanka in these sectors. The elimination of tariffs on products such as wheat, cereals, oilseeds, livestock products, vegetables, dairy products, and sugar enhances the competitiveness of Pakistani exports in the Sri Lankan market. As a result, Pakistan experiences an expansion in agricultural exports, which is accompanied by a corresponding increase in aggregate imports due to broader trade linkages and increased economic activity. These findings imply that tariff liberalisation in importable agricultural products provides greater trade opportunities for Pakistan than liberalisation in sensitive agricultural products or food manufacturing sectors.

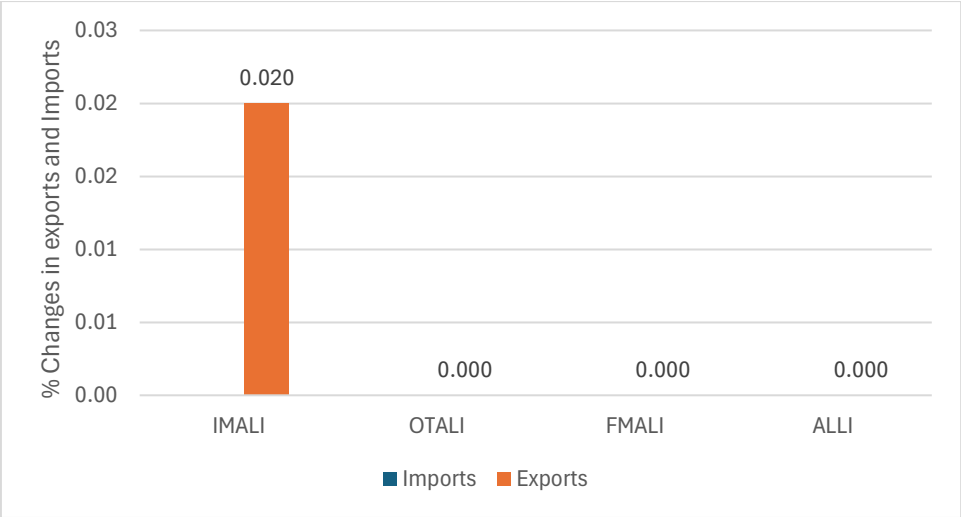

Figure 8: Changes in Aggregate Exports and Aggregate Imports of Pakistan

Source: Author generated

CONCLUSIONS

The present study evaluated the economic effects of negative list products under the PSFTA using the GTAP model framework. In the sectoral aggregation, negative list products were grouped under the sensitive agriculture sector, while four additional sectors were included to capture broader trade policy effects. Four policy simulations were conducted: tariff liberalisation of importable agriculture, sensitive agriculture (negative list products), and food manufacturing separately, together with a combined scenario in which all three sectors were liberalised simultaneously. The results show that all scenarios generate negative overall welfare effects for Sri Lanka, as measured by equivalent variation.

However, the welfare decomposition indicates that the AE effect becomes positive when tariffs on sensitive agricultural products are eliminated. This positive AE effect is mainly driven by the export tax effect, reflecting improved export competitiveness and reduced distortions affecting export-oriented activities. Nevertheless, this gain is not large enough to offset the negative TOT and IS effects, and therefore the overall welfare impact remains negative. The trade flow analysis further shows that although aggregate exports increase slightly more than aggregate imports under the sensitive agriculture liberalisation scenario, the magnitude of change is very small. This implies that unilateral liberalisation of negative list products does not lead to a meaningful expansion of trade for Sri Lanka.

With regard to domestic market outcomes, all scenarios cause marginal declines in market prices, with a relatively larger reduction observed under the sensitive agriculture liberalisation scenario. This is mainly because tariff removal allows cheaper imports to

enter the domestic market, thereby placing downward pressure on prices. At the same time, industrial output also declines slightly across the scenarios, again with a relatively stronger effect under sensitive agriculture liberalisation, largely due to increased import competition. The GDP results show that liberalisation of sensitive agricultural products generates only a very small increase in real output, while reducing the overall domestic price level. Since the value of GDP depends on both output quantity and prices, the fall in the GDP price index outweighs the slight increase in output volume, leading to a decline in nominal GDP. This indicates that the policy shock improves real production only marginally, while the associated price effect is relatively stronger. The analysis also shows that government tariff revenue declines significantly when tariffs on negative list products are removed, highlighting the importance of import duties as a source of fiscal revenue in Sri Lanka.

To further test whether market responsiveness could alter these outcomes, the study introduced alternative simulations by increasing the Armington substitution elasticities by 100%, assuming stronger substitutability between domestic and imported goods. Although this adjustment generated a marginal improvement in AE, the overall welfare results remained negative because the adverse TOT and IS effects continued to dominate.

Overall, the findings suggest that liberalising negative list agricultural products alone is unlikely to generate significant economic gains for Sri Lanka under the PSFTA. Although some efficiency gains may arise through reduced distortions, these benefits are limited and are outweighed by negative price effects, fiscal revenue losses, and weak trade expansion. Therefore, any further liberalisation of sensitive products should be approached cautiously, with attention to domestic competitiveness, sectoral adjustment capacity, and complementary policy measures needed to improve the effectiveness of bilateral trade agreements.

Policy Implications

The findings of this study provide several important policy implications for improving the effectiveness of the PSFTA and the broader trade policy of Sri Lanka. First, the results suggest that full tariff liberalisation of negative list agricultural products may not necessarily generate significant welfare gains for Sri Lanka. Although the removal of tariffs in these sectors leads to a small improvement in allocative efficiency, the overall welfare effect remains negative due to adverse TOT and IS effects. Therefore, policymakers should approach further liberalisation of sensitive agricultural sectors cautiously and ensure that domestic industries are sufficiently competitive before removing existing tariff protections.

Second, the analysis indicates that trade flow changes resulting from negative list liberalisation are relatively small, even when tariffs are completely eliminated. This implies that the limited expansion of bilateral trade cannot be explained solely by the

presence of negative list products. Other structural factors such as product competitiveness, non-tariff barriers, logistics constraints, and limited export diversification may also restrict trade growth. Consequently, policy efforts should focus not only on tariff liberalisation but also on improving supply-side capacity, export diversification, and trade facilitation measures to enhance the export performance of Sri Lanka in the Pakistani market.

Third, the results highlight the fiscal implications of tariff liberalisation, particularly the reduction in government revenue associated with removing import duties. Since tariff revenue remains an important source of government income in Sri Lanka, policymakers should carefully consider alternative revenue mechanisms, such as strengthening domestic taxation systems, to mitigate potential fiscal losses arising from further trade liberalisation.

Fourth, the alternative simulations show that greater substitutability between domestic and imported goods leads only to marginal improvements in allocative efficiency, while overall welfare effects remain negative. This suggests that increasing market responsiveness alone is insufficient to generate substantial gains from tariff reductions. Instead, complementary policies aimed at enhancing productivity, improving value addition in agriculture and food manufacturing, and strengthening export competitiveness are necessary to benefit from trade agreements fully.

Finally, the findings indicate that future negotiations should move beyond simple tariff reductions and focus on broader economic cooperation, including reducing non-tariff barriers, promoting investment partnerships, and improving trade facilitation between the two countries. Such measures could help create a more favourable environment for trade expansion and allow both countries to achieve greater benefits from the agreement.

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APPENDIX

Table A1: Regional aggregation of the GTAP database

Code	Comprising old region
Ind	India
Pak	Pakistan
Lka	Sri Lanka
Bgd	Bangladesh
Usa	United States of America
Chn	China
Den	Germany
Gbr	United Kingdom
EU	Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden
Rest of the World	Rest of the World

Source: Simulation results derived from GTAP version 10A (Database 2020)

Table A2: Sector aggregation of the GTAP database

Code	Comprising the old sector
Other Agriculture	Paddy rice, Vegetables, fruit, nuts, sugar cane, sugar beet, plant-based fibres, raw milk, wool, silk-worm cocoons, forestry, fishing, bovine meat products, processed rice, beverages, and tobacco products
Importable Agriculture	Wheat, cereal grains nec, oil seeds, bovine cattle, sheep and goats, vegetable oils and fats, dairy products, sugar
Food Manufacturing	Crops nec, animal products nec, meat products nec, food products nec
Other manufacturing	Coal, oil, gas, minerals nec, beverages and tobacco products, textiles, wearing apparel, leather products, wood products, paper products, publishing, petroleum, coal products, chemical products, basic pharmaceutical products, rubber and plastic products, mineral products nec, ferrous metals, metals nec, metal products, computer, electronic and optical equipment, electrical equipment, machinery and equipment nec, motor vehicles and parts, transport equipment nec, manufactures nec, electricity, gas manufacture, distribution, water, construction
Service Sector	Trade, accommodation, food and service, transport nec, water transport, air transport, warehousing and support activities, communication, financial services nec, insurance, real estate activities, business services nec, recreational and other services, public administration and defence, education, human health and social work, dwellings

Source: Simulation results derived from GTAP version 10A (Database 2020)