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Potential impacts of the African Continental Free Trade Area on agri-food sectors and food security in Ghana

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Contents

Abstract

This study employs the economy-wide model DEMETRA to provide a detailed characterisation of the impacts of the African Continental Free Trade Area on the Ghanaian economy from 2020 to 2035 and how these economy-wide impacts will affect food consumption and affordability. It considers two liberalisation scenarios – tariff-only liberalisation and tariff and non-tariff measures liberalisation – across four potential liberalisation schedules defined by different government revenue, food security and economic development objectives. Results from a continental-level assessment are linked to the DEMETRA model to accommodate changes in international markets as a result of the establishment of the African Continental Free Trade Area. The study shows that tariff-only liberalisation leads to positive effects on trade and that there is a further boost to trade when tariffs are combined with non-tariff measures. A moderate growth in gross domestic product potentially increases capital stock and intermediate goods for manufacturing. Demand for labour in the manufacturing sector also rises, but labour demand in livestock production declines. In terms of food security, prices of processed food generally decline, while prices of cash crops rise. Overall, household consumption of food and other commodities rises. Ultimately, overall government tax revenue falls as a result of a significant reduction in trade taxes, which calls for innovative ways to expand tax collection in country.

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Executive summary

This report addresses the broader framework of trade liberalization under the African Continental Free Trade Area (AfCFTA), with specific implications for the agri-food sectors and food security in Ghana. The report was prepared by the Institute of Statistical, Social and Economic Research (ISSER), University of Ghana, in collaboration with the Joint Research Centre of the European Commission and examines both tariff and non-tariff liberalization measures. The stakes are high for Ghana, as the study explores potential impacts on economic sectors, food security, and government revenue. It offers new insights into how trade liberalization could affect food affordability and household consumption in Ghana, making it relevant for upcoming political debates on food security and trade policies.

The study's findings highlight that tariff-only liberalization leads to moderate GDP growth, driven by expanded trade and reduced consumer prices. The agricultural sector, however, shows mixed outcomes, with positive effects on certain crops like rice and vegetables but a decline in sectors like sugarcane and cotton. The processed food sector will benefit from lower input costs, leading to a fall in prices.

Overall, AfCFTA's implementation will promote trade, but the distributional effects on sectors like agriculture and the reduction in government revenues require close monitoring to safeguard food security and employment.

The report reveals several policy-relevant consequences of AfCFTA's implementation on Ghana's economy. At an aggregate level, AfCFTA could boost Ghana's GDP by up to 0.59% in 2035 compared to no AfCFTA under a combined tariff liberalisation and non-tariff measures (NTMs) cost reduction scenario. Trade volumes are expected to rise significantly, with imports increasing by 9.17% and exports by 8.77%.

For food security, food prices, especially for processed goods, are projected to decline, improving affordability. However, the price of livestock and certain crops may rise due to changes in demand and bilateral trade at the continental level.

At the sectoral level, the manufacturing and processed food sectors are poised for expansion, while agriculture and livestock face contractions under certain scenarios. Employment in manufacturing will increase, but there may be a decline in agricultural and public sector jobs.

Trade liberalization is likely to reduce trade-related tax revenues, prompting the need for alternative revenue-generation strategies. Policy options include introducing compensatory fiscal measures to mitigate tax revenue losses and enhancing agricultural competitiveness to protect vulnerable sectors. New policy measures could focus on supporting food security and promoting domestic industries such as agro-processing.

1. Introduction

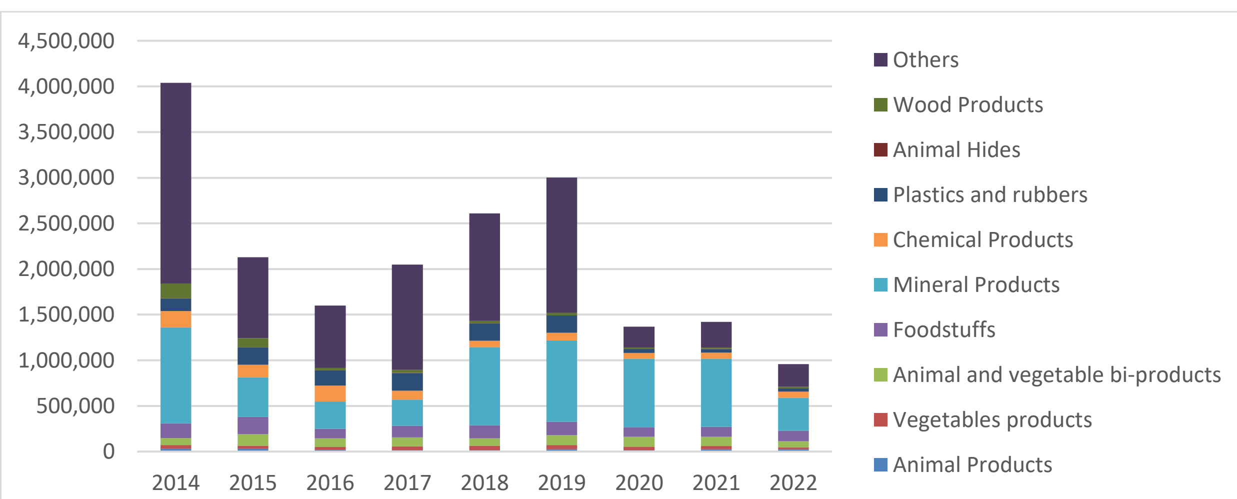
The African Continental Free Trade Area (AfCFTA) agreement entered into force on 30 May 2019 after being ratified by 22 countries. AfCFTA, the world's largest free trade area in terms of participating members, was officially launched on 7 July 2019 during the African Union extraordinary summit in Niamey, Niger (Gohl, 2019). Prior to the establishment of AfCFTA, there existed sub-regional economic communities, including the following: Common Market for East and South Africa, East African Community, Economic Community of West African States (ECOWAS), South African Development Community, South African Customs Union, West African Economic and Monetary Union, and Economic and Monetary Community of Central Africa.

AfCFTA was scheduled to become operational on 1 July 2020. However, commencement of the operationalisation phase of the agreement was postponed to January 2021 due to the emergence of the COVID-19 pandemic. The agreement seeks to reduce tariffs and trade barriers as well as provide trade facilitation measures on the continent. Specifically, 90 % tariffs on intra-continental trade will be removed progressively in line with AfCFTA modalities over a 5- to 10-year period. Non-tariff barriers on both goods and services will be reduced on a most-favoured nation basis. AfCFTA will be accompanied by measures that facilitate trade through implementation of a trade facilitation agreement (World Bank, 2020).

Ghana has ratified the AfCFTA agreement, and its implementation is gradually gaining momentum. The potential benefits of AfCFTA to the entire African content are largely undebatable. AfCFTA brings together countries with a total population of about 1.3 billion and a combined gross domestic product (GDP) of USD 2.5 trillion. The implementation of the agreement will remove tariffs for 97 % of all tariff lines and not less than 90 % of all intra-African trade. However, just like any trade liberalisation scheme, there are likely to be winners and losers in different sectors of the economy. This may depend on the trade relations that already exist between the country in question and the rest of Africa, particularly the value and volume of trade and the items that are already traded.

Between 2014 and 2016, Ghana's trade with Africa dropped from more than one fifth of Ghana's trade to a little over one tenth. Between 2017 and 2019, there was some evidence of recovery, but not to 2014 levels, in either absolute or relative terms (Figure 1).

Figure 1. Ghana's exports to African countries (2014–2022; USD)



Source Authors' compilation from UN Comtrade data

A significant proportion of Ghana's exports to the African continent are gold and crude and non-crude petroleum oils. About a quarter of Ghana's imports from Africa are frozen fish, vehicles for transport of goods and cement products. In 2019, the top three destinations Ghana's exports in Africa were South Africa (over 50 %), Burkina Faso (almost 17 %) and Togo (a little below 10 %). South Africa (around 33%), Nigeria (about 14 %) and Morocco (roughly 9 %) were the top three countries from which Ghana imported products on the African continent. Import tariffs on some of the major agricultural products traded between Ghana and the rest of Africa range between 0 % and 19 % (Table 1). Aside from import tariffs, Ghana's trading costs with other African countries are significantly higher than those when Ghana trades with countries outside the continent such as the United Kingdom, China and the United States. The only exceptions are the ECOWAS countries and South Africa (Raga, 2022).

Table 1. Effectively applied tariff rates on Ghana's top imported products from Africa (2019)

Items	Position on the list of Ghana's top 15 imported products	Effectively applied tariff rates on products from Africa (%)
Frozen fish	1	9
Palm oil and its fractions	5	0
Cane or beet sugar and chemically pure sucrose in solid form	7	19
Onions, shallots, garlic, leeks and other alliaceous vegetables	14	1

Source: Adapted from *Raga (2022).*

Given that the economies of most African countries, including Ghana, are agro-based, a key research and policy issue is how the agricultural sectors of these countries will be shaped following the implementation of AfCFTA and the consequences for food security. In Ghana, just as in other African countries, food security remains an important issue. About 45 % of Ghanaians earn their livelihood from agriculture and related activities (MoFA, GSS, WFP and FAO, 2020). With less than 1 % of cultivated land being irrigated, agriculture in Ghana is largely rain fed, with negative implications for productivity and livelihoods. This situation is exacerbated in northern Ghana, where there is only one rainy season, than in southern Ghana, with two rainy seasons. Poverty and food insecurity in Ghana are largely a rural phenomenon (MoFA, GSS, WFP and FAO, 2020). Recently, however, urban poverty and food insecurity are also becoming a concern, particularly with respect to adequacy and sustainability of food supply, food price and affordability, food safety and quality, and vulnerabilities to food shortages and the capacity to mitigate them (Akparibo et al., 2021).

There are currently protections in place in agricultural and food production subsectors in the country. Ghana is a signatory to the common external tariff (CET) of ECOWAS, which came into force on 1 February 2016. This followed the passage of the Customs (Amendment) Act, 2015 (Act 905), which provided the framework for aligning Ghana's law with the provisions of CET. CET comprises five tariff bands: zero duty on essential social goods such as veterinary drugs; 5 % duty on imported essential foods, raw materials and specific inputs; 10 % duty on intermediate goods; 20 % duty on finished goods (final consumption goods); and 35 % on goods in government-protected sectors, such as poultry and rice.

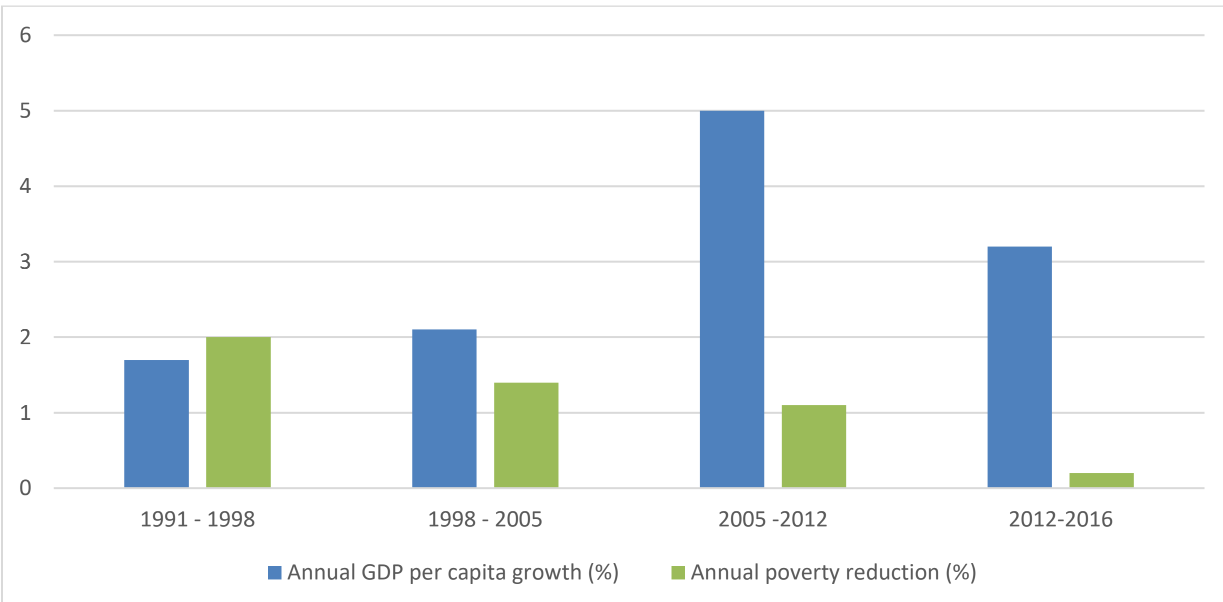
With the opening of the entire economy to the African continent through AfCFTA, the protections in the food subsector will be removed, meaning it will face competition from other African countries. However, it is still unclear how the agreement will impact the food subsector and food security in Ghana. Understanding the qualitative and quantitative effects of AfCFTA on food security and nutrition as well as their distributional consequences will help policymakers initiate policies to either support or mitigate the impact on sectors that will be negatively affected and parts of the population that will suffer from food insecurity and nutrition issues resulting from trade liberalisation.

The main objective of this study is to analyse the implications of AfCFTA on agri-food subsectors in Ghana. This study uses a single-country computable general equilibrium (CGE) model – the Dynamic Equilibrium Model for Economic Development Resources and Agriculture (DEMETRA). Both import tariff measures and non-tariff measures (NTMs) as a means of trade liberalisation are considered. The distributional effects of AfCFTA on agricultural and food system workers are analysed to understand the effect on different groups of people, considering region, income and job (sector of activity).

2. Ghana's economic growth, poverty reduction and food security trajectory

Between 1990 and 2016, Ghana recorded a significant growth in GDP per capita, accompanied by welfare improvement in terms of poverty reduction and an increase in happiness (GSS, 2018; Atta-Ankomah et al., 2024). Between 1991 and 2005, these positive developments in GDP per capita resulted in significant reductions in poverty, averaging 1.4–2 % per annum (Figure 2). However, between 2005 and 2016, poverty reduction slowed considerably (from 2.0 % to 1.1 %), not because growth was stifled, but because the beneficiaries of growth were primarily not the poor (GSS, 2018). That is, the rate at which growth translated into poverty reduction declined substantially (Figure 2). This trend has also been associated with rising inequality, a potential factor driving the declining growth–poverty elasticity in Ghana (Atta-Ankomah et al. 2020, 2023; Osei et al. 2022).

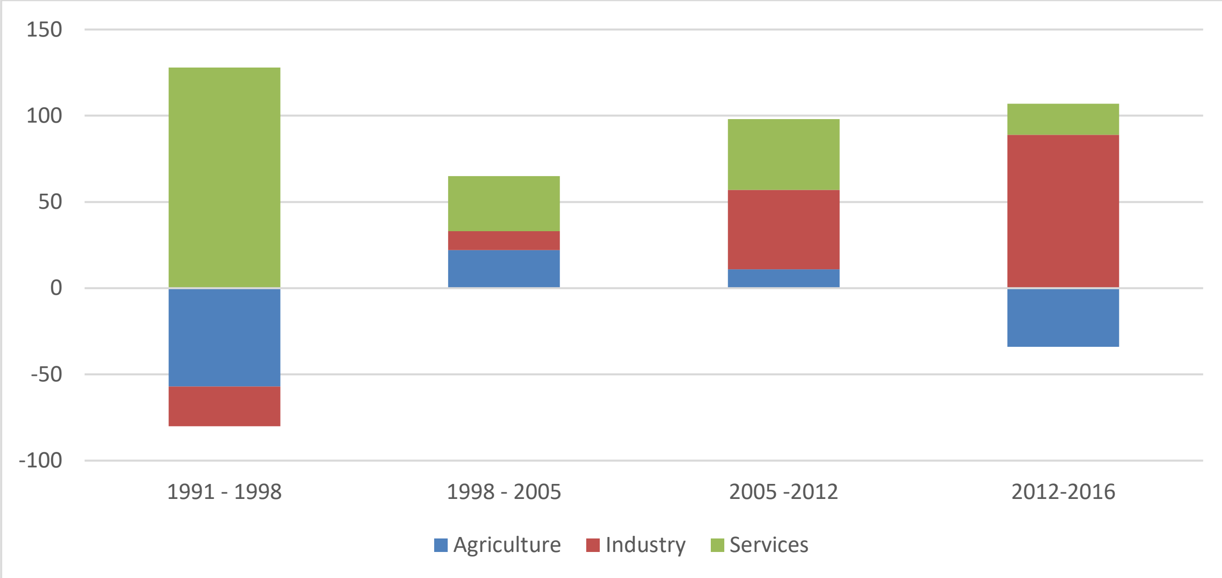
Figure 2. GDP growth and poverty reduction in Ghana (1991–2016)



Source: Authors' compilation of data from the Ghana Living Standards Survey, rounds 3–7.

Between 1991 and 1998, the services sector made a greater contribution to growth in Ghana, while the contributions of both industry and agriculture to growth declined (Figure 3). However, between 1991 and 2005, the agricultural sector's contribution moved from being negative to positive. While this may suggest that workers in the agricultural sector, who are known to be relatively poor, benefited from the growth, thus reducing overall poverty, there may be other factors driving poverty reduction. Although the proportion of Ghana's labour force employed in agriculture declined from about 68 % in 1991 to 40 % in 2016, this figure is still quite large. Therefore, if the agricultural sector does not grow, the consequences for poverty reduction will be negative. As expected, between 2012 and 2016, when Ghana witnessed a decline in the agricultural sector's contribution to growth (Figure 3), poverty reduction slowed down considerably (Figure 2). Between 2011 and 2016, the main contributor to Ghana's GDP growth was industry, resulting from rents in exports of hydrocarbons (crude oil). However, the industry sector employs only about 14 % of the labour force; thus, the gains in this sector did not trickle down to the poor. This period witnessed limited movement of labour from other sectors into industry, compared with movement of labour between the agricultural and services sectors (Atta-Ankomah and Osei, 2021).

Figure 3. Changes in contribution to growth by sector (1991–2016)



Source: UNCTAD, (2019) and World Bank (2020).

Among the three major economic sectors, the services sector is now dominating in terms of contribution to GDP, following a continuous decline in agriculture's contribution to GDP. In 2013, the contributions of the agriculture, industry and services sectors were 21.7 %, 36.9 % and 41.4 %, respectively. In 2020, the services sector made the largest contribution of 47.9 %, followed by industry with 31.6 % and agriculture with the remaining 20.5 %. Although the agricultural sector's contribution to GDP has been declining, its importance to employment, food security and, more broadly, development cannot be overemphasised given that it is largely dominated by the crop subsector. In 2020, the crop subsector alone contributed 16.6 % of the 20.5 % contribution to growth; the remaining 3.9 % was provided by livestock (1.7 %), forestry and logging (1.1 %) and fishing (1.0 %). Despite the fall in the contribution of the agricultural sector, it continues to serve as an important avenue for employment. In 2016, about 47 % of the labour force was engaged in services, 40 % in agriculture and 13 % in industry (World Bank, 2020).

Associated with the structural shift in the sectors' contribution to output is a continuous decline in the poverty rate. However, this decline has begun to slow in recent years. Overall, 23.4 % of Ghanaians are currently living below the poverty line, compared with over 50 % in 1991. There is, however, evidence to suggest that economic inequalities have deepened recently. The rate of inequality calculated using the Gini coefficient stood at 0.38 in 1991 but increased steadily to 0.43 in 2016 (Table 2).

Table 2. Poverty rates and inequalities in Ghana (1991–2016)

Year	Poverty rate (%)	Inequality rate (Gini coefficient)
1991	52.7	0.38
1998	39.5	0.38
2005	31.9	0.42
2012	24.2	0.42
2016	23.4	0.43

Source: Calculations based on the Ghana Living Standards Survey, rounds 3–7.

There are, however, disparities across regions, particularly between those in southern Ghana and northern Ghana in terms of poverty (Table 3). That is, for all three regions of the northern part of Ghana (Northern, Upper East and Upper West) where agriculture is the main employment sector, poverty increased between 2012 and 2016. Another region of concern is the Western region, where a greater share of Ghana's cocoa production occurs. Poverty levels increased over the same period, although the change in poverty rate (0.2 %) is quite low when compared with that of the Northern (10.7 %) and Upper East (10.4 %) regions.

Table 3. Poverty dynamics in Ghana by region (2012–2016; %)

Region	Change in poverty rate between 2012 and 2016	Source of change	
		Growth	Inequality
Western	0.2	3.3	– 3
Central	– 5	– 5.1	0.1
Greater Accra	– 3.1	– 1	– 2.1
Volta	3.4	8.4	– 5
Eastern	– 9.1	– 6.3	– 2.8
Ashanti	– 3.2	– 3.6	0.4
Brong Ahafo	– 1.1	– 0.6	– 0.5
Northern	10.7	7.6	3.1
Upper East	10.4	7.5	2.9
Upper West	0.2	6.8	– 6.6

Source: Calculations based on the Ghana Living Standards Survey, rounds 3–7.

In summary, there is evidence of growth, but poverty reduction is slowing down, especially in regions of the country where agriculture is an important employment avenue. The question is: in what ways can the anticipated continental free trade area help to promote agricultural trade between Ghana and other African countries to the extent that it helps drive down poverty among the labour force engaged in agriculture?

Ghana has promoted agricultural modernisation through subsidies on inputs such as fertiliser, seeds and mechanisation for the food crops subsector under a flagship programme called Planting for Food and Jobs. Since the inception of this programme in 2017, the crops subsector has grown quite considerably – from an annual growth rate of 2.2 % in 2016 to 8.9 % in 2021 (Table 4). There have been other auxiliary initiatives, such as Planting for Export and Jobs and Rearing for Food and Jobs, which target some tree crops and livestock production improvements, respectively. Other programmes, such as One Village, One Dam and One District, One Warehouse, have been initiated to support food production through water supply and robust storage systems to prevent post-harvest losses.

Table 4. Agricultural sector growth rates (2015–2021; %)

	Subsectors					
Year	Crops	Cocoa	Livestock	Forestry/ logging	Fisheries	All
2015	1.7	– 8	5.2	– 3.9	8.5	2.3
2016	2.2	– 7.0	5.4	2.9	3.1	2.9
2017	7.2	9.2	5.7	3.4	– 1.4	6.1
2018	5.8	3.7	5.4	2.4	– 6.8	4.8
2019	5.3	5.4	5.4	– 1.7	1.7	4.6
2020	8.7	1.9	5.4	– 9.2	14.4	7.4
2021	8.9	10.4	5.5	4.7	13.4	8.4
Mean (2015–2021)	5.7	3.8	5.4	– 0.2	4.7	5.2

Source: Ghana Statistical Service, https://statsghana.gov.gh/nationalaccount_macros.php?Stats=MzE2Njk3MDQ0LjUxOA==/webstats/q4q76srp20

Taken together, the results of these initiatives show some progress on the production side. To deepen the gains from production, the Government of Ghana has also implemented policies to increase the value added through manufacturing that builds linkages with the raw material base of the economy, especially agriculture. The government has therefore embarked on an industrialisation programme called One District, One Factory (1D1F). The 1D1F programme seeks to establish a factory in every district of the country, with a view to adding value to raw materials available in those districts. Given that many of the districts produce agricultural raw materials, including cereals, legumes, fruits, vegetables and nuts, many of these factories are anticipated to be agro-processing based. The question is: if Ghana succeeds in its agricultural modernisation and agro-processing drive through the Planting for Food and Jobs programme and the 1D1F, where will the products go? Of course, the Ghanaian and ECOWAS markets could absorb a portion, but is the rest of the African continent an option as the anticipated free trade area enters into operation?

Finally, food security is a fundamental aspect of human and social development. Food security describes a situation in which ‘all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (World Food Summit, 1996). Based on the 2020 *Comprehensive Food Security and Vulnerability Analysis (CFSVA)* for Ghana, food insecurity stands at 11.7 %, implying a food-insecure population of 3.6 million people (MoFA et al., 2020). Out of the 3.6 million food-insecure people in the country, 5.2 % are severely food insecure and 6.5 % are moderately food insecure. Furthermore, 78 % and 22 % of Ghana’s 3.6 million implied food-insecure people are located in rural areas and urban areas, respectively. The results also show that 18.2 % of Ghana’s rural population are food insecure, of which 7.3 % are severely food insecure and 10.9 % are moderately food insecure. The findings further show that 5.5 % of Ghana’s urban population are food insecure, of which 3.2 % are severely food insecure and 2.3 % are moderately food insecure (MoFA et al., 2020). The question is: will full-scale trade liberalisation make food available, accessible and affordable to Ghanaians and help reduce the level of food insecurity?

3. Related literature

3.1. Trade liberalisation, growth, tax revenues and employment

Traditional trade theory predicts growth gains from openness at the country level through specialisation, investment in innovation, productivity improvements or enhanced resource allocation (Zahonogo, 2016). The costs arising from reducing trade barriers in the wake of trade liberalisation is the loss in tariff revenue of governments in developing countries (Moller, 2016). If tariffs are reduced or eliminated, these countries may increase other domestic taxes in order to balance their budgets (Blejer and Cheasty, 1990). This could cause some distortions within the economic environment. Agriculture may also be affected by liberalisation – removing barriers to agricultural imports too quickly can lead to displacement of the rural labour engaged in the sector as a livelihood. Standard economic models assume that these people are re-employed in other sectors of the economy, but rapid liberalisation can lead to substantial unemployment and underemployment, as well as social and economic instability (Schneider, 2006). This may also lead to an uneven distribution of 'gains and pains', where the gains are distributed across the economy, while the burdens of adjustments are borne mainly by a particular group (Yasmin et al., 2006).

Empirical studies suggest that trade liberalisation measures that encourage more openness by removing tariff and non-tariff barriers have both positive and negative effects. For example, Onafowora and Owoye (1998) used a vector error correction model to examine the likely effects of changes in trade policies, exports and investment on economic growth in 12 sub-Saharan African (SSA) countries. Their results indicated that changes in trade policies, exports and investment would have a positive and significant impact on economic growth in 10 of the 12 SSA countries. The study, therefore, suggests that it is possible to stimulate economic growth in some African countries through an outward-looking strategy of export expansion. Similarly, Manni and Afzal (2012) assessed the impact of trade liberalisation on Bangladesh's economy between 1980 and 2010. The study examined the impact of trade liberalisation on growth, inflation, and exports and imports using an ordinary least squares technique. Their analysis indicated that GDP growth increased as a consequence of liberalisation but inflation was not affected. Both real exports and imports increased with greater openness. Liberalisation policy increased exports of the country, which eventually led to higher economic growth after the 1990s. The findings of this study provide an interesting example for trade liberalisation policy study in developing countries.

On the other hand, Baunsgaard and Keen (2010) noted that, with public finances of many developing and emerging market countries still heavily dependent on trade tax revenues, further trade liberalisation could hinder their revenue mobilisation unless alternative sources of revenue are developed. Their study, which used panel data for 117 countries over 32 years, found that high-income countries are able to recover revenues lost from trade taxes as a result of liberalisation; middle-income countries are likely to recover; and low-income countries are not quite able to recover – although their replacement process seems to be growing over time. Thus, while richer countries have alternative sources of revenue such as more robust value added tax (VAT) and property tax systems to offset the loss of revenue from liberalisation, it takes poorer countries a longer time to find replacements for the lost revenue.

A study by Chinembiri (2010) modelled the effects of trade on employment in South Africa in a labour demand framework. The study used aggregated data, as opposed to a number of studies that used either factor content or growth accounting approaches. The paper examined the extent to which imports, exports, wages and output impacted upon employment levels across the primary, secondary and tertiary sectors at the aggregated level of the standard industrial classification. The analysis revealed that the derived labour demand in the primary sector (agriculture, fishery forestry and mining activities) and the secondary industries (manufacturing, utilities and construction) were negatively impacted by increased imports. However, the study was not able to establish any evidence that increasing export openness increased the derived labour demand in any of the sectors.

3.2. Free-trade zones, gross domestic product growth and welfare effects

Free trade implies sub-regional, regional and continental trade agreements whereby goods and services can be exchanged without underlying restrictions on trade among nations (Abubakari et al., 2021). Free trade has not been attained globally, but regional trading blocs provide some mechanisms for free trade. These regional groupings try to remove trade restrictions among their members but maintain some restrictions for third parties. Participation in free-trade zones has significantly grown in the last 50 years. As a result, regional groupings have evolved, such as the EU, Caribbean Community and Common Market, Central American Common Market, Latin American Integration Association, Association of Southeast Asia Nations, Mercosur, Southern African Customs Union, Common Market for Eastern and Southern Africa, East African Community, Economic Community of Central African States, ECOWAS, Arab Maghreb Union, Community of Sahel–Saharan States, Intergovernmental Authority on Development, and Southern African Development Community.

The largest and most successful of the regional groupings is the EU. It has achieved the highest level of integration by establishing an economic and monetary union. The EU constitutes a very small portion of the world population, accounting for 6.3 %, but commands 20 % of world GDP and more than 40 % of world exports. The EU and its Member States organised a huge amount of resources for economic recovery following the global financial crisis. In Africa, despite the growing number of regional economic integration groupings, economic growth achievement remains very poor. There are therefore mixed results when regional groupings are evaluated. Despite these mixed results, the United States, the largest economy in the world, has joined two other nations, namely Canada and Mexico, to form the North American free trade agreement.

According to the World Bank (2020), AfCFTA has the capacity to lift 30 million people, representing 1.5 % the continent's population, out of extreme poverty and lift 68 million people out of moderate poverty. The poverty headcount is expected to decrease by 12 million in West Africa. In central and East Africa, the poverty headcount is expected to decline by 9.3 million and 4.8 million, respectively. The implementation of AfCFTA is expected to boost employment opportunities in member countries and increase wages for unskilled labour as well as close the gender wage gap. Potential benefits of AfCFTA to businesses include economies of scale, access to cheaper raw materials and intermediate inputs and greater utilisation of technology and knowledge transfer (International Trade Centre, 2018).

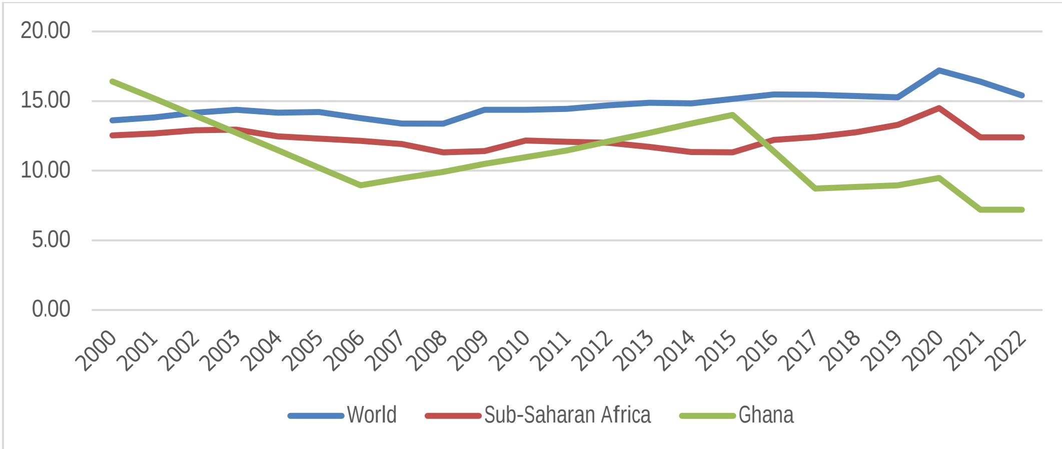
Trade among African countries is expected to rise by 81 % while trade with non-African partners will rise by 19 %. Countries such as Cameroon, Egypt, Ghana, Morocco and Tunisia are expected to experience a fast rise in intra-African trade, with exports doubling or tripling. The manufacturing sector is expected to gain the most, followed by the agricultural sector. Gains within the services sector are projected to be the lowest. Overall, AfCFTA is expected to boost output and productivity on the continent. It is estimated that production on the continent will reach USD 212 billion by 2035 (World Bank, 2020). The short-term effect of AfCFTA on tax revenue will be small for most countries. It is projected that revenues from tariffs will decline by less 1.5 % in 49 member countries and tax revenues will decline by not more than 0.3 % in 50 member countries. The small impact on revenues can be explained by the small share of revenues that come from tariffs on imports from African countries (less than 10 %, on average). In the medium to long term, revenues from tariffs are expected to grow by 3 % by 2035 as imports rise due to the reduction in non-tariff barriers and implementation of trade facilitation measures (World Bank, 2020).

The agreement could affect four economic aspects: income; income distribution; employment; and tax revenue. We discuss these in turn. First, the effects of AfCFTA on income, welfare and trade could be negative or positive depending on the country in question. It is difficult to say whether AfCFTA will improve incomes, welfare and trade for member countries. Lowering trade barriers could expand countries' ability to trade, and that can increase incomes and welfare. However, with barriers removed among member countries, their trade with non-members with whom more efficient trade ties exist may be curtailed, and this could have negative welfare outcomes. Empirical studies suggest that elimination of import tariffs results in small income and welfare gains. Removal of non-tariff barriers produces a much larger effect. For example, a study undertaken by Abrego et al. (2019) suggests that removal of tariffs will result in a 0.07 % welfare gain in SSA. Similarly, the removal of 35 % of non-tariff barriers will result in a 2.6 % welfare increase in SSA. These effects vary across countries and are influenced by the country's existing conditions. Although all African countries will experience a net welfare increase, some will gain more than others, in an uneven way. In fact, some may even lose (Simola et al., 2021). Trade will also grow, and countries that faced higher trade barriers prior to the inception of the agreement will benefit more. Overall, the continent's trade growth is estimated at 8 % by Abrego et al. (2019).

Second, the agreement could contribute to inequality in income distribution, as suggested by some empirical studies (Wagle, 2007; Anwar and Sun, 2012). In other instances, trade liberalisation could reduce inequality, especially if it allows for labour mobility (Acharya et al., 2012). There exists significant evidence to suggest that the impact of trade liberalisation on inequality is inconclusive (Mumuni and Abille, 2023). Thus, going forward, key stakeholders on the continent and in Ghana must consider the effects on income distribution and approach the management of the agreement with the potential risks in mind. The question here is: how can you ensure that some economic agents, especially vulnerable workers engaged in agricultural value chains, do not lose as a result of this agreement? Given that existing studies support the idea that trade rewards skills, as technological developments brought about by trade tend to favour skilled labour, the question is: how will different types of household in Ghana (rural/urban, rural – agricultural, urban – agricultural), as predominantly informal producers and consumers who are mostly unskilled, be affected? In addition, how do we prepare them to navigate the process? Depending on how different sectors of the economy are affected, we will potentially see significant distributional effects.

Third, unemployment in Africa, especially youth unemployment, is on the rise and more endemic than in other regions of the world. The International Labour Organization's modelled data put youth unemployment for SSA at 12.7 % in 2020. Different countries have different levels of unemployment. Informal markets, which employ a significant proportion of the population, appear to be heavily unregulated, but are potentially susceptible to trade policies that enhance or disrupt access to the goods traded in these markets. The more regulated formal markets are proportionately small and have capital requirement barriers, which young people and poorer sections of the population cannot easily participate in, either as suppliers or consumers. These characteristics can influence the effects of AfCFTA on employment in Africa. Reducing trade barriers can cause some sectors to expand and others to contract. It is expected that labour within the contracting sectors will gradually transition into the expanding ones. This creates transitional unemployment, which can persist for a long time. In the case of Ghana, unemployment is quite high, especially among young people, and rose between 2006 and 2015 (Figure 4).

Figure 4. Youth unemployment (% of labour force aged 15–24; modelled ILO estimate)



Source: World Bank (https://databank.worldbank.org/source/sustainable-development-goals-(sdgs)/Type/TABLE/preview/on).

Given that the potential for new jobs to be created is most likely to benefit skilled workers, creating pathways to help informal and semi-skilled workers in agricultural value chains should be paramount for policymakers and industry leaders. Developing value chains governed by firms within or outside Ghana that rely on the agricultural sector for the provision of certain inputs and products will be key.

Fourth, the impact of AfCFTA on tax revenues is a critical aspect. For example, direct revenue losses could result from the removal of tariffs on trade within Africa, and if incomes rise as a result of increased trade, then domestic tax revenues could also rise. Currently, estimated tax losses following the implementation of AfCFTA range from no losses for countries such as Egypt to about a 3 % loss per annum for countries such as Mali (World Bank, 2020). As usual, the impact will vary across countries. Countries with higher welfare gains will also experience higher tax revenues.

In addition to the above, cheaper imports resulting from AfCFTA could drive the price of food commodities down and increase affordability for poorer households, thus improving their food security status. However, if it becomes more lucrative for food crop producers to export their produce as a result of AfCFTA, it could deprive some parts of the Ghanaian populace of the opportunity to access cheaper locally produced foodstuffs. Similarly, if producing cash crops for export becomes more profitable for producers, then some may convert their food crop farmlands into cash crops, and this could have a negative impact on food availability for Ghanaians.

One potential approach to unpacking how Africa in general, and Ghana in particular, will be affected is CGE modelling. Although some global and African analyses (including Ghana) (Simola et al., 2021) have been undertaken, studies using this approach to evaluate in detail the possible implications of trade liberalisation in general, and of AfCFTA in particular, for Ghana's economy are quite limited and dated in some cases. For example, Bhasin (2011) used CGE models and the 1999 social accounting matrix (SAM) to examine the impact of unilateral partial trade liberalisation on poverty and income distribution in Ghana. CGE models were used in this study to analyse the impact on poverty of three different types of shocks – partial trade liberalisation alone, and partial trade liberalisation combined with foreign capital inflows and with VAT – in 12 scenarios. The study applied the scenarios to agricultural trade and industrial trade to determine the incidence, depth and severity of poverty and their impact on the income distributions of households. The study found that eliminating trade-related import and export tariffs on agricultural goods and import tariffs on industrial goods in isolation, combined with foreign capital inflows and with VAT, reduces the incidence, depth and severity of poverty among all categories of households, with the exception of the incidence of poverty among public sector employees and the non-working group when import tariffs on industrial goods are eliminated in isolation.

On the other hand, elimination of trade-related export tariffs on industrial goods in isolation and combined with foreign capital inflows increases the incidence, depth and severity of poverty among all categories of households, with the exception of the incidence of poverty among the non-working group. Moreover, elimination of trade-related export tariffs on industrial goods combined with VAT reduces the incidence, depth and severity of poverty among all categories of households. The study found that income distribution among private sector employees and the non-working group improves to a larger extent when trade liberalisation in isolation is considered. For agricultural households, on the other hand, income distribution improves to a larger extent when trade liberalisation is combined with foreign capital inflows and VAT.

Quartey et al. (2006) also investigated the effect of trade liberalisation on poverty and income distribution among households in Ghana, using the calibrated 1993 SAM for Ghana and a CGE model. Their paper examines the extent to which trade liberalisation has affected economic growth in Ghana. Since trade liberalisation leads to tariff reduction, in their first simulation they reduced the import tariff on all imports to 20 %. In the second simulation, they reduced the export tariff on all exports to 20 %. The tariff rates they used were in line with the then proposed ECOWAS common external tariff. The study found that elimination of trade-related import and export taxes could reduce the incidence, depth and severity of poverty in low-income countries. The paper suggests that although trade liberalisation can lead to poverty reduction, over-liberalisation can be harmful to local producers, since foreign products that are already established outcompete local manufacturers. Second, liberalisation should ensure that no dumping of products occurs; the situation where developed countries subsidise products, particularly agricultural products that are sold on developing countries' markets, should be discouraged. The main limitation of this single-country approach is its inability to account for changes happening in other countries or within the ECOWAS bloc and beyond. Our present study overcomes this gap by adding continental-level changes in bilateral trade using the Modular Applied General Equilibrium Tool (MAGNET).

Zamani et al. (2021) also analysed the potential effects of trade policies (increasing tariffs and abolishing tariffs), the 2020 partial ban on poultry product imports from some European countries in November 2020 due to avian influenza subtype H5N8, and a potential complete ban on poultry imports on Ghanaian poultry trade, imports and production using a modified CGE model and typical farm analysis. Their findings showed that the partial ban had a smaller effect on trade and the whole economy than a total ban. However, the effect of a total ban on domestic producers was more significant.

Mensah (2019) analysed the impact of trade liberalisation on sectors, region and households defined by quantile income distributions in Ghana using a CGE model. Given the fact that Ghana is largely dependent on trade in agricultural commodities and that most of Ghana's trade agreements with international partners are reciprocal in nature, Mensah (2019) constructs a baseline model and tests the impact of a policy that reduces tariffs for all imported agricultural commodities by 20 %. Ghana's liberalisation agreements are not only reciprocal in nature but also come with some aid from its non-African trade partners. Although Mensah (2019) agrees that this aid could be modelled as exogenous by adding a transfer to the government revenue equation, the study does not do this. This is because the difficult conditions usually attached to some of these transfers makes it impossible to achieve; difficult periods of fiscal deficits means that governments have to rearrange some of these policies; and if the package allows governments to borrow, it leads to large public debt. Household income groups defined by location, economic activities and income quintiles are examined using the 2013 SAM for Ghana. The study finds that trade liberalisation negatively affects the total and factor income and consumption spending of rural farm households, while it benefits urban non-farm households.

There are many studies that have assessed the impact of trade liberalisation in general on some economic and social variables in Ghana. However, studies that pay attention to the potential impact of AfCFTA by factoring in continental-wide effects into country-level modelling frameworks seem to be limited. Nevertheless, Nechifor et al. (2021) and Maskaeva et al. (2024) undertook similar studies in Kenya and Tanzania, respectively. This study looks at the likely results of the implementation of AfCFTA in Ghana, taking into account the availability of the 2015 SAM, which allows for more granular distributional analysis.

4. Data and methodology

4.1. Description of the social accounting matrix

The Ghana SAM (Ferreira et al., 2021), which was prepared in 2015 by the Ghana Statistical Service together with the Institute of Statistical, Social and Economic Research (ISSER) and the International Food Policy Research Institute (IFPRI), is relied upon for this study. Specifically, we used the 2015 SAM ([1]), modified by the Joint Research Centre (JRC) of the European Commission (Ferreira et al., 2021), and disaggregated it further using data from the 2016/2017 Ghana Living Standard Survey Round 7 (GSS, 2019) and the 2015 Labour Force Survey (GSS, 2016). The SAM is appropriate for the analysis of the key socioeconomic issues, including employment, poverty, growth and income distribution, and trade. As data on households' behaviour are integrated with national accounts, similarly to all other SAMs, the Ghana SAM captures macro transactions of an economic system based on micro-level transfers between all agents in the economy (Mainar-Causapé et al., 2018).

The JRC-modified 2015 SAM for Ghana consists of 45 sectors or activities (10 household agricultural activities or home producers and 35 activities); 69 commodities (14 home commodities and 55 marketed commodities); and 100 household groups, disaggregated into income quintiles for 10 regions and by rural/urban, region and quantiles and 4 taxes accounts). It also has 74 factors of production (60 labour accounts, 10 land factors and 4 capital factors).

There are six food subsectors that could potentially be affected by AfCFTA: meat, fish and dairy; fruit and vegetable processing; fats and oils; grain milling; sugar refining; and other foods and beverages and fertilisers. Key marketable agri-food commodities likely to be affected by AfCFTA implementation include maize, sorghum and millet, rice, pulses, groundnuts, other oilseeds, cassava, other root vegetables, sugar cane, tobacco, cotton and fibres, fruits and nuts, cocoa, coffee and tea, other crops, cattle poultry, other livestock, fishing, meat, fish and dairy, fruit and vegetable processing, fats and oils, grain milling, sugar refining, and other foods and beverages.

4.2. The model

This study relies on CGE models, which are amenable for analysing the distributional implications of trade liberalisation. CGE models enable assessment of the micro effect of economic policy change and investigation of the second-round effect (containing behavioural responses to a given policy direction) of policy change (Bourguignon et al., 2008). In addition, CGE models allow for the introduction of various market imperfections specific to a given economy. Thus, specific market imperfections in Ghana can be introduced to test their effects relative to the hypothetical neoclassical equilibrium (Mensah, 2019). Labour market imperfection is a dominant phenomenon in the Ghanaian labour market where the labour market is segmented, preventing the free flow of labour across different activities, and with corresponding permanent disparities in wages across different sectors. Thus, accommodating imperfect mobility of labour among markets segments depending on different activities and therefore different wages paid by firms across different activities is critical for accurately modelling the structure of the Ghanaian economy. Moreover, CGE modelling using the SAM captures inter-industry linkages between sectors of the economy, which enables analysis of policy changes from an economy-wide perspective.

([1]) The updated 2015 Ghana SAM was used because the 2019 Ghana SAM was not available when this work began.

This study uses a single-country CGE model named the Dynamic Equilibrium Model for Economic Development Resources and Agriculture (DEMETRA). DEMETRA(2), developed by JRC, comprises a large number of economic sectors and household types. The model is able to describe the Ghanaian economy and its relationship with the rest of the world, including the Africa continental region.

Key features of the DEMETRA model include the following.

- Output is produced through a constant elasticity of substitution production function nested with the possibility of specifying separate market and home production functions.
- The model assumes a small open economy whose domestic activities cannot affect global prices. In this regard, household demand can be obtained from both domestically produced goods and imports. In a similar manner, marketed commodities output produced domestically can be either consumed locally or exported.
- Production of marketed commodities is separated from that of subsistence commodities, which are assumed to be non-marketed commodities only for home consumption. This specification allows for the study of semi-subsistence agriculture where production and consumption decisions are not separable.
- Perfect competition assumptions are made for the determination of prices and quantities of output. Thus, prices and quantities are not subject to market power on the supply or demand side.

The results of various policy experiments relating to AfCFTA implementation and other trade policies relating to the agri-food sector are compared with benchmark results to analyse the possible impact of the policies.

4.3. Policy scenarios

The DEMETRA model for Ghana simulates the effects of trade liberalisation at the country level only. Thus, to capture the trade creation and trade diversion effects as a result Ghana’s participation in the AfCFTA, the DEMETRA model is linked to the global multiregional CGE model MAGNET (Woltjer et al., 2014), calibrated using the Global Trade Analysis Project (GTAP) database, version 10 (Aguiar et al., 2019).

The two models are linked in a top-down fashion related to the exports and imports structure of the two models. In the global MAGNET model, export changes in one region are determined by the import changes of all trade partners. In this way, both price and trade quantities are determined endogenously. Conversely, in the country model, DEMETRA, the trade partners are explicitly modelled as the rest of the world (ROW) and the export decisions of a producer are determined by the CET function based on the relative difference between the domestic commodities price and the world export price. In this setting, either the price is set exogenously and the quantity varies endogenously or vice versa.

(2) DEMETRA is a development of the STAGE_DEV models documented in Aragie et al. (2016). STAGE_DEV is a variant of STAGE_2 (McDonald and Thierfelder, 2021) that incorporates a series of additional behavioural relationships that better account for economic relationships in developing countries, such as the dual role of semi-subsistent agricultural households, a nested consumption function, the endogeneity of the functional distribution of income, domestic migration and factor market segmentation. The recursive dynamic version of DEMETRA is derived from the STAGE_DYN model and STAGE_DEV_DYN models (https://datam.jrc.ec.europa.eu/datam/model/DEMETRA/documentation.html).

Therefore, when the two models are linked, the modeller chooses which variable, price or quantity should be exogenous and which should endogenous.

First, liberalisation scenarios similar to those described in Section 4.3.1 were run in the MAGNET model. The results from this model represent the changes in bilateral trade after tariff and NTMs liberalisation at the continental level. Changes in the import prices from the MAGNET model, tariff reductions and rent-generating NTMs were then introduced in the DEMETRA model as exogenous shocks. The changes in import prices from the MAGNET model were aggregated into a single ROW trade partner for Ghana. The exogenous world import price in the DEMETRA model was then simulated, following these import price changes from MAGNET. Moreover, the iceberg NTMs (non-rent generating) were included in DEMETRA as efficiency gains of each commodity variety imported are affected by NTMs. After the inclusion of price and NTM changes in the DEMETRA model, the import quantities were determined following the Armington specification of trade, which is a similar function in MAGNET. Trade elasticities obtained from the GTAP database were applied to better align the two models.

To better align the exports, the study followed the approach in Horridge and Zhai (2006) and introduced an export demand function in the DEMETRA model (equation 1). With this function, the export price and quantity information from the MAGNET model were introduced as exogenous export demand shift parameters arising from trade interactions taking place due to the AfCFTA across the continent and in the ROW (equation 2).

$$QE = \left(\frac{FP}{PWE}\right)^{\frac{1}{ESUBM}} \tag{1}$$

$$\Delta FP = \left(\frac{QE_{magnet}}{QE_{base}}\right)^{\frac{1}{ESUBM}} \times \frac{PE_{magnet}}{PE_{base}} \tag{2}$$

where *QE* is export of commodity, *PWE* is the world export price and *PE* is export price.

4.3.1. Liberalisation schedules

The impacts of the free-trade agreement are considered across the following four liberalisation schedules.

1. Tariff revenue (REV). Tariff liberalisation seeking government revenue maximisation. The authors consider this the main liberalisation schedule, as it responds to immediate government revenue concerns.
2. Agricultural trade (AGR). A full liberalisation of agri-food tariffs to improve food access, with government revenue maximisation a secondary objective.
3. Intermediate inputs trade (INT). The promotion of industrialisation through full liberalisation of intermediate input products, with government revenue maximisation a secondary objective.
4. Revealed comparative advantage (RCA). Improving the efficiency of competitive sectors by fully liberalising sectors with RCA, with government revenue maximisation a secondary objective.

The four liberalisation schedules were calculated at a continental level a priori to the model simulation (see further details in Simola et al. (2021, 2022)). This implies that for each schedule, all AfCFTA countries share the same policy objectives and base their tariff reductions on revenue calculations; these do not consider potential changes in trade volumes as a consequence of the implementation of these tariff reductions. Furthermore, this optimisation exercise involves only tariffs and thus excludes revenue changes from NTMs liberalisation.

The simulation scenarios in this study include both a tariff-only (‘tar’ variant) reduction in the 2025–2035 period and tariff with NTMs liberalisation (tar + NTMs variant), with the NTMs reduced gradually over a 10-year period up to 2035. In line with the continental-level study, the NTMs are assumed to decrease in this time horizon by 50 % for all intra-African trade and by 25 % for trade between AfCFTA members and the ROW. The first assumption, from Annex 5 to the AfCFTA treaty, accounts for the continued efforts of member states to reduce costs related to trade barriers. The second assumption accounts for the rest of the world's easier access to African markets, given the harmonisation of standards across the 54 AfCFTA member states.

Specifically, in the Ghanaian case, we concentrate on three broad activity areas in the agri-food system: inputs, production and processing. In Table 5, we enumerate specific products in these activity areas and state some reasons why it is important to examine them using the DEMETRA model. We discuss this with the backdrop that Ghana is promoting agricultural modernisation through input subsidies and technology transfer and an industrialisation agenda anchored on agro-processing. We also recognise that the middle-level activities of the agri-food system, including processing and value addition, are not quite developed, and it will be interesting to see how these related products evolve as continental free trade begins. To examine the effects of AfCFTA on food security in Ghana, we use increases in consumption as a proxy for availability and decreases in prices as a proxy for affordability.

Table 5. Products for consideration in the simulations

Activity	Product	Reason for interest
Production of inputs (intermediate inputs)	Machinery and equipment	Agricultural mechanisation is being promoted by the Ministry of Food and Agriculture in Ghana. To this end, the 2023 budget makes provisions for the supporting an industry that will assemble some of the basic mechanisation equipment in Ghana and, possibly, begin to manufacture them in future. Given that other countries such as South Africa are relatively more advanced in the manufacture of such farm tools, will free trade stifle Ghana's attempt to produce the same or not?
	Chemicals	Any modern agri-food system relies heavily on fertiliser and other agrochemicals. There are a lot of discussions about using Ghana's gas reserves from petroleum fields to support the production of fertilisers in the country. That is yet to happen. What are the implications of AfCFTA for these plans?
Primary production of agricultural commodities	Rice	In 2010, Ghana produced about one third of its rice consumption needs. Currently, Ghana produces about 49 % of its consumption of rice. This has been achieved through investment in research, technology transfer, improvements in milling and promotion of consumption of Ghana-grown rice. Will this strong rise in production of rice continue or decline in the face of AfCFTA?
	Vegetables	The Planting for Food and Jobs programme is supporting the production of vegetables such as tomatoes with a view to helping Ghana increase its self-sufficiency. There have been arguments that many supermarkets are filled with vegetables imported from other countries on the continent. How will this situation be affected by AfCFTA?
	Poultry	Ghana's poultry industry depends on both locally produced and imported cereals. For instance, an important source of maize for Ghana's poultry industry is Côte d'Ivoire. This is expected, since Côte d'Ivoire is very near to Ghana geographically. In addition, under ECOWAS arrangements there are no tariffs. Will we see more maize and other legumes coming from further afield on the African continent into Ghana because of free trade? How will this increase affect Ghana's poultry industry, which sometimes struggles to cope with the price of maize in the country?

Activity	Product	Reason for interest
	Sugar cane	Will farmers produce more of the crop, or will production decline because of potential imports of the crop from other parts of Africa because of free trade?
Agro-processing	Fruit and vegetable processing	The 1D1F programme has given renewed commitment to the processing of fruits such as pineapples. New processing plants have been set up to augment existing ones (in the Central and Ashanti regions). These factories are expected to increase production of these fruit crops, only if there is a market for the processed products both within and outside Ghana. Will AfCFTA create this market, or will countries such as Côte d'Ivoire and South Africa, which have a relatively more developed industrial sector, take the lead and capture the market on the continent?
	Sugar refining	Ghana has rehabilitated its main sugar processing factory. However, farmers of the crop have generally failed to produce the volume of raw sugar cane needed to make the plant viable and efficient. Will the liberalised trade environment allow Ghana to import raw sugar cane and use it to feed its plant?
	Beverages	Under the 1D1F programme, some processing of cereals into beverages and baby foods are being promoted. How will AfCFTA affect this? Will cheaper imports curtail the local drive to process cereals? Or will the removal of tariffs encourage Ghana to produce more and export?

Source: Authors.

5. Results and discussion

5.1. Macroeconomic impacts

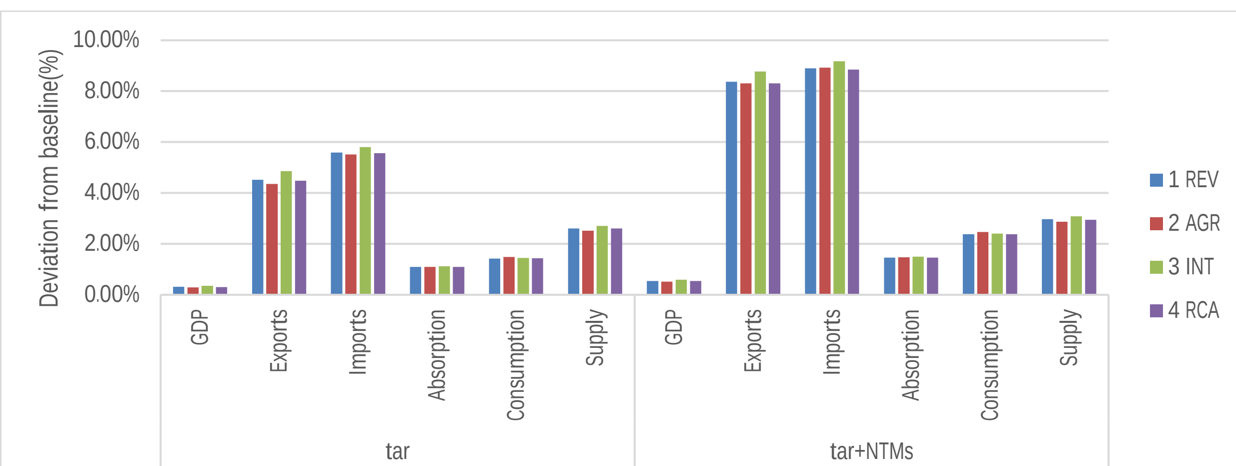
Contrary to the aggregate outlook presented by continental studies, the effect of AfCFTA on the Ghanaian economy is not insignificant, even when considering tariff-only liberalisation. Results show that tariff-only liberalisation leads to a GDP increase of between 0.31 % and 0.35 %, with a pronounced effect on aggregate supply (2.51–2.71 %) by 2035 (Figure 5a). The impacts on trade (imports and exports) are positive. Nevertheless, the effect on imports is about 1 percentage point higher than exports. Exports will expand by between 4.36 % and 4.86 %, while imports will expand by between 5.57 % and 5.80 % depending on the liberalisation schedule.

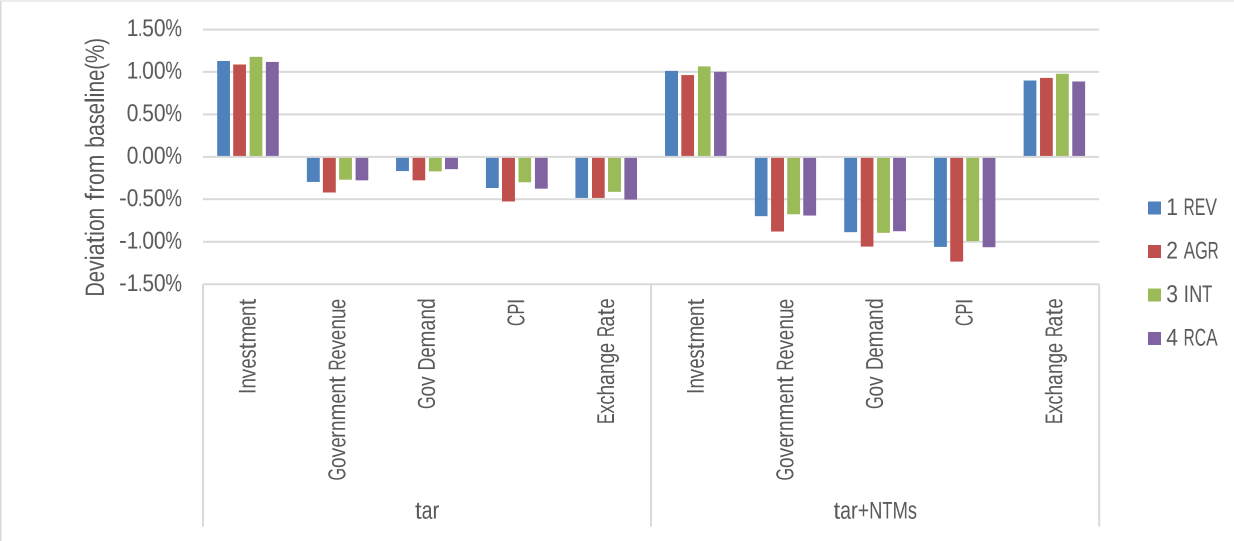
Of the four liberalisation schedules, INT and REV are important determinants of the magnitude of import and export increases. Effectively, the increasing levels of trade and the reduction in tariffs also drive down consumer prices (– 0.30 % to – 0.37 %), with potentially positive welfare implications. Investment grows by 1.12–1.18 % above the baseline. Both government revenue and, naturally, government demand will fall by 2035 under the tariff-only liberalisation, all things being equal (Figure 5b).

A combination of tariff and NTMs liberalisation gives a further push to GDP gains over the baseline (0.52–0.59 %). It also boosts trade further. With trade bottlenecks such as border constraints, number of check points and illegal fees reduced, imports increase faster (8.85–9.17 %) than exports (8.30–8.77 %). Notice, however, that the trade balance or deficit observed under tariff-only liberalisation is much higher than those observed when we expand into NTMs, suggesting that trade barriers are more detrimental to exports than to imports. This reduction in the trade gap leads to further reduction in the consumer price index (– 1.06 % to – 1.23 %).

The results show a depreciation of the Ghanaian cedi (0.89–0.98 %), which is consistent with an improvement in the trade balance by 2035 for tariff-only liberalisation. On the other hand, a combination of tariffs and NTMs results in an appreciation of the cedi (0.88–0.98 %). With significant increases in imports, domestic aggregate supply increases marginally (2.88–3.09 %) over the baseline when compared with tariff-only liberalisation. Although consumption increases with NTMs, the effect of NTMs on investments is not significantly different from what we observe under tariff-only liberalisation in 2035 (Figure 5b).

Figure 5. Macroeconomic impacts of AfCFTA across liberalisation schedules in 2035





Source: DEMETRA results.

5.2. Trade impacts

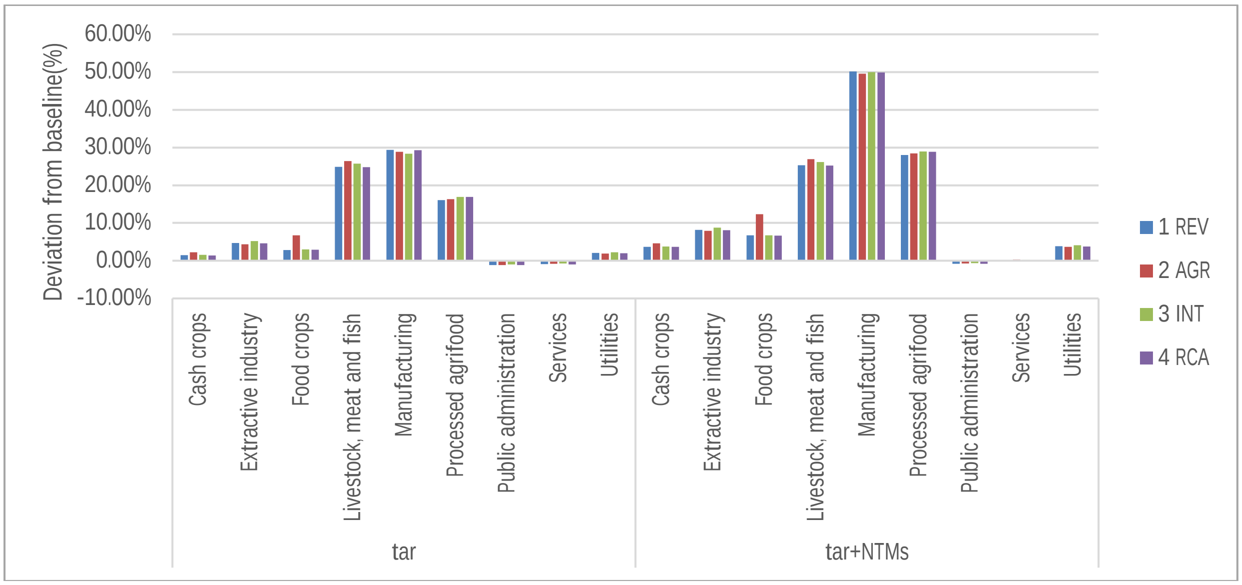
Tariff-only liberalisation leads to positive results for the exports of the main product groups, except public administration and services, which fall slightly by 2035 (Figure 6a). By 2035, exports from the manufacturing, livestock, meat and fish, and processed agri-food product sectors will expand by 28.34–29.37 %, 24.78–25.68 % and 16.35–16.89 %, respectively, depending on the liberalisation schedule. Thus, these three product groups will experience a double-digit percentage increase in exports. Given the baseline value of manufacturing exports of USD 334.3 million, a 28.34 % increase would see the value rise to USD 429 million by 2035. Similarly, the baseline value of livestock, meat and fish exports of USD 4.5 billion would see a significant increase by USD 1.1 billion to USD 5.6 billion by 2035 using the lower-bound estimated potential increase in exports of 24.78 %. In contrast, and as stated earlier, exports of product groups such as services (– 0.77 % to – 0.95 %) and public administration (– 1.02 % to – 1.17 %) will face contraction. Export of product groups such cash crops, extractive industry, food crops and utilities will expand in the range of between 1 % and 7 %. As expected, a full liberalisation of agricultural trade under the tariff-only AGR schedule will be the main driver of the increases in exports of cash crops by 2035 relative to the baseline. That is, while other schedules such as REV, INT and RCA will result in an average of a three percentage point expansion in the export of food crops, AGR will drive this export by about 6.77 %.

A combination of tariff and NTMs liberalisation further pushes up exports of the various product groups. A very prominent gain is in the manufacturing sector, which records an increase of nearly 50 % over the baseline value by 2035. Although export of livestock, meat and fish (25.25–26.11 %), and processed agri-food products (28.40–28.88 %) increase as a result of the combination of tariffs and NTMs, the change observed over the baseline is not very different from tariff-only liberalisation. However, for cash crops, the extractive industry and food crops, tariffs and NTMs results in export expansion that is nearly double, on average, over the baseline when compared with what is obtained with tariff-only liberalisation. Similarly to tariff-only liberalisation, the main schedule that produces the highest expansion in the export of food crops is the AGR. Under the combination of tariffs and NTMs, we still observe a reverse trend for public administration and services, although the magnitude of the change is relatively small when compared with tariff-only liberalisation.

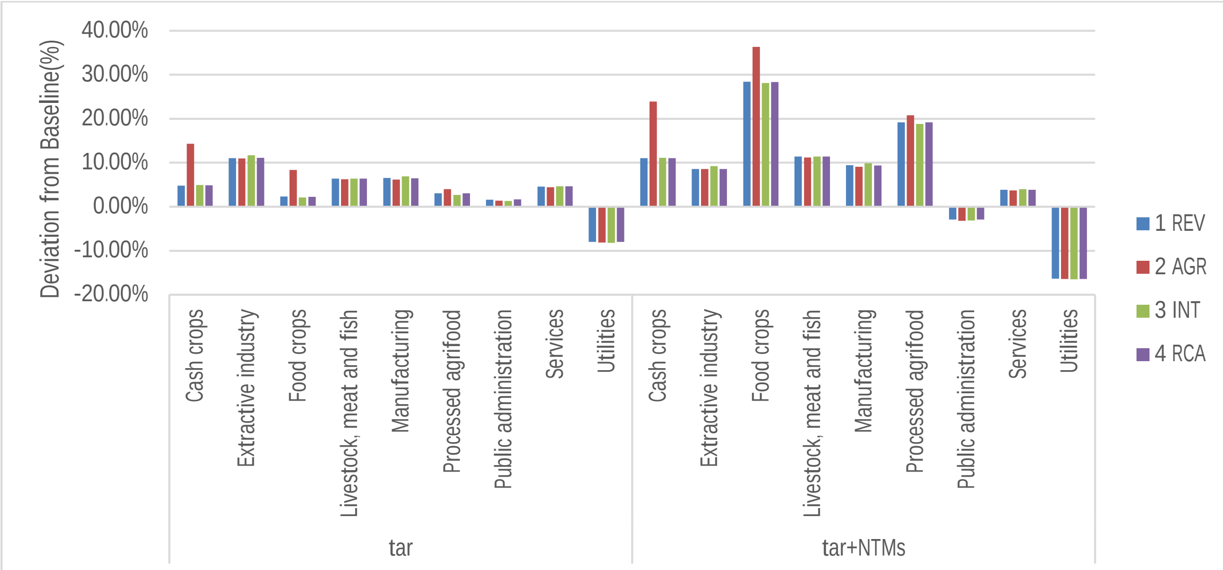
For imports of the various product groups (Figure 6b), we observe an increase for all except utilities. Notable among these products experiencing expansion in 2035 over the baseline are the extractive industry (11–11.72 %), manufacturing (6.48–6.90 %) and livestock, meat and fish (6.25–6.41 %). Notice that the AGR schedule leads to the highest expansion in agriculture-related products such as cash crops, food crops and processed agri-food. NTMs drive significant increases in export of food crops (28.38–36.35 %), processed agri-food (18.85–20.70 %), cash crops (11.02–23.90 %) and livestock (11.17–11.39 %).

Figure 6. Trade impacts across liberalisation schedules in 2035

(a) Exports



(b) Imports



Source: DEMETRA results.

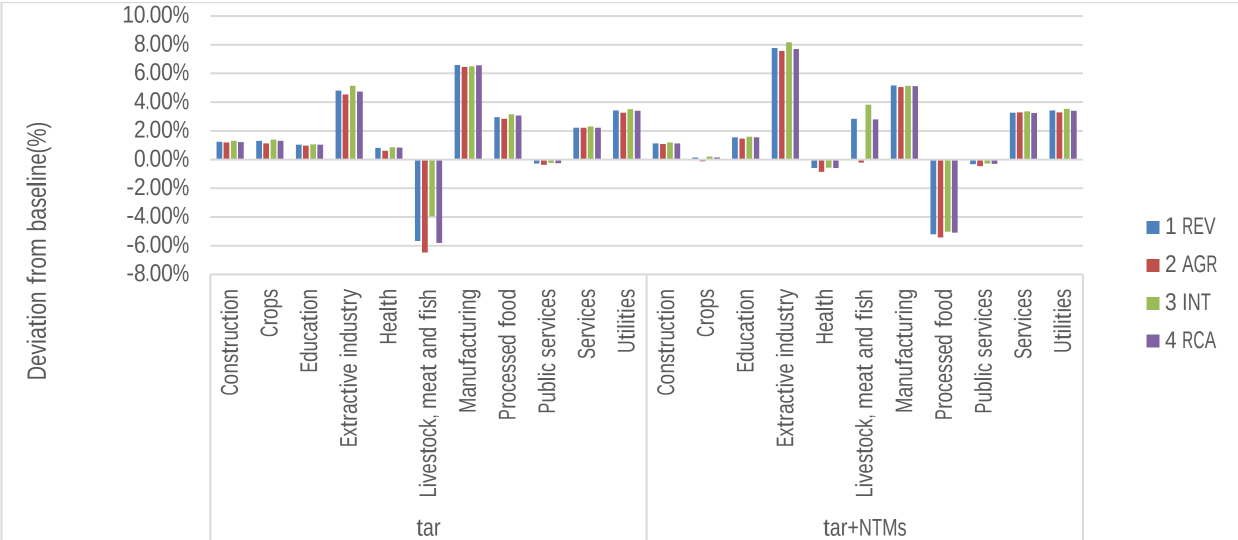
5.3. Sectoral and employment impacts

5.3.1. Output changes

Tariff-only liberalisation results in output expansion for some sectors and output contraction for others (Figure 7). Manufacturing, the extractive industry, utilities and processed food are the top four sectors that will expand over the baseline value in 2035. For example, the manufacturing sector will expand by at least 6.46 % and the extractive industry by at least 4.53 % depending on the liberalisation schedule. Despite increases in the export of livestock, meat and fish, as discussed in the trade section, their outputs decline compared with the baseline (by approximately 5 percentage points). Note, however, that the livestock, meat and fish trade value is relatively low in the baseline, so changes do not have a huge impact overall. In line with the contraction in the export of public administration, we observe here that output of public services decreases by about 0.2 %.

A combination of tariff and NTMs liberalisation further increases the positive impacts on the extractive industry, education, construction and services. However, utilities stay virtually the same when compared with the tariff-only impacts. In addition, some sectors record a fall in impacts with the tariffs and NTMs compared with tariff-only liberalisation (e.g. the crops subsector, which records more than a 1 % expansion but with tariff-only drops to about 0.2 %). Furthermore, tariffs and NTMs reverse the gains in the health sector and thus cause it to decline by – 0.58 % to – 0.86 %.

Figure 7. Output changes across main economic sectors in 2035



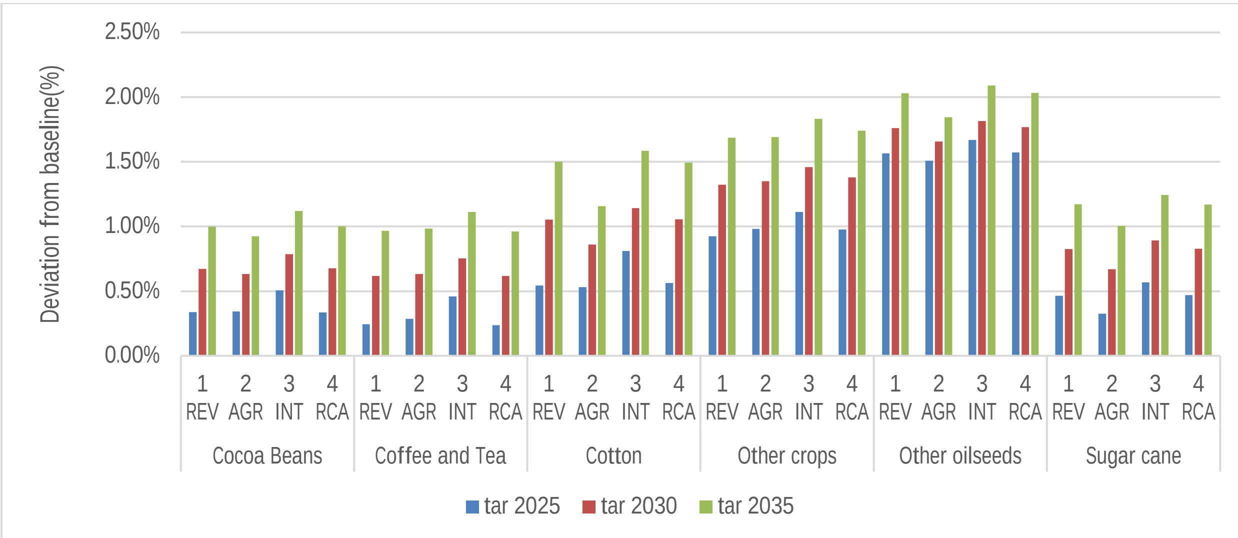
Source: DEMETRA results.

With tariff-only liberalisation, all cash crops under review (cocoa, coffee, tea, cotton and sugar cane) observe an increase in output regardless of the schedule and the year (Figure 8a). A combination of tariff and NTMs liberalisation results in a decline in output of cotton and sugar cane, especially in 2030 and 2035 (Figure 8b). A decline in output of sugar cane will be of particular concern given Ghana's objective of processing sugar locally, as noted in Table 5. In terms of food crops, tariff-only liberalisation drives up production of cassava, fruits, groundnuts, rice and vegetables, and the magnitude of the rise in output becomes larger with time (Figure 8c). Tariff and NTMs liberalisation results in an over 8 % reduction in the production of rice in 2035 (Figure 8d). This outcome is not good news for Ghana's drive to become self-sufficient in the production of rice, as noted in Table 5.

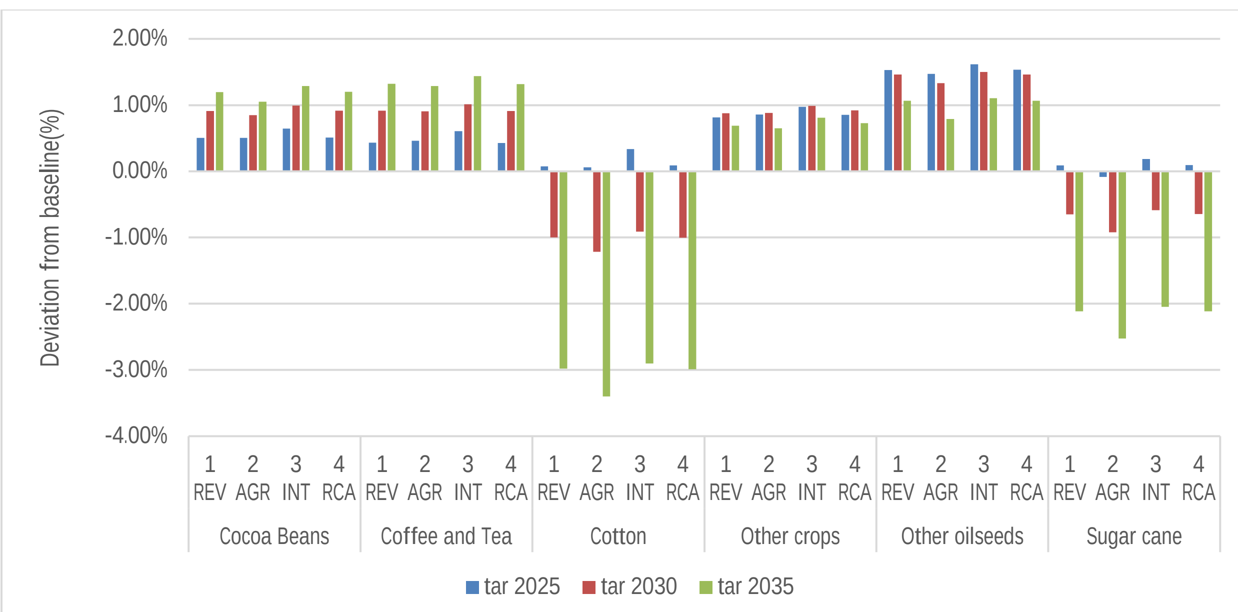
Livestock, meat and fish output are impacted positively by tariff-only liberalisation (Figure 8e); however, when tariffs are combined with NTMs, three out of the four product groups under consideration are negatively impacted, especially in 2035 (Figure 8f). Processed food, fruits and vegetables processing will record at least a 10 % increase in output under tariff-only liberalisation (Figure 8g). Tariff and NTMs liberalisation results in the reduction of output for beverages and sugar refining (Figure 8h).

Figure 8. Output changes for selected crops, livestock and processed food (2025–2035)

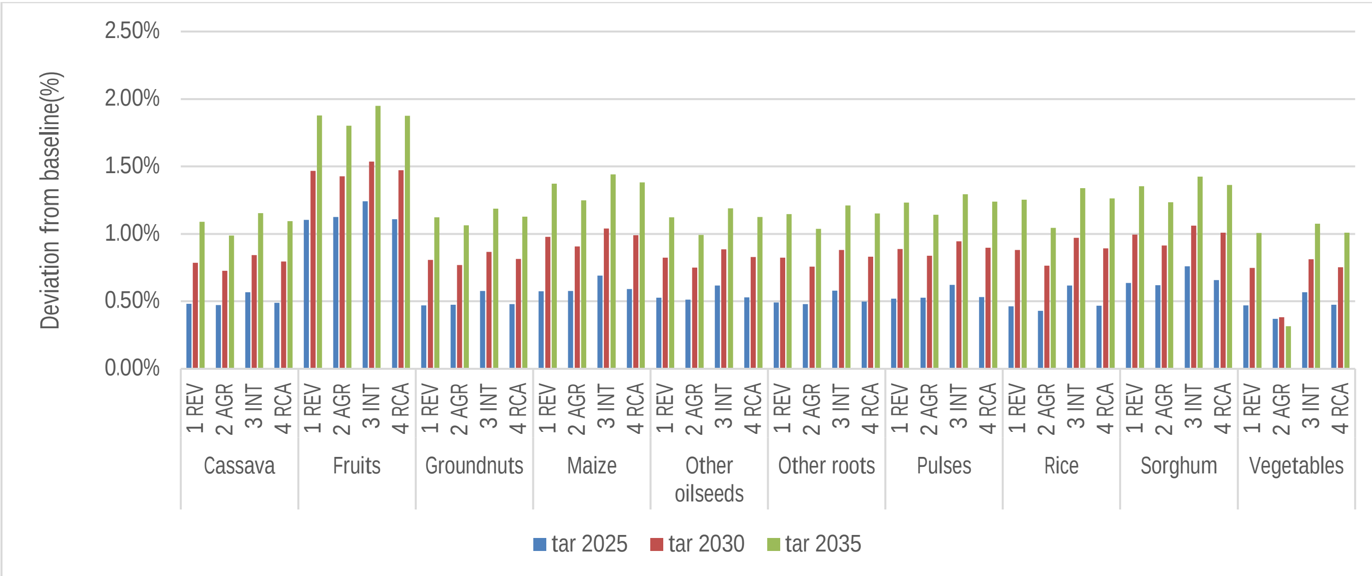
(a) Cash crop output changes – tar



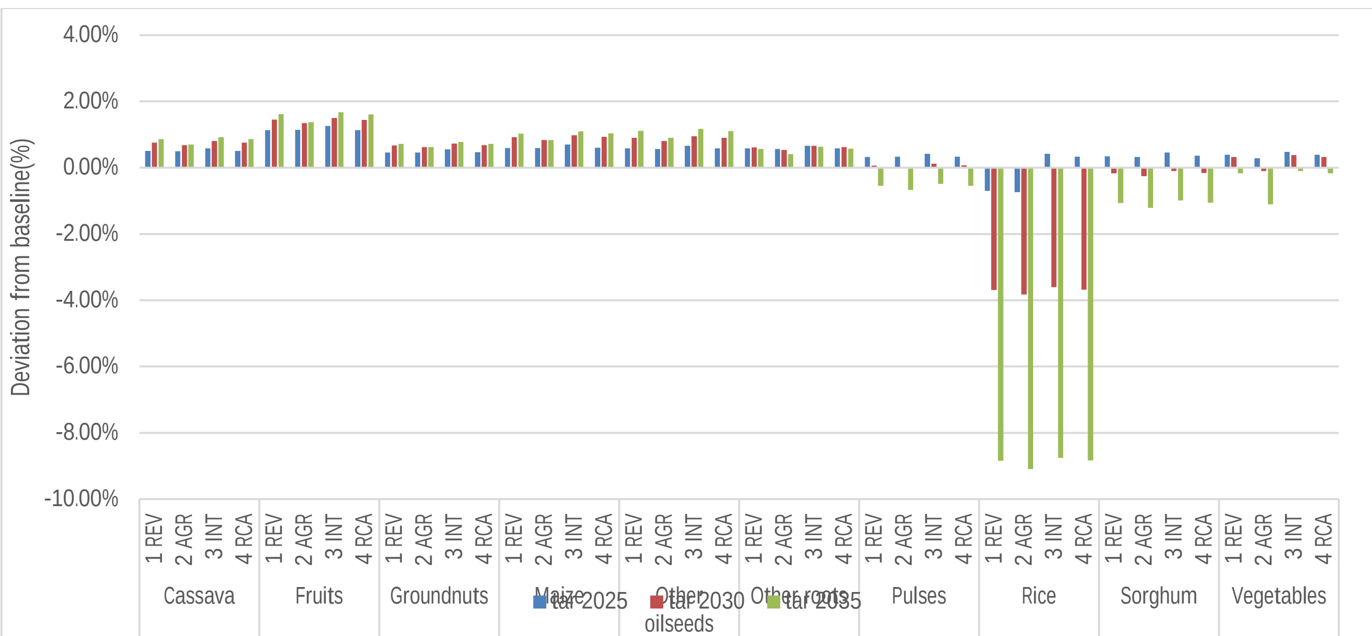
(b) Cash crop output changes – tar + NTMs



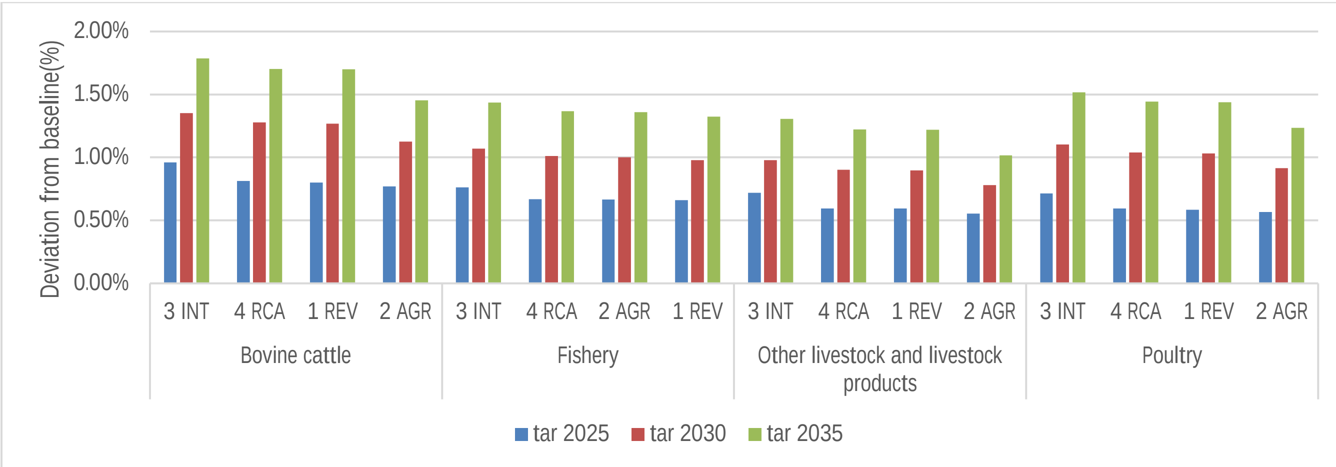
(c) Food crop output changes – tar



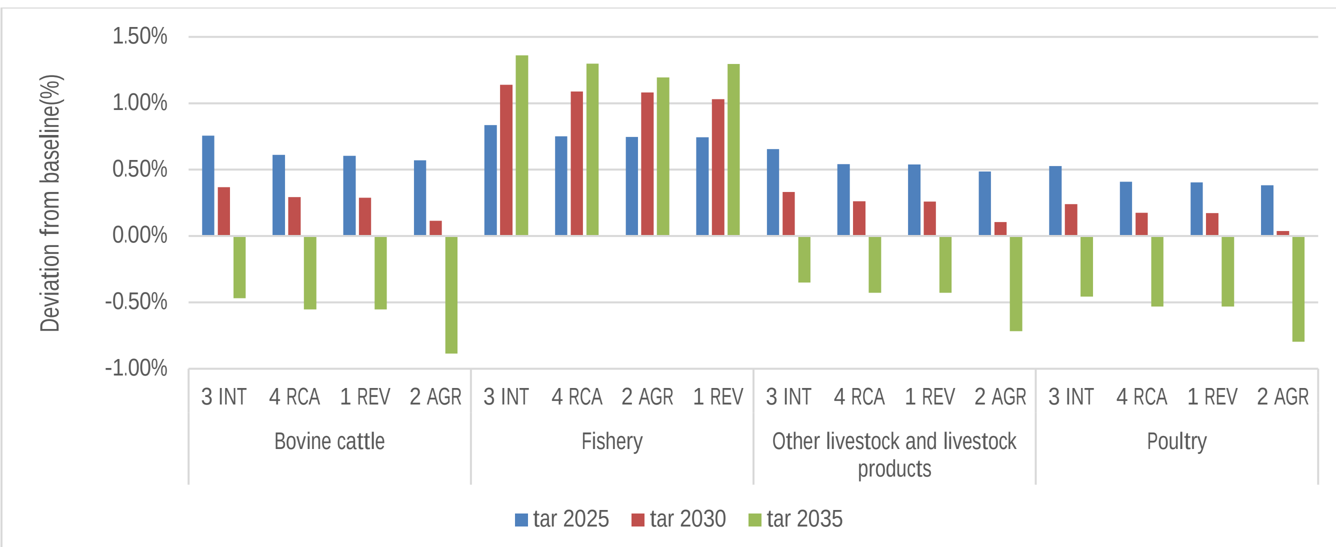
(d) Food crop output changes – tar + NTMs



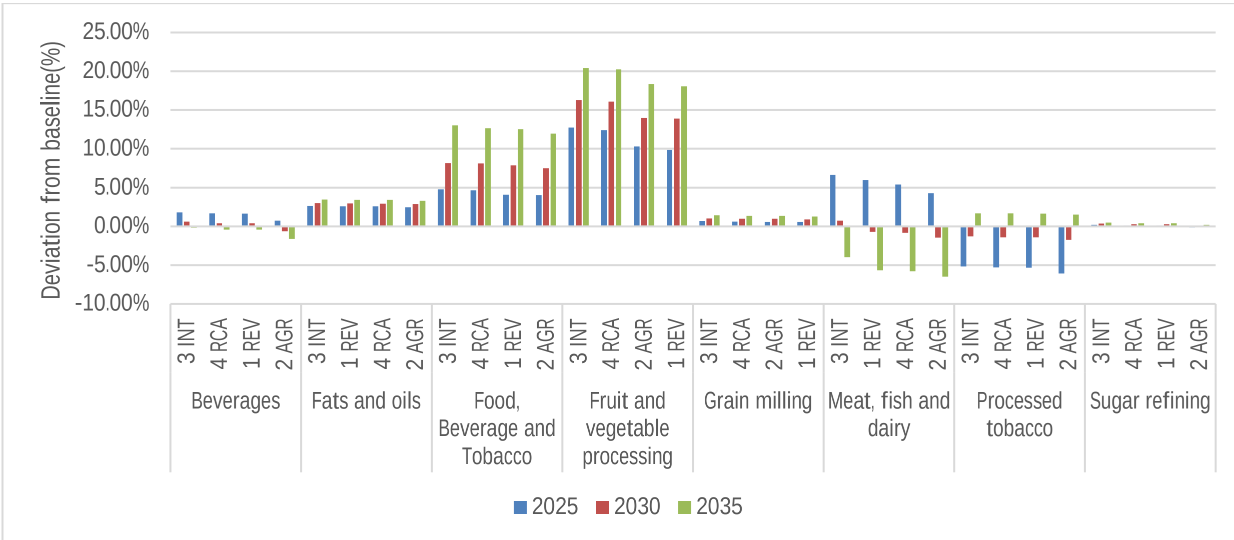
(e) Livestock, meat and fish output changes – tar



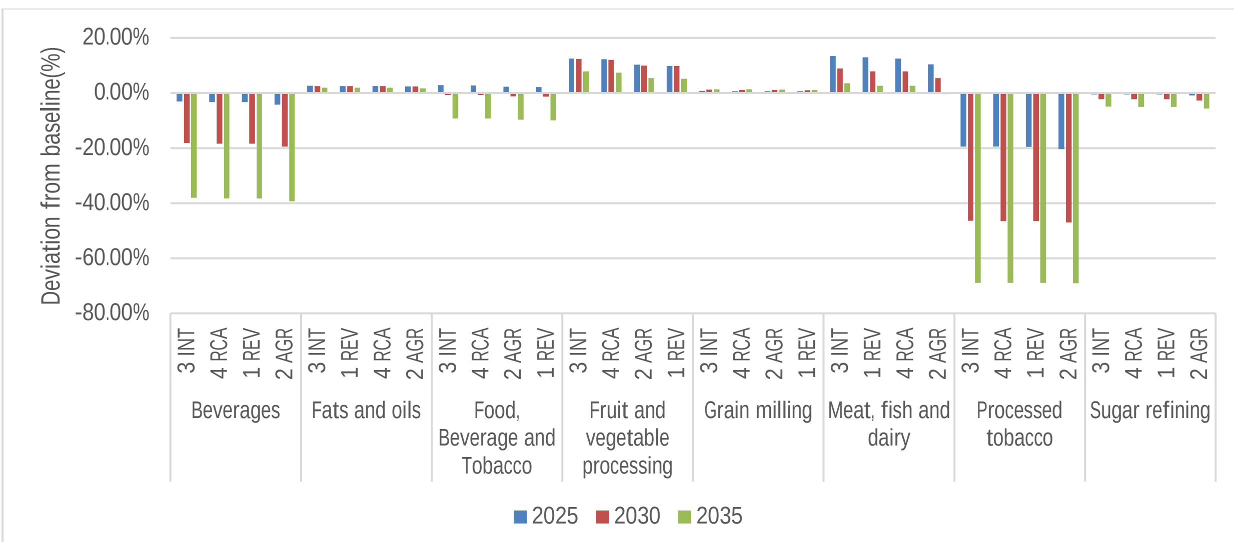
(f) Livestock, meat and fish output changes – tar + NTMs



(g) Processed food output changes – tar



(h) Processed food output changes – tar + NTMs

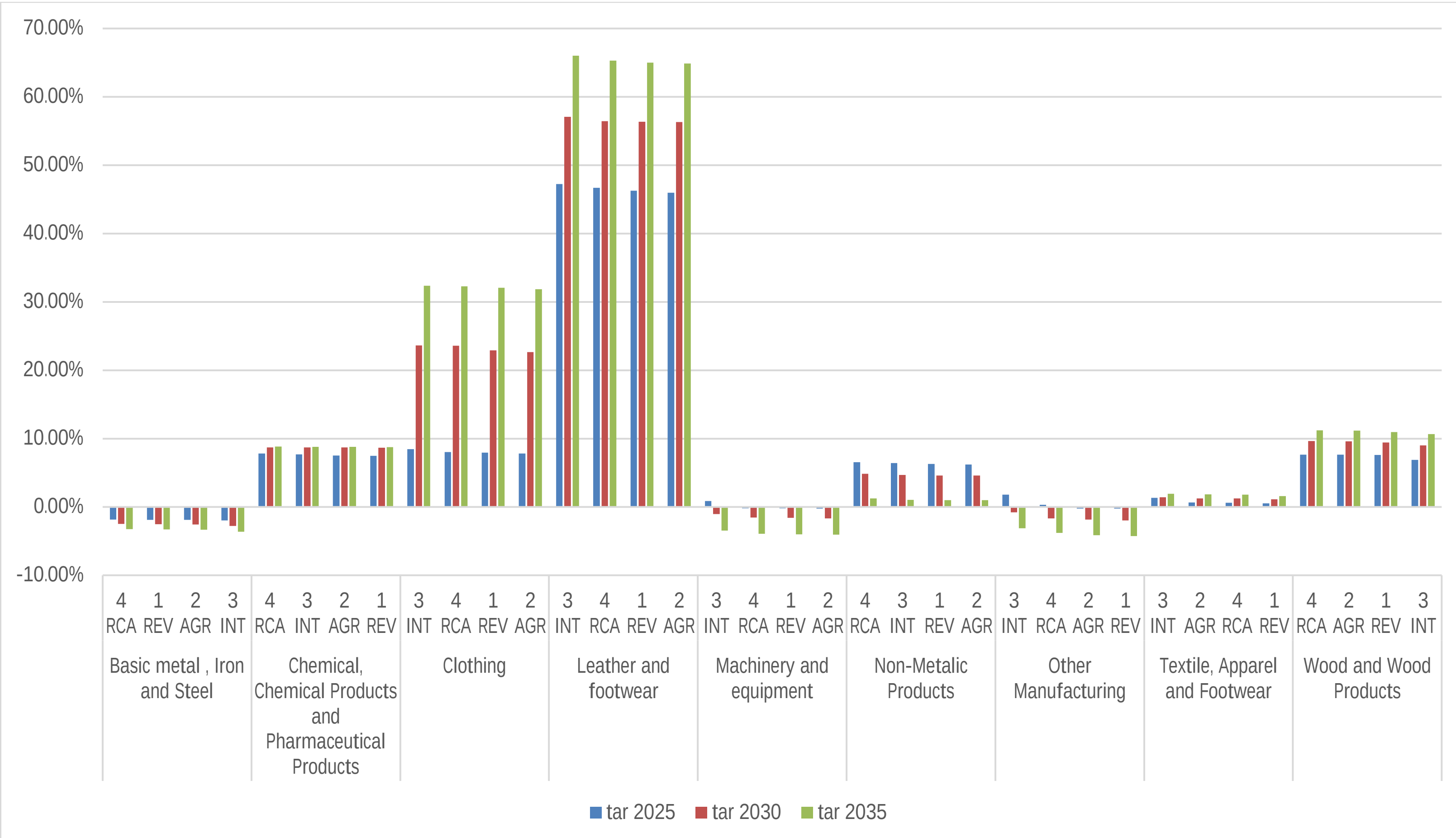


Source: DEMETRA results

Figure 9 examines in detail how AfCFTA affects specific subsectors of manufacturing. Under the tariff-only scenario, chemical and pharmaceutical products, clothing, leather and footwear, non-metallic products, and wood and wood products respond positively. However, subsectors such as basic metal, iron and steel, and machinery and equipment are impacted negatively, although by a smaller magnitude in terms of percentage reduction over the baseline (Figure 9a). Under the tariffs plus NTMs regime, metal, iron and steel, and machinery and equipment manufacture declines further (by over 2 % and 10 %, respectively, in 2035) (Figure 9b). A decline in these two subsectors could negatively affect Ghana’s drive to manufacture tools and equipment for agricultural mechanisation.

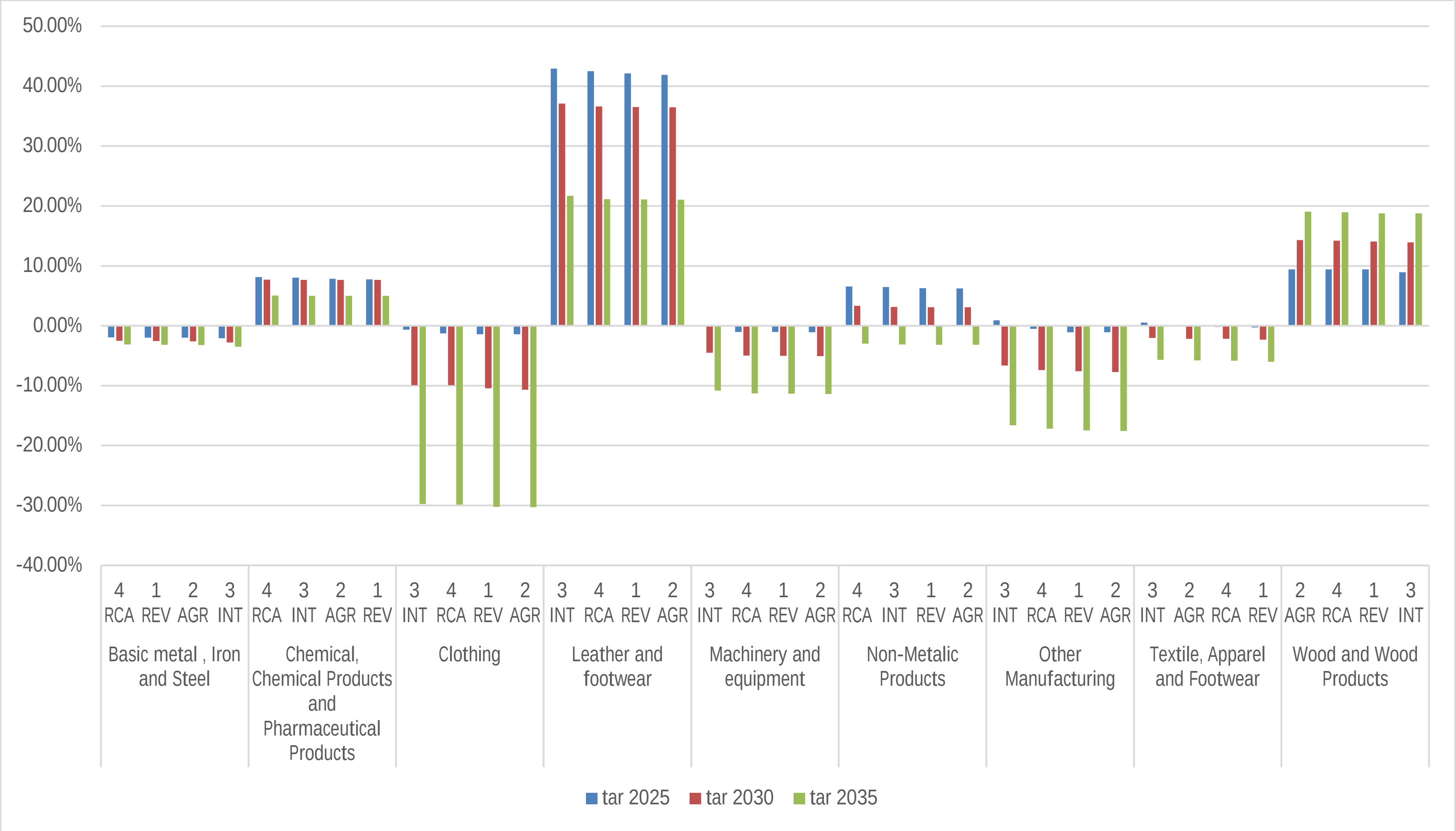
Figure 9. Output changes for selected manufacturing (2025–2035)

(a) Manufacturing output changes – tar



Source: DEMETRA results.

(b) Manufacturing output changes – tar + NTMs



Source: DEMETRA results.

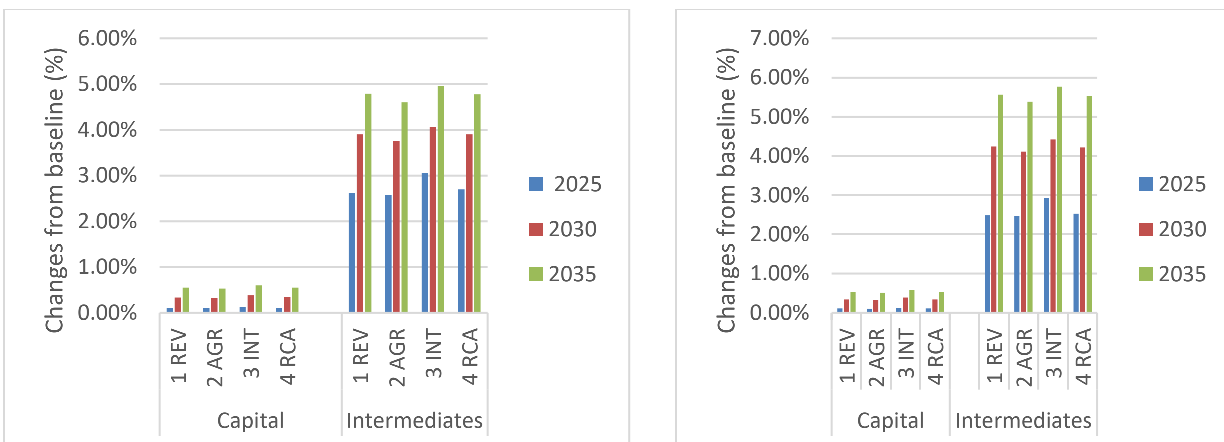
Overall, both capital stock and intermediary inputs will rise gradually from 2025 to 2035 as a result of tariff-only liberalisation. However, the gains in intermediate inputs are several times higher (about eight times higher, depending on the schedule in question) than the growth in capital stock (Figure 10a). On average, capital stock will increase by 0.10 % in 2025 over the baseline and by 2035 it will record an increase of at least 0.52 %. Similarly, intermediate inputs will grow by at least 2.57 % in 2025 and by 2035 they will record an increase of at least 4.60 % over the baseline.

A combination of tariff and NTMs liberalisation further pushes up the expansion of capital investment and intermediate inputs (Figure 10b). Notice that for both inputs (capital and intermediate) the INT schedule produces the highest growth over the baseline, regardless of the type of liberalisation.

Figure 10. Changes in demand of capital and intermediate inputs

(b) Tar

(b) Tar + NTMs

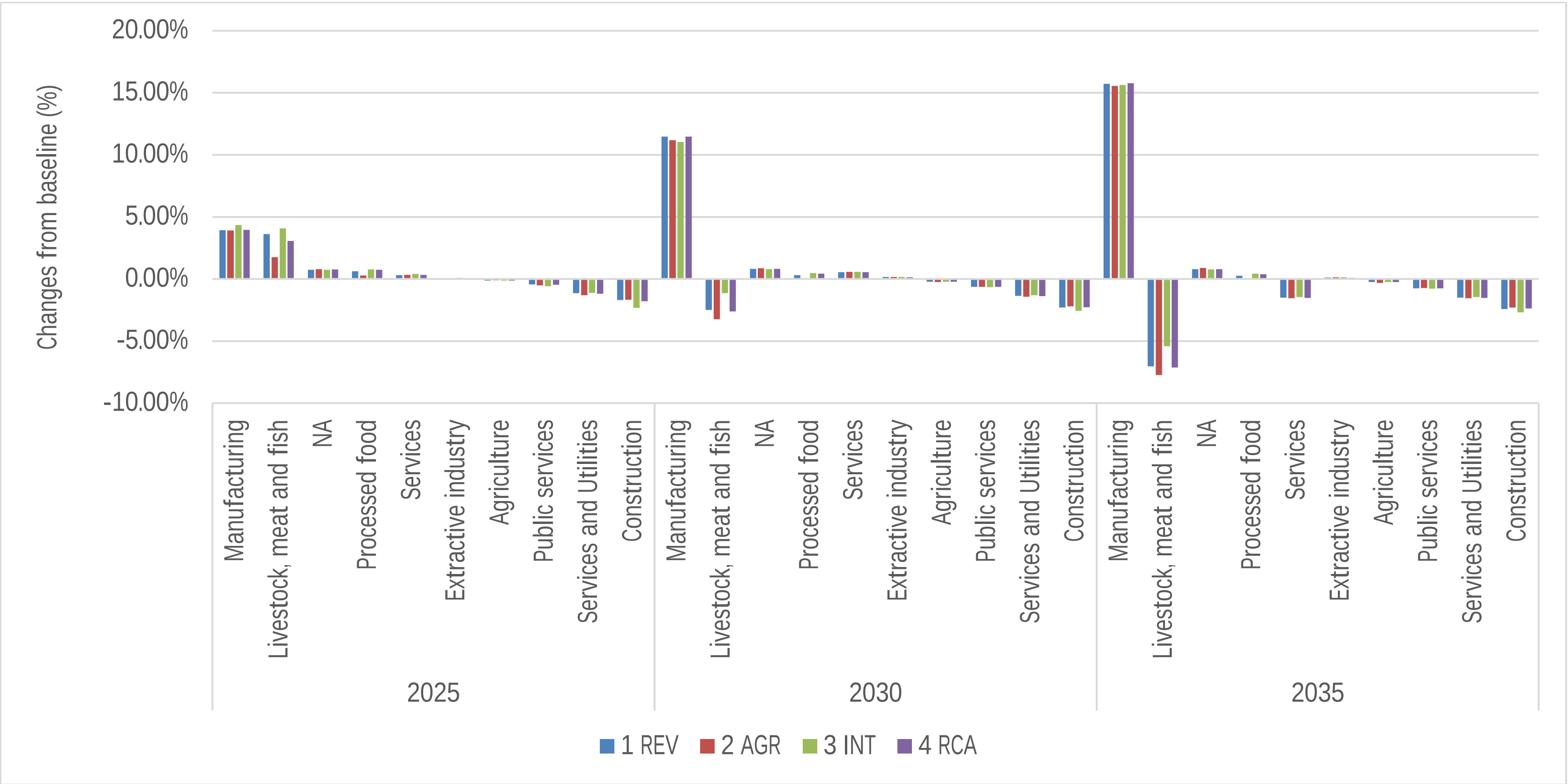


Source: DEMETRA results.

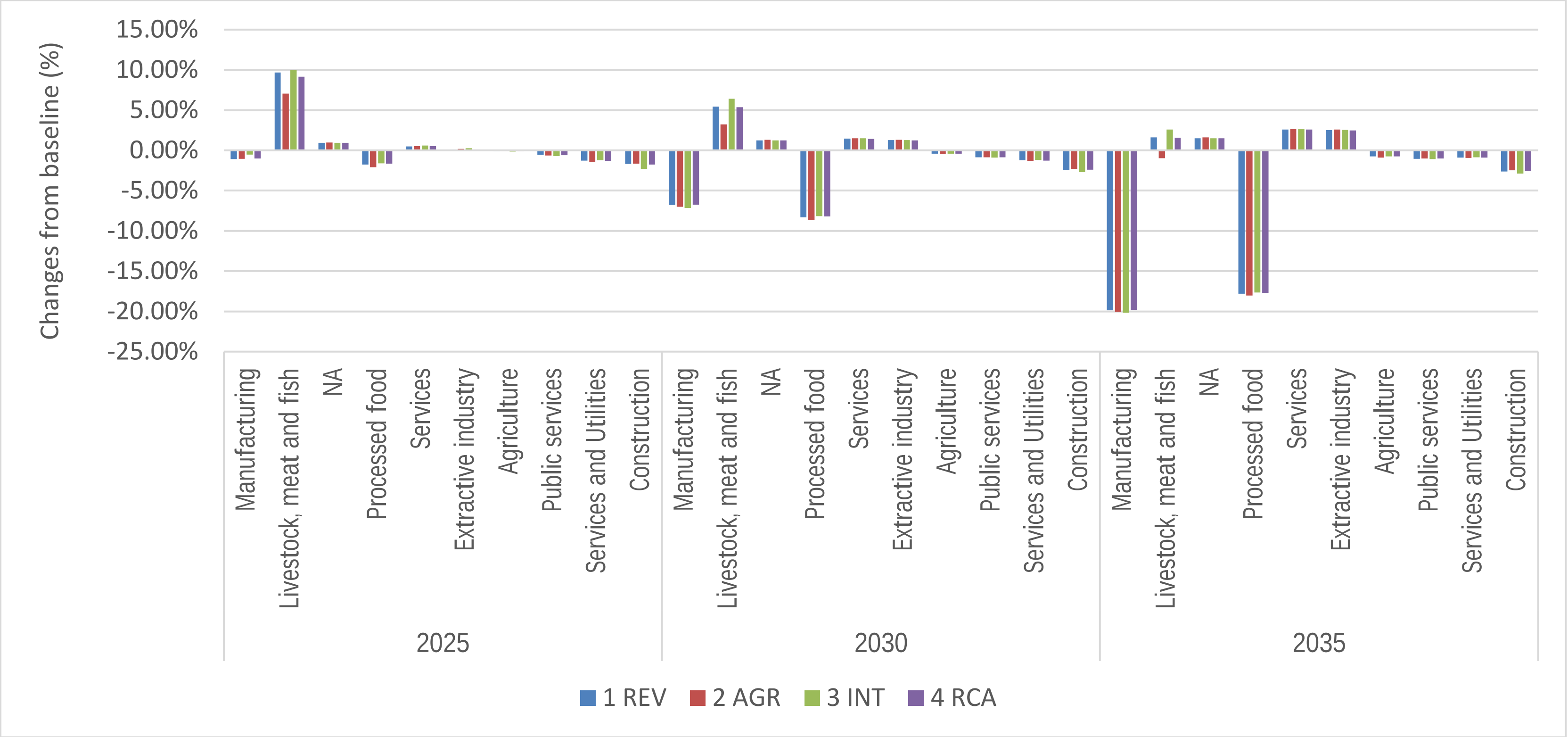
Overall, labour employment in manufacturing will rise gradually as a result of tariff-only liberalisation from 2025 to 2035 (Figure 11a). On the other hand, employment in the livestock sector will experience an initial rise in 2025 but fall in the two subsequent years (2030 and 2035). Changes in labour driven by tariff-only liberalisation is quite flat for all three periods under consideration. Although there is a negative impact on services by 2035, the magnitude of the change is quite small (– 1.56 %). A combination of tariffs and NTMs results in a slight decline in employment in agriculture by 2035. However, employment in livestock, meat and fish production is positively affected by tariffs plus NTMs in 2025, 2030 and 2035 (Figure 11b).

Figure 11. Employment changes by sector (2025, 2030 and 2035)

(c) Tar



(d) Tar + NTMs



Source: DEMETRA results.

5.4. Household welfare impacts

5.4.1. Incomes

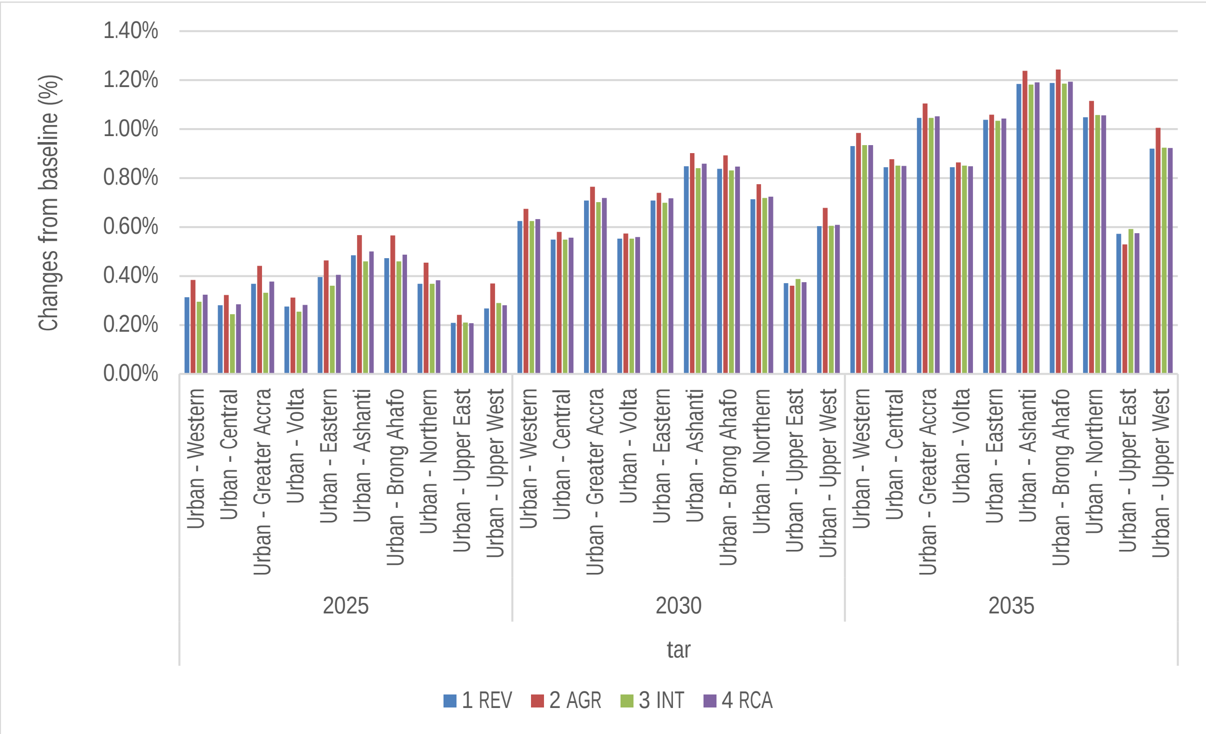
As observed in other African countries, including Kenya, the best household welfare outcomes are achieved with the AGR schedule under the tariff-only liberalisation for almost all households in Ghana over time. The only exception is the Upper East region, where for both rural and urban households the importance of the AGR schedule in determining positive welfare impacts is prominent in 2025 but declines in 2030 and 2035. Similarly to the case of Kenya, the RCA schedule follows the AGR schedule as the largest driver of household welfare improvement (Figure 12).

Tariff-only liberalisation has no negative impact on welfare for any of the 10 urban households. These welfare gains among urban households also increase gradually with time, from a minimum of about 0.2 % in 2025 over the baseline to nearly 1.2 % in 2035 for some regions. The area that benefits the least from these welfare gains among urban households is also the Upper East region, regardless of the year under consideration. Similarly, tariff-only liberalisation has a positive impact on all rural households, and these positive impacts increase with time from 2025 through 2030 to 2035. AGR is an important driver of household welfare among rural people. Rural households in the Ashanti region seems to benefit the most over the base year, and the least impacted by tariff-only liberalisation is the Greater Accra region in 2025 and 2030; however, in 2035 the Upper East region records the lowest impact.

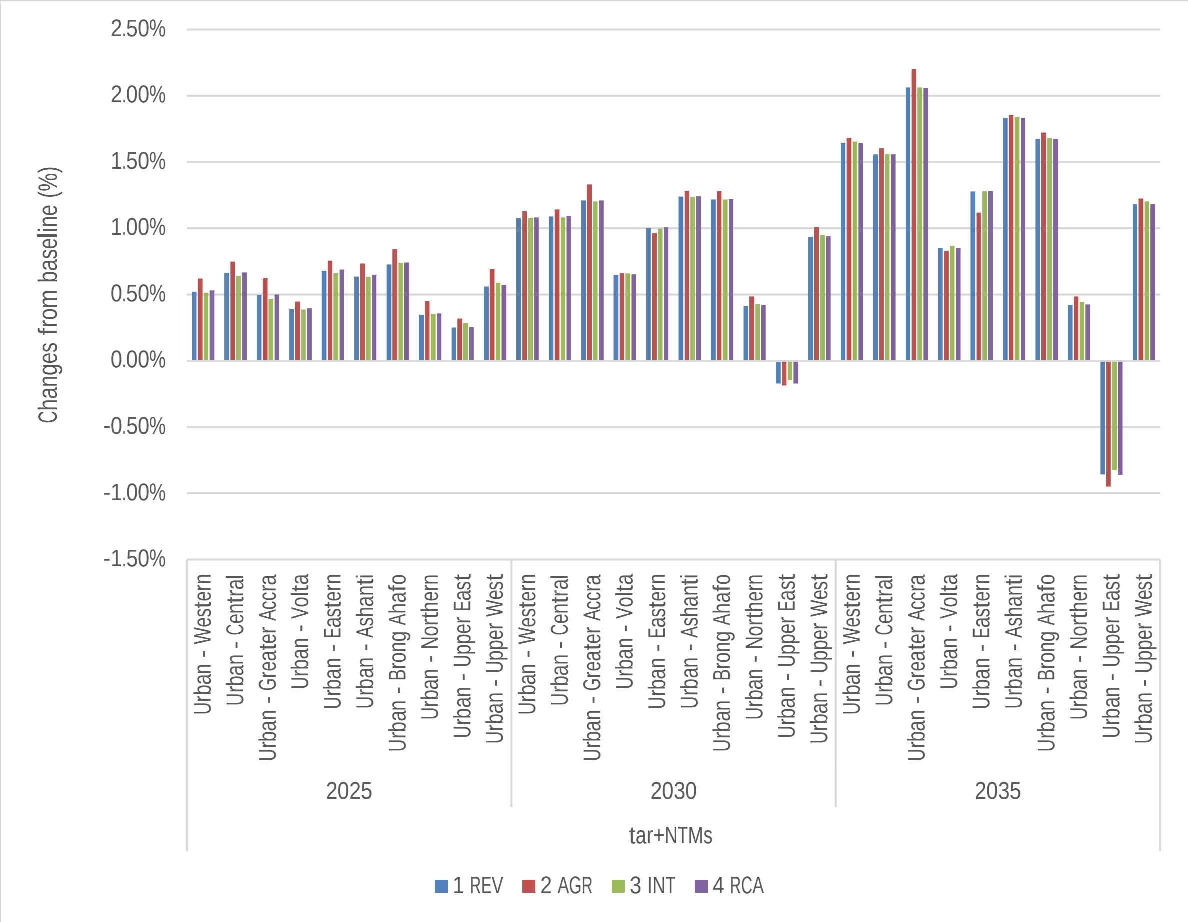
A combination of tariff and NTMs liberalisation further improves welfare outcomes across most households, regardless of their locality – rural or urban. Nevertheless, the positive impact recorded by urban and rural households in the Upper East region in 2025 are reversed in 2030 and 2035.

Figure 12. Welfare impacts on regional households across liberalisation schedules

(a) Urban



(b) Rural



Source: DEMETRA results.

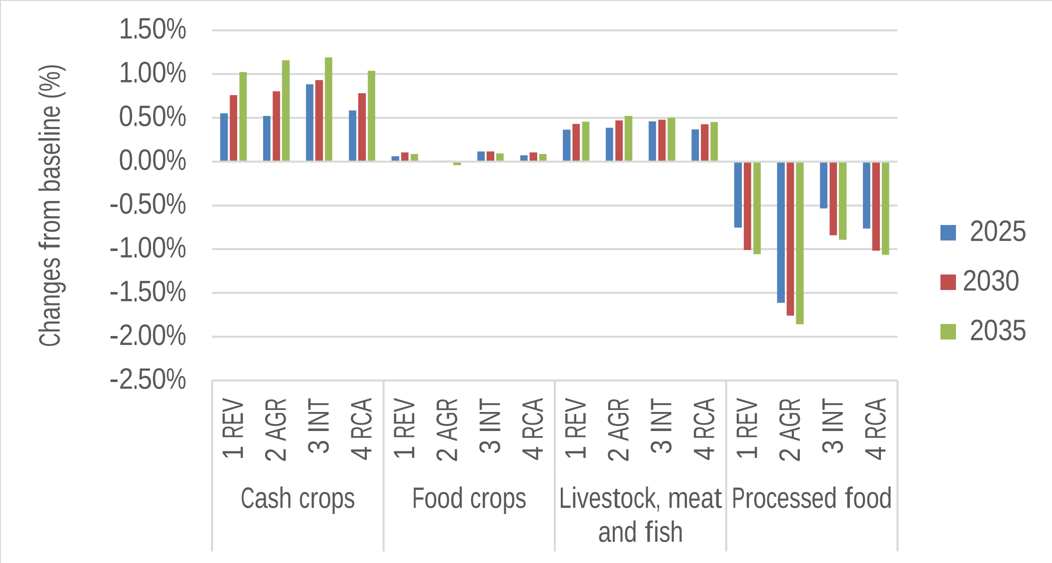
5.4.2. Food prices and affordability

Food prices have implications for affordability and, ultimately, food security. We present results on the impact of AfCFTA on food prices in Figure 13a (tariff-only liberalisation) and b (tariff + NTMs). Overall, cash crop, livestock, meat and fish, and food crop prices under tariff-only liberalisation are positive. For cash crops, the percentage change over the baseline rises gradually from an average of 0.5 % in 2025 to over 1 % in 2035. Livestock, meat and fish prices increase on average by about 0.4 % in 2025 and up to about 0.5 % in 2035. However, the changes in food crop prices compared with the base year are very minimal (at most 0.1 %), and this figure does not seem to rise over time. In contrast, under tariff-only liberalisation, processed food prices fall by 0.5 % up to over 1.5 %, depending on the schedule (Figure 13a).

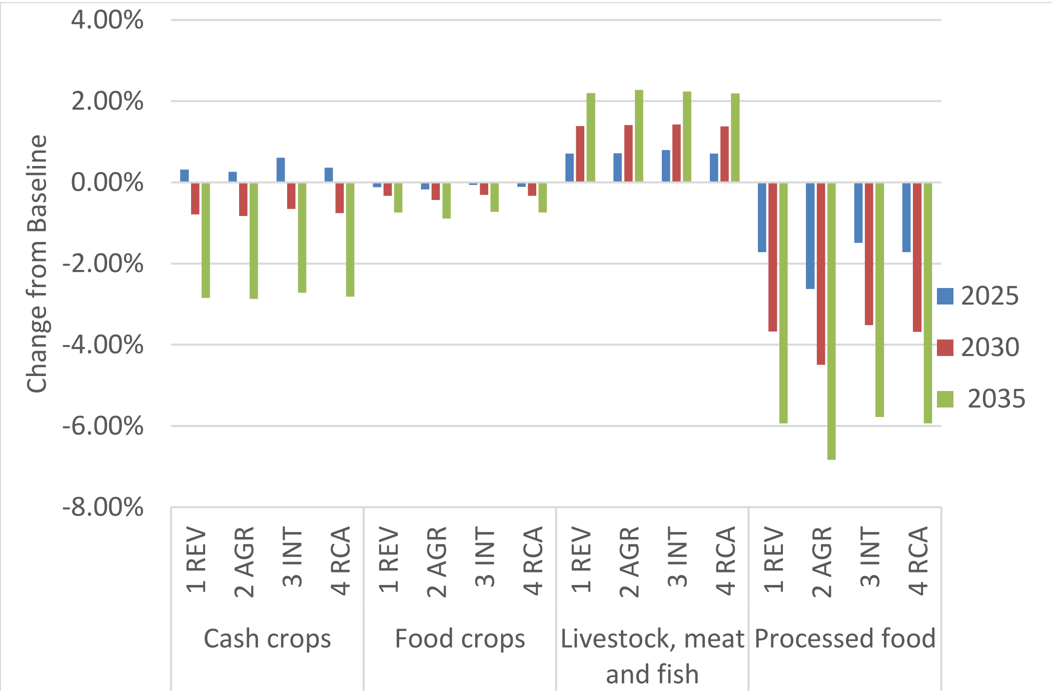
When tariff-only liberalisation is combined with NTMs the story changes a little. That is, only livestock, meat and fish continue to have increased prices (a minimum of 0.4 % in 2025 to a maximum of 2.2 % in 2035). For cash crops, the results are mixed, depending on the year. That is, in the short term (2025), cash crop prices rise by at most 0.6 %. In the medium term (2030), cash crop prices fall by about 0.4 %, and this decline continues in 2035 up to about 2.6 % (Figure 13b).

Figure 13. Commodity price changes (2025, 2030 and 2035)

(a) Tar



(b) Tar + NTMs

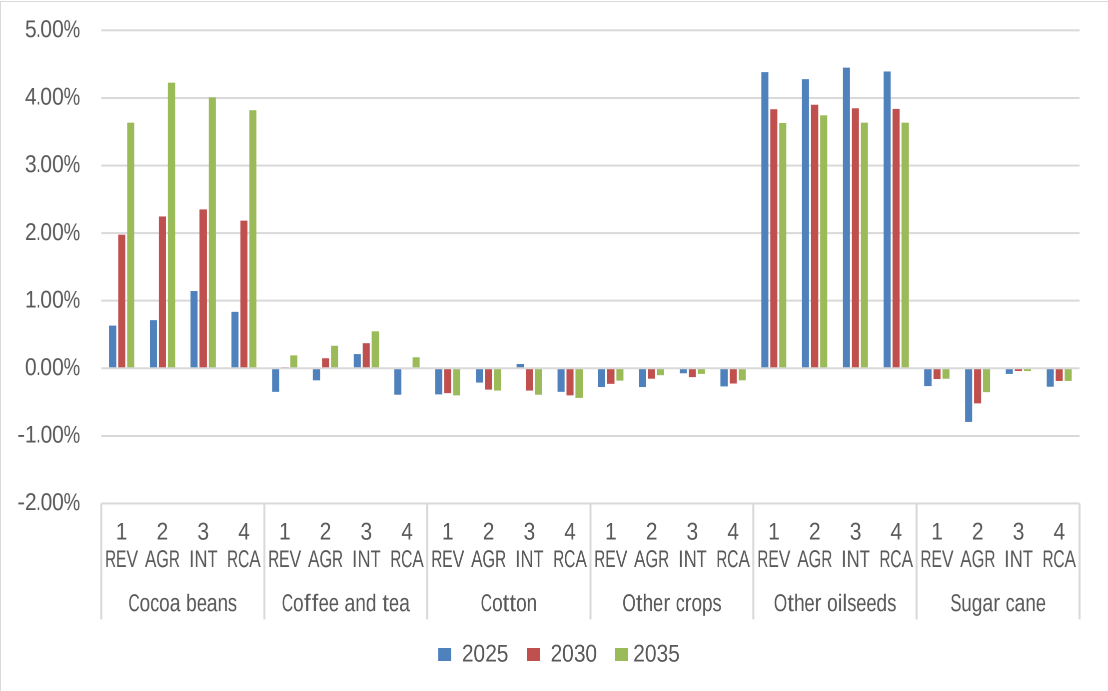


Source: DEMETRA results.

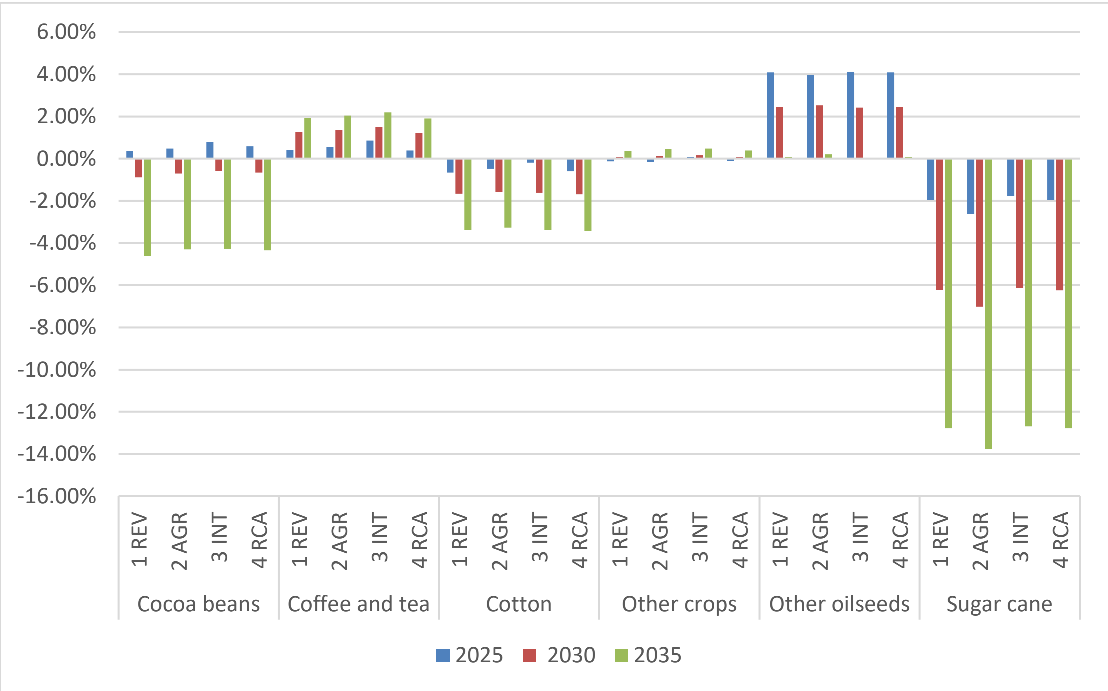
The main drivers of the positive effect of tariff-only liberalisation on cash crops are cocoa beans (reaching an over 3 % increase in 2035) and other oil seeds (which begins with a price increase of over 4 % relative to the baseline, and is about 3.6 % in 2035). With tariffs and NTMs combined, cocoa experiences an initial price rise in 2025 but records price reductions in both 2030 and 2035. Under this regime, prices of other oil seeds increase in 2025 and 2030 but not in 2035. The price of sugar cane and cotton declines further by over 13 % and 3 %, respectively (Figure 14a and b).

Figure 14. Breakdown of cash crop price changes (2025, 2030 and 2035)

(a) Tar



(b) Tar + NTMs

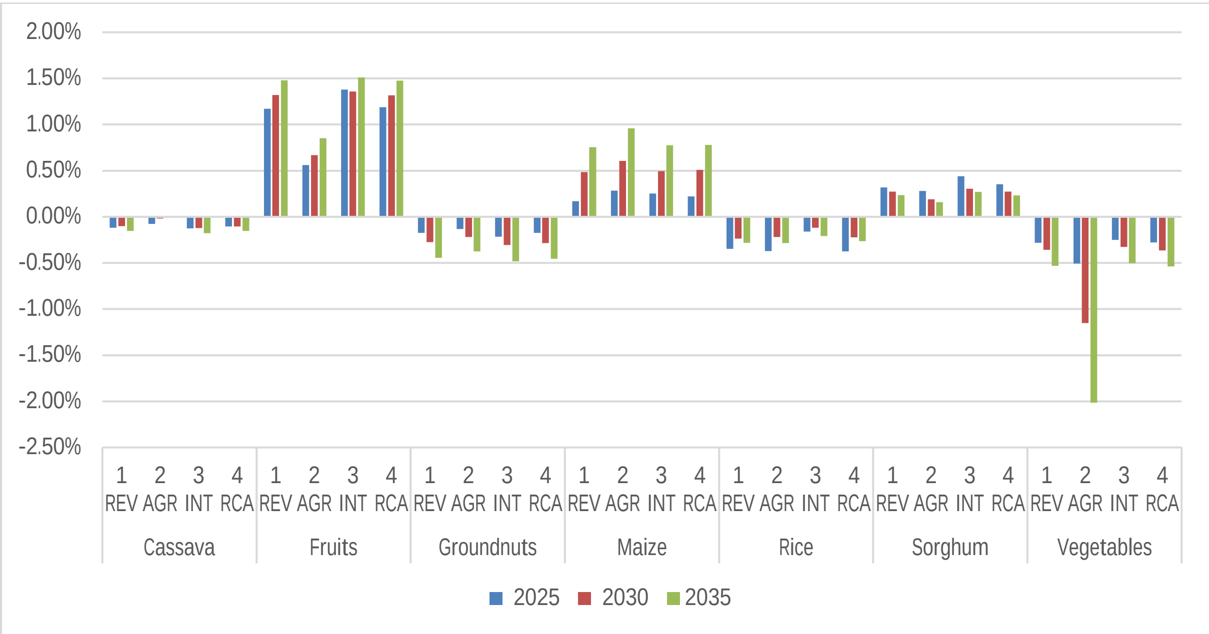


Source: DEMETRA results.

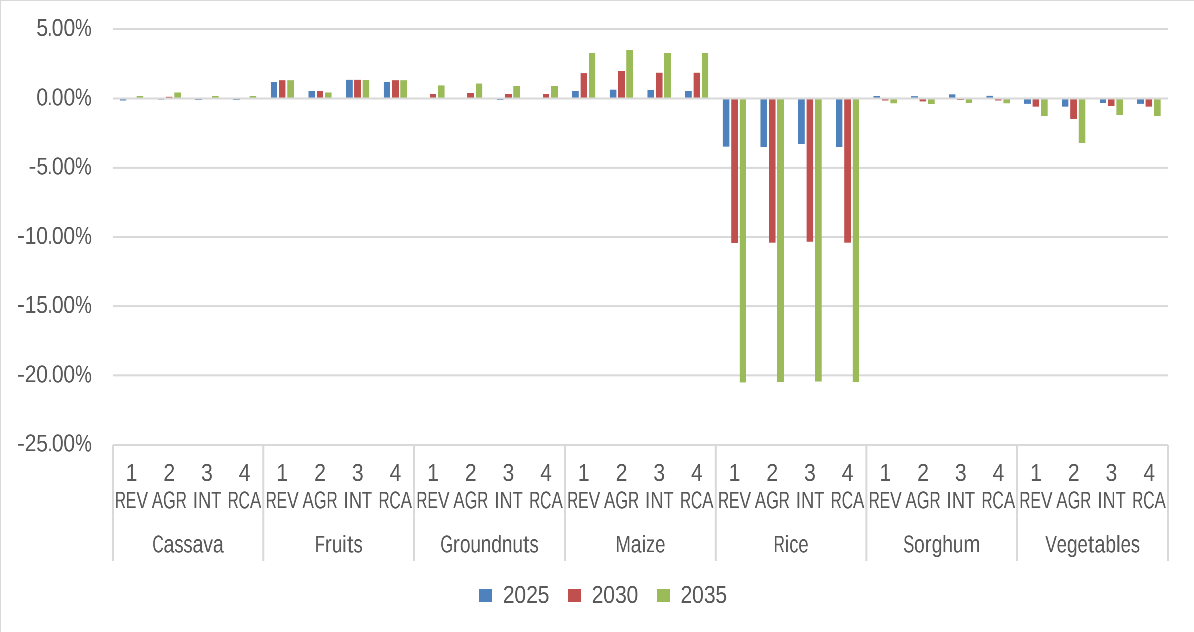
In terms of food crop prices, although overall these decline as a result of AfCFTA, crops such as fruits, maize and sorghum experience an increase in prices, mostly under tariff-only liberalisation. Under the combination of tariffs and NTMs the effects are positive but generally smaller in magnitude. Crops such as rice and vegetables experience a decline in prices under both tariff-only and tariff + NTMs liberalisation. These declines become more prominent with time. For instance, by 2035, the price of rice declines by about 20 % compared with a decline of about 3.5 % in 2025 (Figure 15a and b).

Figure 15. Breakdown of food crop price changes (2025, 2030 and 2035)

(a) Tar



(b) Tar + NTMs

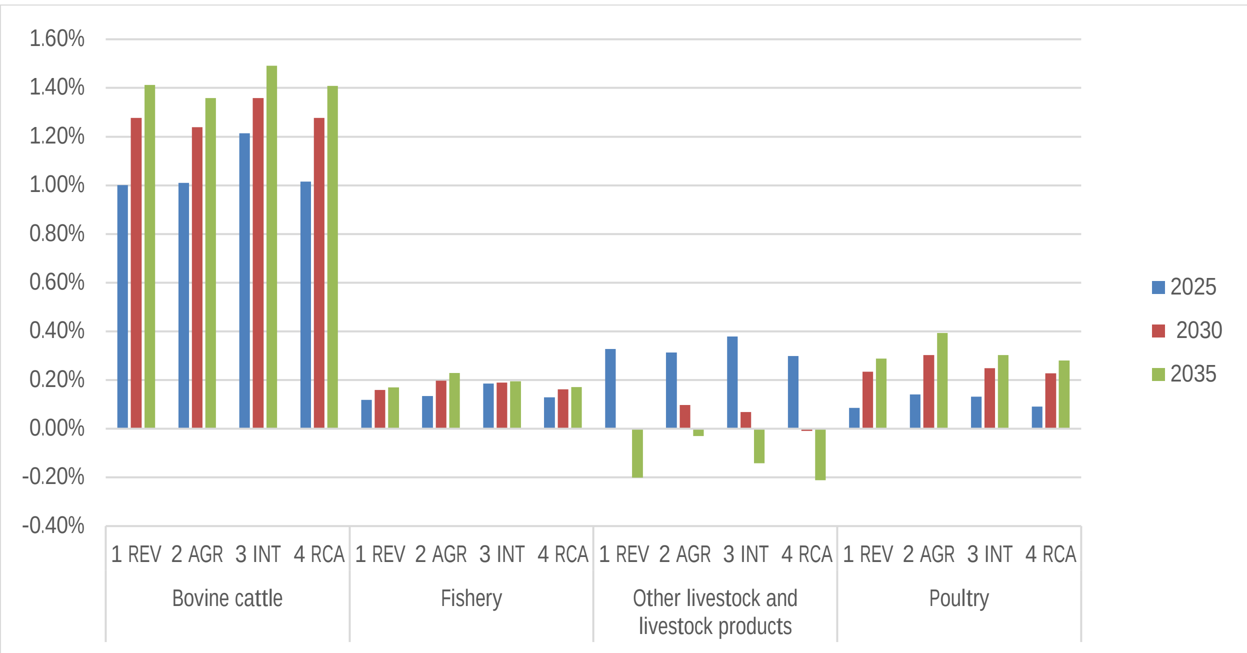


Source: DEMETRA results.

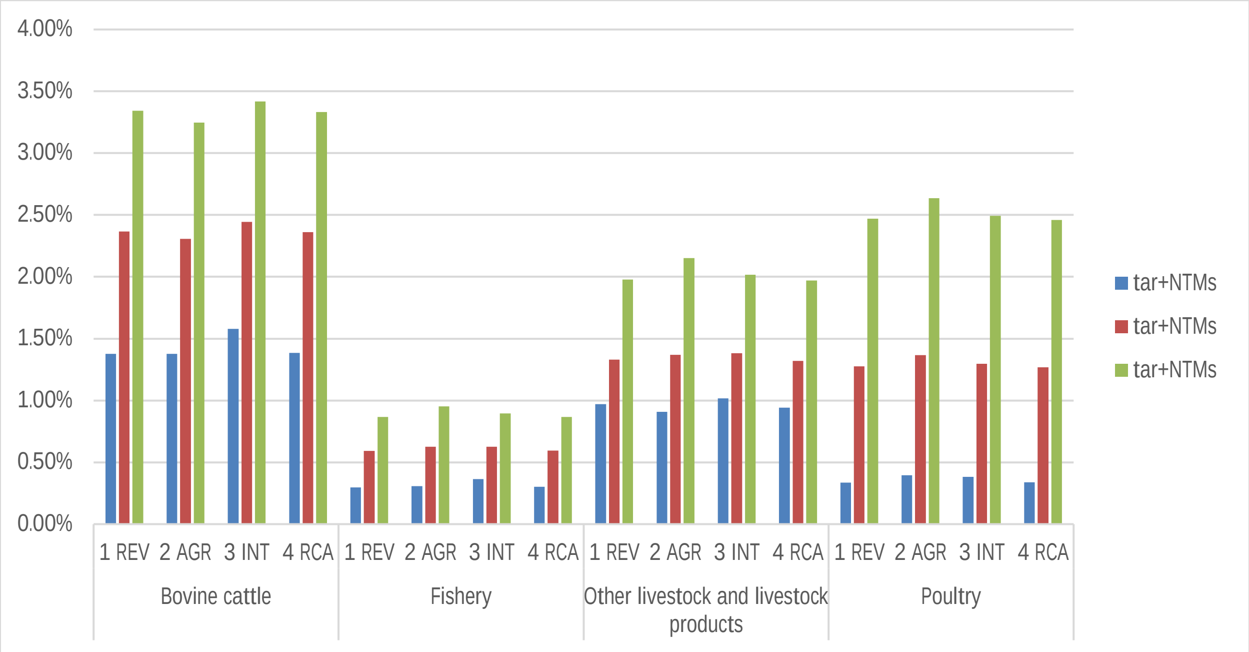
The prices of cattle, fisheries and poultry rise regardless of the liberalisation schedule and year. For example, under tariff-only liberalisation the price of cattle goes up by between 1 % and 1.4 % depending on the year. A combination of tariffs and NTMs pushes up the price of cattle further, with an increase of between 1.4 % and 3.4 %. A similar pattern is observed for poultry (Figure 16a and b).

Figure 16. Breakdown of livestock price changes (2025, 2030 and 2035)

(a) Tar



(b) Tar + NTMs

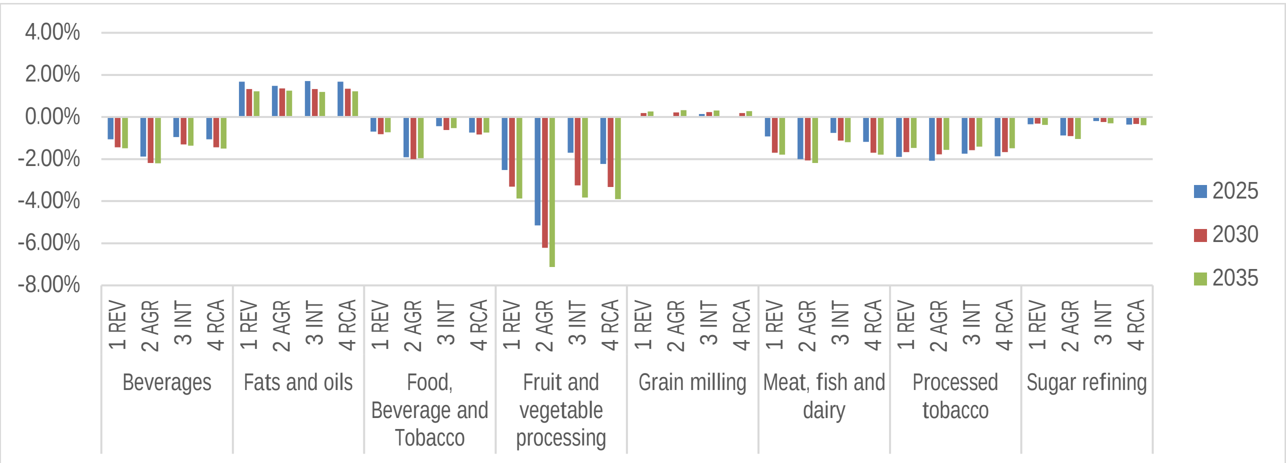


Source: DEMETRA results.

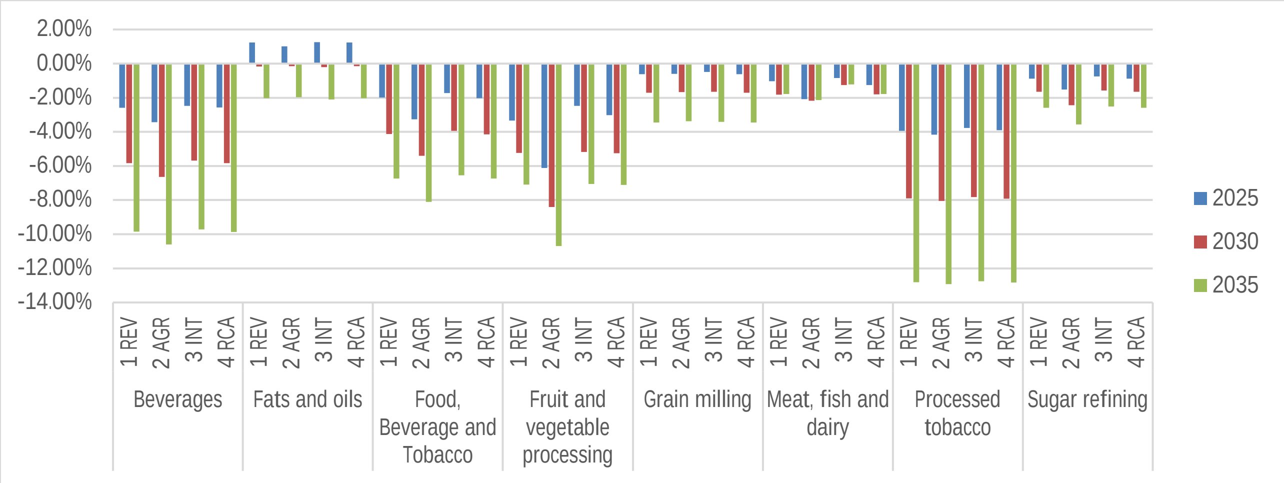
Aside from fats and oils and milled grains, the price of which increases under tariff-only liberalisation, all processed food categories examined in Figure 17 experience price declines as a result of AfCFTA (Figure 17a and b). This may happen as a result of cheaper imports of these processed foods from other parts of Africa or cheaper inputs for these processing activities imported from other African countries as a result of reduced tariffs and removal of other trade barriers.

Figure 17. Breakdown of processed food price changes (2025, 2030 and 2035)

(a) Tar



(b) Tar + NTMs

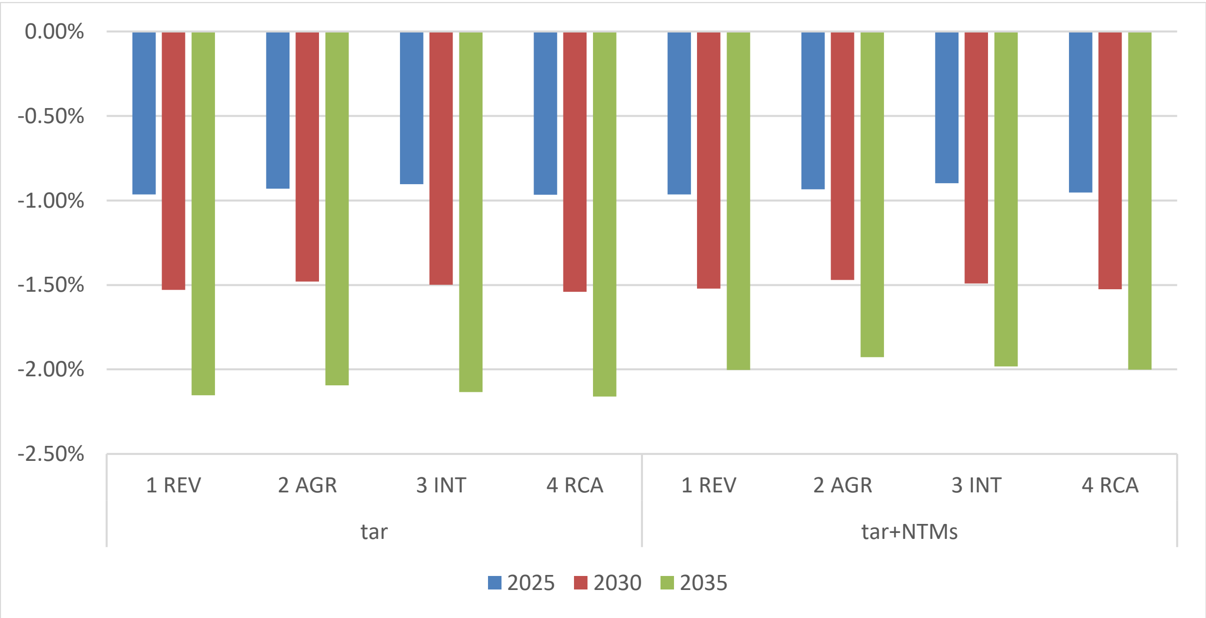


Source: DEMETRA results.

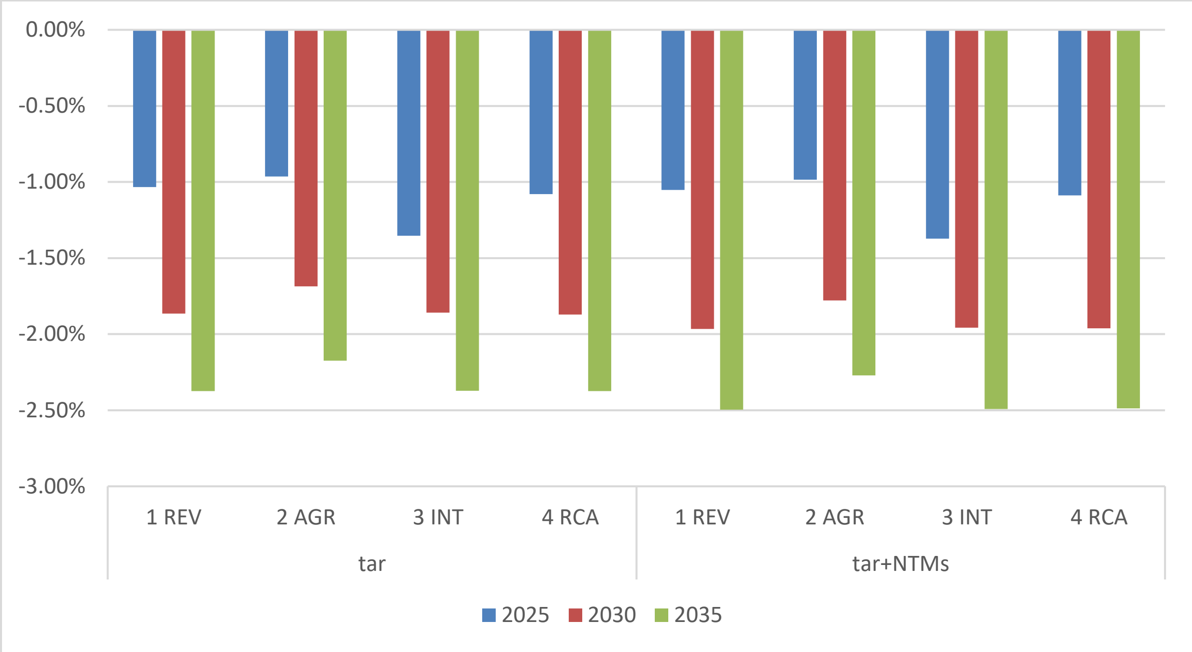
Given the role that machinery and equipment, and chemicals such as fertilisers play in food production and processing, we examine how AfCFTA will affect their prices in Ghana in Figure 18. Machinery and equipment prices are negatively affected by tariff-only and tariff plus NTMs liberalisation. Thus, prices fall by between 0.9 % and a little over 2 % depending on the year and schedule (Figure 18a and b).

Figure 18. Prices of production and processing inputs (2025, 2030 and 2035)

(a) Machinery and equipment price changes



(b) Chemical and chemical product price changes



Source: DEMETRA results.

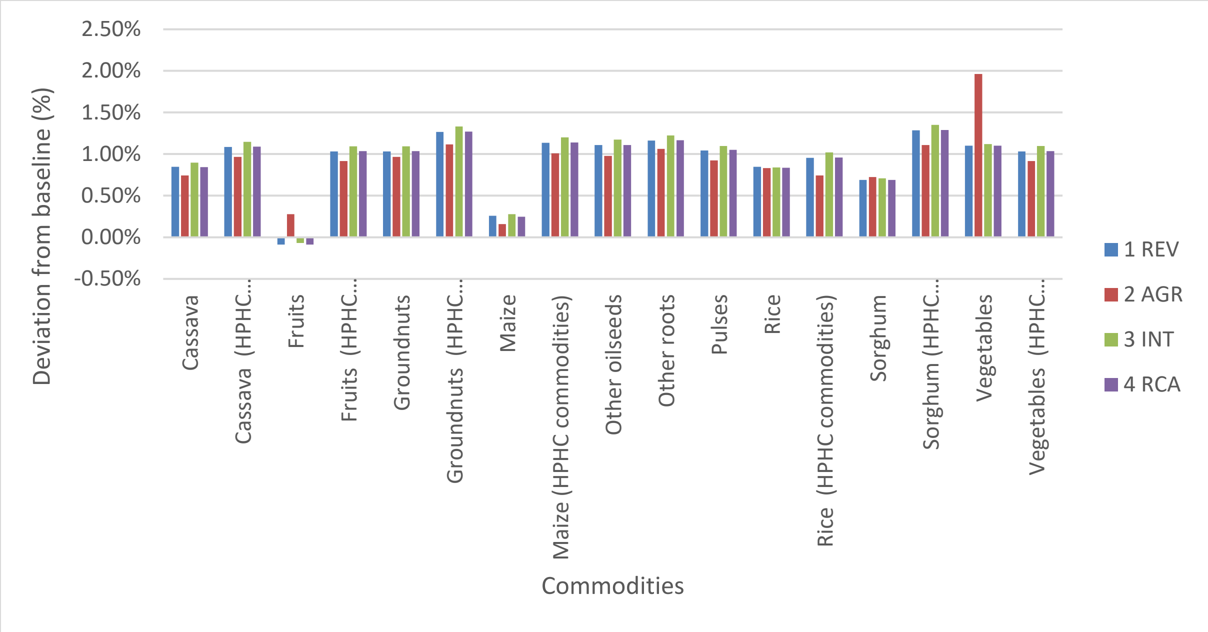
5.4.3. Food demand

The aggregate consumption effects of tariff-only liberalisation are positive for all marketed and subsistence commodities. However, some product groups benefit more from this positive impact of liberalisation than others (Figure 19a). For instance, while the demand for maize increases by at most 0.28 % over the baseline in 2035, the demand for vegetables rises by at most 1.96 % over the baseline. In many instances, the best-performing schedule is the INT, although in the case of vegetables, the impact of the AGR is extraordinary. On average, however, sorghum and millet witness the highest impacts (1.11–1.35 %) from tariff-only liberalisation.

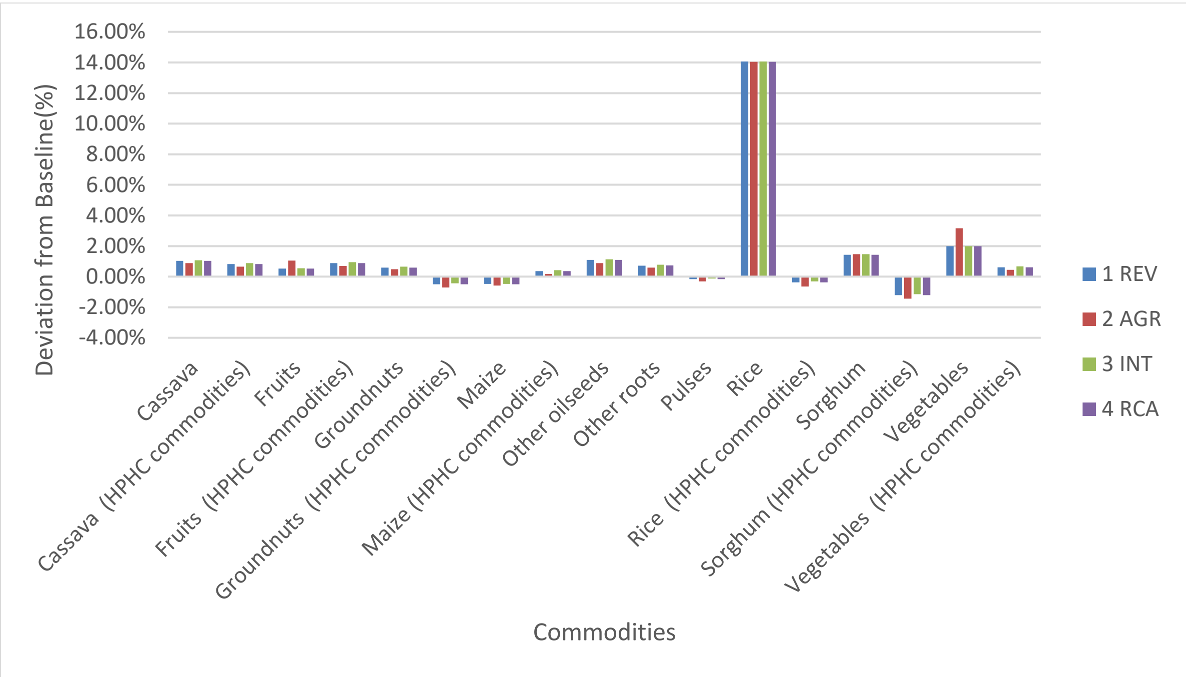
The combination of tariffs and NTMs has mixed outcomes on household demand for marketed and subsistence commodities (Figure 19b). First, the increase in demand for subsistence sorghum and millet under tariff-only liberalisation is reversed when NTM reductions are introduced. Thus, the demand for subsistence sorghum and millet falls by at least 1 %. However, the demand for marketed sorghum seems to rise under the NTM reduction regime. Other commodities that record a decline in demand in 2035 include groundnuts (subsistence), maize (marketed) and pulses (subsistence). Second, a more obvious increase in demand is witnessed for marketed rice (14 %) in 2035 relative to the baseline value. Given that Ghana imports nearly half of the rice consumed in the country, an improved NTM that allows for expanded trade could increase imports of rice at a relatively reduced price, making it affordable for consumers. Third, the importance of the AGR in driving demand for vegetables (marketed commodities) is still prominent under the tariff and NTMs liberalisation.

Figure 19. Food commodities demand in 2035

(a) Household demand changes (tar)



(b) Household demand changes (tar + NTMs)



Source: DEMETRA results.

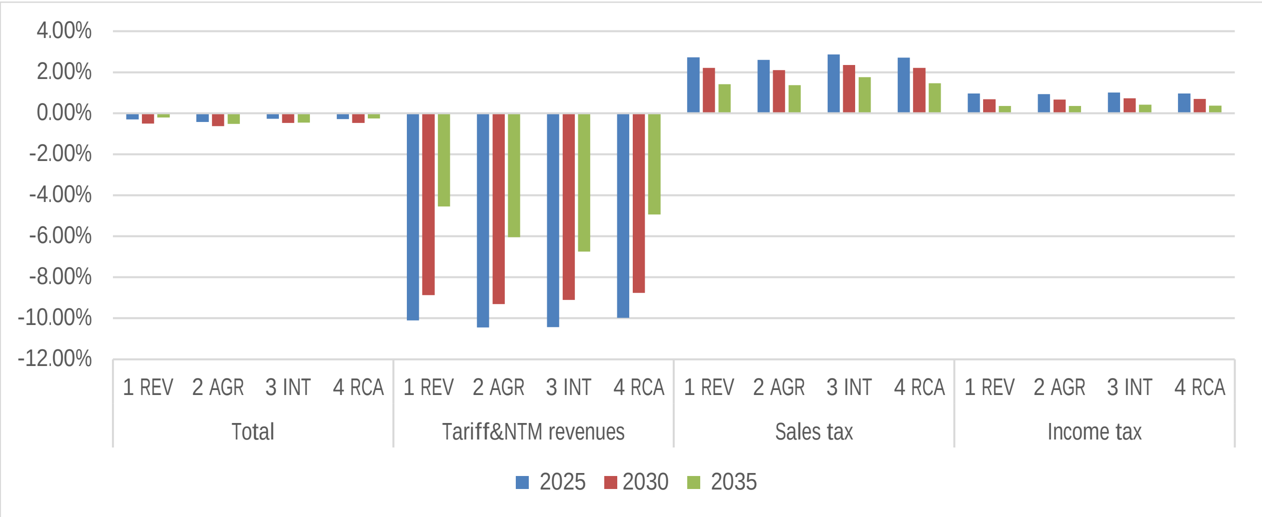
5.5. Government revenue

Tariff-only liberalisation leads to a significant reduction in government revenues relative to baseline values (Figure 20). First, by 2025, tariff-only liberalisation results in a reduction in import tariff-related revenues of at least 9.97 %. This drop in revenue from trade tariffs reaches at least 8.75 % in 2030 and 4.55 % in 2035. Sales taxes increase by about 2.6 % in 2025, 2.11 % in 2030 and 1.37 % in 2035. Income taxes increase by at most 1.01 % in 2025 and 0.36 % in 2035. The overall effect of tariff-only liberalisation on government revenue is negative – between 2025 and 2035 average government revenue losses are between 0.5 % and 1 % (Figure 20a).

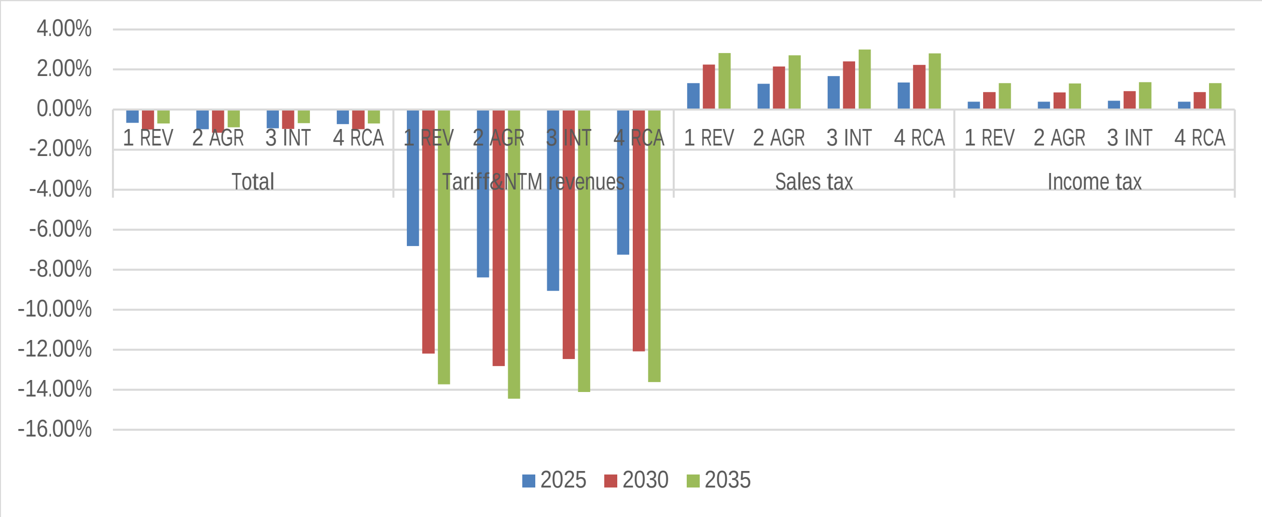
The introduction of NTMs liberalisation in addition to tariff-only liberalisation increases the negative impacts on tariff revenue when compared with the tariff-only scenario. Similarly, the positive effects on sales and income taxes goes up slightly and the overall negative effect on government revenue deepens further (Figure 20b).

Figure 20. Government fiscal revenue changes by tax type (2025, 2030 and 2035)

(a) Tar



(b) Tar + NTMs



Source: DEMETRA results.

6. Conclusions

This study examined the impact of AfCFTA on the Ghanaian economy using a country-level CGE model that allows to quantify the effects of AfCFTA on different aspects of the Ghanaian economy (sectors, commodities, household groups and government revenue) from 2021 to 2035. This section summarises the main findings and draw some conclusions.

6.1. Macroeconomic outcomes

- Tariff-only liberalisation leads to a GDP increase of between 0.31 % and 0.35 %, resulting in an expansion in aggregate supply and trade.
- A combination of tariff and NTMs liberalisation gives a further push to GDP gains over the baseline (0.52–0.59 %) and further boosts trade.

6.2. Trade

- Tariff-only liberalisation generally leads to increases in exports of the main product groups, except public administration and services, which fall slightly by 2035.
- A full liberalisation of agricultural trade under the tariff-only scenario drives increases in exports of cash crops by 2035 relative to the baseline.
- A combination of tariff and NTMs liberalisation further increases exports of the various product groups. The manufacturing sector records an increase in exports of nearly 50 % over the baseline value by 2035.
- Imports of all product groups increase, except utilities and services. NTMs drive significant increases in the export of food crops, processed agri-food, cash crops and livestock but result in a further fall in the export of public administration and utilities.
- Of the four liberalisation schedules, the INT and REV schedules are the most important determinants of the magnitude of import and export increases.

6.3. Employment

- Overall, both capital stock and intermediary inputs rise gradually from 2025 to 2035 as a result of tariff-only liberalisation. However, the gains in intermediate inputs are relatively higher than the growth in capital stock.
- On average, capital stock increases by 0.10 % over the baseline in 2025 and by 2035 records an increase of at least 0.52 %. Similarly, intermediate inputs grow by at least 2.57 % in 2025, and by 2035 record an increase of at least 4.60 % over the baseline.
- A combination of tariff and NTMs liberalisation pushes a bit further the expansion of capital investment and intermediate inputs; for both inputs, the INT schedule produces the highest growth over the baseline.
- Overall, labour employment in manufacturing rises gradually as a result of tariff-only reduction from 2025 to 2035.
- On the other hand, employment in livestock experiences an initial rise in 2025, as a result of tariff-only reduction, but reduces in the two subsequent years (2030 and 2035).
- Changes in labour employment in the agricultural sector driven by tariff-only reduction are quite flat for all three periods under consideration.
- Although there is a negative impact on services by 2035, the magnitude is quite small (– 1.56 %).

- A combination of tariff and NTMs liberalisation results in a slight decline in employment in agriculture by 2035. However, employment in livestock, meat and fish production is positively affected by tariff and NTMs liberalisation in 2025, 2030 and 2035.

6.4. Household welfare and consumption

- Consumption effects of tariff-only liberalisation are positive for all commodities, with some product-specific variations.
- The most important driver of this positive impact of tariff-only liberalisation among many commodities is the INT schedule. Nevertheless, in the case of vegetables, the positive impact of the AGR schedule is high.
- A combination of tariff and NTMs liberalisation has mixed outcomes for demand for marketed and subsistence commodities from households. Increases in demand as a result of tariff-only liberalisation are reversed by reductions in demand as a result of NTM liberalisation – a case in point is sorghum.
- An improved tariff and NTMs liberalisation results in an increase in the demand for marketed rice of nearly 14 percentage points over the baseline.
- Tariff-only liberalisation has a positive impact on all rural households, and these positive impacts increase with time.
- The AGR schedule is an important driver of household welfare among rural people. Rural households in the Ashanti region seem to benefit most over the base year. The least impacted by tariff-only liberalisation is the Greater Accra region in 2025 and 2030, although in 2035 the Upper East region records the lowest impact.
- The best household welfare outcomes are achieved with the AGR schedule under tariff-only liberalisation for almost all households in Ghana over time. The only exception is the Upper East region.
- A combination of tariff and NTMs liberalisation further improves welfare across most households, regardless of their locality – rural or urban.

6.5. Investment and environment for production and processing

- In general, capital investments increase and the use of intermediate inputs also rises.
- The cost of machinery and equipment falls, and this could drive up investment in the processing of agricultural products.
- Similarly, the cost of chemicals and chemical products is expected to fall, which may serve as an incentive for farmers to use more fertilisers and other agrochemicals to boost agricultural production.

6.6. Government revenue

- Tariff-only liberalisation reduces government revenues from trade taxes.
- On the other hand, the introduction of tariff plus NTMs liberalisation increases the negative impacts on tariff revenue when compared with the tariff-only outcome.
- Ultimately, the effect of liberalisation has a negative impact on government revenue but a mixed impact on various tax types: sales and income tax increase but tariff and NTMs revenues fall.

7. Policy recommendations

- Given that a combination of tariff and NTMs liberalisation leads to higher GDP growth, efforts to remove trade barriers and improve infrastructure and logistics for trade should be promoted by the Ghanaian government.
- Despite improvements in GDP and the trade balance as a result of AfCFTA, the Ghanaian cedi is still expected to depreciate against the US dollar. This suggests that the other components of the balance of payment, such as services, income and transfer, and reserves, should be managed more effectively. For example, it is important to disincentivise capital flights as well as illicit financial flows.
- Signs that capital stock and intermediate inputs will rise as a result of AfCFTA suggest that issues of absorptive capacity, such as managerial skills and labour capacity, need to be nurtured by both producers of agricultural commodities and industrial manufactures to take advantage of the new opportunities opened up by the resource injection. This is reflected in the increased demand for labour in the manufacturing sector. This requires that education and training in the technical skills needed to operate industrial machines are promoted through Ghana's educational system.
- The increase in demand for marketed rice is indicative of affordability to households. At the current production level, Ghana is able to supply only 50 % of its demand for rice. Thus, an increase in demand as a result of AfCFTA presents a further growth in demand for Ghanaian rice that farmers can take advantage of. This means that production constraints on rice farming in Ghana, especially low levels of investment in irrigation systems, should be addressed. We therefore recommend that the Ghana Irrigation Development Authority focus on promoting rice production and attracting resources from the private sector to expand irrigation infrastructure for rice production in Ghana.
- Agriculture will drive significant improvements in the welfare of rural households under AfCFTA. Thus, efforts by the Ministry of Food and Agriculture in Ghana to remove any impediments to crop production, including access to inputs, technology and markets, will be crucial in helping rural households take advantage of the potential benefits of AfCFTA. At a more nuanced level, the Department of Social Welfare should focus its attention on urban households in the Upper East region through the provision of social protection support programmes, since urban households are likely to witness a decline in welfare.
- To mitigate the ultimate decline in overall tax revenue, the Ghana Revenue Authority should widen the tax net to catch individuals who are not currently paying income tax in particular, which is expected to rise. Similarly, sales taxes, which are also expected to increase, should be monitored closely to prevent leakage.

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List of abbreviations

1D1F	One District, One Factory
AfCFTA	African Continental Free Trade Area
AGR	agricultural trade
CET	common external tariff
CGE	computable general equilibrium
DEMETRA	Dynamic Equilibrium Model for Economic Development Resources and Agriculture
ECOWAS	Economic Community of West African States
GSS	Ghana Statistical Service
INT	intermediate inputs trade
IFPRI	International Food Policy Research Institute
ISSER	Institute of Statistical, Social and Economic Research
JRC	Joint Research Centre
MAGNET	Modular Applied General Equilibrium Tool
NTM	non-tariff measure
PFJ	Planting for Food and Jobs
RCA	revealed comparative advantage
REV	tariff revenue
ROW	rest of the world
SAM	social accounting matrix
SSA	sub-Saharan Africa

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Annexes

Annex 1. Web infographic with interactive data visualisations

This report is associated with an interactive infographic published on the European Commission's data portal of agro-economic modelling (DataM website). The link and the related QR code can be found below.

https://datam.jrc.ec.europa.eu/datam/mashup/AFCFTA_GHANA_DASHBOARD

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