2. Africa's trade, food security and climate risks

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This chapter aims to anchor the book in exactly what we mean when we consider Africa's agricultural trade – from grains and legumes through to fertilisers and tractors – and to establish a model for thinking about the interaction between trade, food security and climate risks in subsequent chapters.

It does this by examining Africa's agricultural exports in the broader context of its trade history. It then focuses on specific commodities such as maize, rice, wheat and fertilisers, which drive agricultural trade. The goal is to clarify the concept of 'food trade' as understood in this book.

The findings reveal that Africa's agricultural deficit has stabilised over the past decade in absolute terms despite rapid population growth. However, challenges in Africa's agricultural sector reflect broader issues seen in the continent's trade patterns. These include exporting unprocessed primary products in exchange for imports of finished consumer goods, thereby channelling Africa's raw materials towards value addition and processing jobs abroad rather than domestically. What is more, a worrisome dependence on imported food has emerged in several countries. This raises concerns about food security during shifts in trade terms and with the effects of climate change.

2.1 Five facts and a conceptual model of trade, food security and climate risks in Africa

The narrative surrounding Africa's food security, food trade and climate risks is intricate and defies reduction to a simple, all-encompassing story. Figure 2.1 illustrates the conceptual model used to frame the analysis of trade, food security and climate change in this book. Central to this framework are five narrative facts about Africa's agricultural trade.

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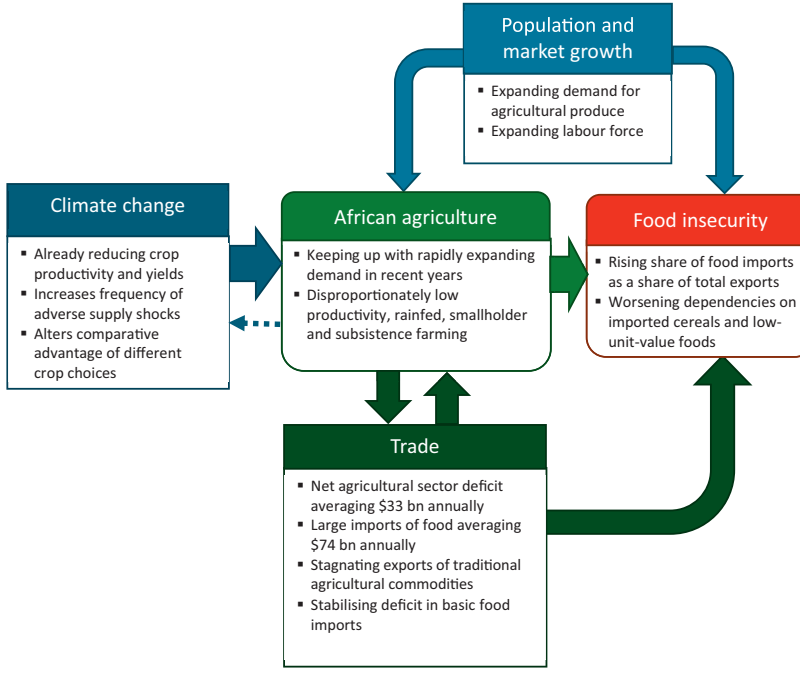
Figure 2.1: Conceptual model of trade, food security and climate change in Africa



Source: Author's composition.

First, the continent faces a significant and persistent trade deficit when considering the entire agricultural sector – including trade in foods, agricultural commodities, inputs and capital equipment. This deficit amounted to $33 billion in 2021, markedly higher than in the early 2000s, when the sector was at a breakeven and came close to even registering a small surplus.

Second, Africa is importing a tremendous amount of food, worth US$74 billion annually on average over the last five years. These food imports encompass low-unit-value items such as cereals and cooking oils, as well as higher-unit-value products such as fish and seafood, dairy and poultry. The demand for low-unit-value foods tends to increase with population growth, whereas higher-unit-value items correlate more closely with rising per capita incomes. In recent decades, population growth (a major confounding variable in our model) has outpaced other factors in putting increased pressure on food imports (Rakotoarisoa, Iafrate and Paschali 2011).

Third, exports of traditional African agricultural commodities have stagnated. Exports of agricultural commodities like cocoa, sugar, cotton, coffee, tobacco and tea have historically helped to balance out some of Africa's overall food trade deficit. In the post-independence period of the 1960s, these agricultural

goods accounted for as much as 42 per cent of Africa's total merchandise exports (Saner, Tsai and Yiu 2012). However, such exports have since lagged, failing to keep pace with the continent's increasing food import bill, as well as growing more slowly than exports of manufactures or primary commodities.

Fourth, Africa's food import deficit has actually been stabilising. The deficit in Africa's agriculture sector has remained relatively stable over the past decade, decreasing from its peak of $47 billion in 2011, despite rapid population growth and rising per capita incomes during this period (Fox and Jayne 2020). This stability is encouraging news and means that Africa's agricultural sector has managed to keep pace reasonably well with rapidly expanding domestic demand, reversing a long-standing negative trend (Rakotoarisoa, Iafrate and Paschali 2011). Put another way, the uncontrolled, rising food import deficit experienced in the first decade of the millennium has been arrested.

Fifth, Africa's agricultural sector, population growth and associated trade patterns have important consequences for food security. The continent's approach to agricultural trade has led to an increasing reliance on food imports in several countries. Since the mid-2000s, North, East and West Africa have seen a rise in the share of total merchandise exports needed to fund their food import bills, positioning many African nations among the most dependent on food imports globally. On average, the median African country allocates a quarter of its export revenue to food imports, with 16 African countries spending over 40 per cent on food imports. These countries face substantial food insecurity in the event of adverse terms of trade shocks or global food price rises.

Of particular concern are staple foods like cereals, which are crucial for many regions. Around 30 per cent of the available cereal supply in African countries is imported, with North Africa experiencing the most severe dependency, importing 52 per cent of its cereals in 2017–2019 – a 10-percentage-point increase from 2003 to 2005.

What we can think of as these five 'narrative facts' describe an agricultural sector under stress – a sector in a stable trade deficit, driven by food imports, stagnating traditional commodity exports, and emerging risks, including food security.

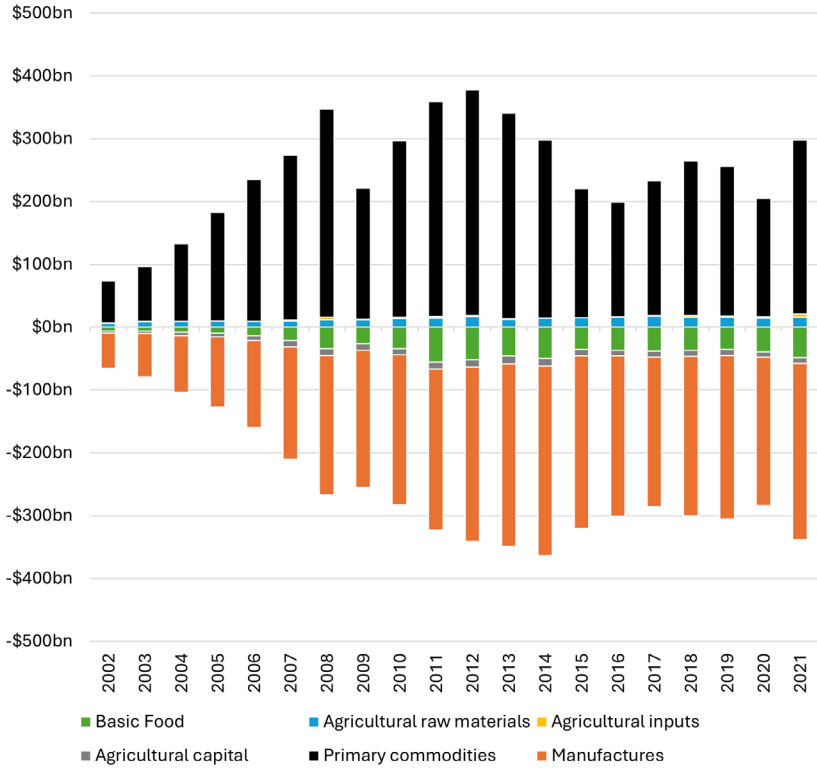
Adding to these challenges is climate change, a formidable factor exacerbating existing agricultural and food security issues despite Africa's minimal contribution to global greenhouse gas emissions. Climate change is altering temperature averages and weather patterns, impacting optimal crop choices and increasing the frequency of supply disruptions. Yield projections indicate declines for staple crops across much of Africa, including vital sources of food security such as wheat, maize, sorghum and rice.

This cumulative effect underscores a pressing challenge that demands bold, ambitious and deliberate policy actions in agriculture and trade. The remainder of this chapter delves into the intricate details of this conceptual model – exploring specific products, countries and trade dynamics that shape Africa's trade, food security and climate resilience framework.

2.2 Africa's agricultural trade in perspective

Zooming out of just agriculture, the main story of Africa's overall trade is a persistent concentration in exports of primary commodities, particularly petroleum fuels but also metals, precious metals, and minerals. At the macroeconomic level, Africa's trade dynamics involves surpluses in exports of primary commodities that help to offset deficits in manufactures and the agriculture sector. Figure 2.2 illustrates this interplay, showing how expansions in primary commodity exports in some years mirror increases in imports of manufactured goods and basic food.

Figure 2.2: African countries' net exports by product categories, showing primary commodities exported for imports of manufactured and agricultural goods (US$ billion, current prices), 2002–2021



Source: Author's calculations based on Centre d'études prospectives et d'informations internationales's (CEPII) Base pour l'Analyse du Commerce International (Database for the analysis of international trade) (BACI) database (CEPII 2023; Gaulier and Zignago 2010).
Notes: The continent collectively exports primary commodities in exchange for imports of manufactured goods and agricultural goods. See Annex A for details on product category composition. Negative values for net exports shown here refer to net imports.

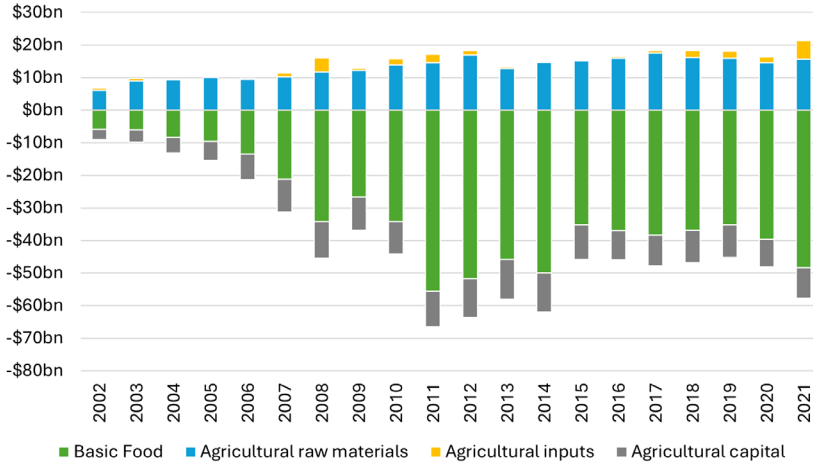
As this book aims to understand Africa's agricultural trade holistically, it considers not just agricultural goods but also inputs such as fertilisers, as well as capital goods like tractors and agricultural equipment. Agricultural inputs are mostly fertilisers and herbicides. Agricultural capital goods include tractors, agricultural machinery – such as seeders, harvesters and dryers – and agricultural tools.

Africa's agricultural output is furthermore divided into two: basic foods and agricultural raw materials, as per the United Nations (UN) Conference on Trade and Development (UNCTAD) broad product group classifications. UNCTAD defines basic foods as edible products like grains, tubers, meat, fish, poultry, fruits and oil seeds. A classification and breakdown of these food products is provided in both the UN's Standard International Trade Classification (SITC) codes and in the World Customs Organization's Harmonized System, Chapters 1–24. However, the UNCTAD definition of basic foods excludes tropical beverages such as coffee and tea, and products such as cocoa, spices, vegetables, tobacco and alcoholic drinks that also fall within the SITC codes and the applicable chapters of the Harmonized System, several of which are among Africa's most important agriculture exports (UN trade & development 2024). On the basis of UNCTAD's definition of basic foods, cassava, yams, rice, maize, wheat, poultry, meat and fish, are identified in this book as the main products in Africa's basket of basic foods that are most widely consumed and thereby contribute most to daily calorie intake requirements. Meanwhile, agricultural raw materials encompass products like cotton, fresh cut flowers, wood, rubber, tea, coffee, cocoa, tobacco, and spices or flavourings such as vanilla. As we will see, the nature of this pre-established classification system can have some issues. Goods that in the African context behave more as commodities, such as raw cashew nuts, are counted as food exports.

While overshadowed by Africa's substantial deficit in manufactured goods, the overall import bill for the agricultural sector remains considerable, totalling $34 billion in 2021. Particularly stark is the deficit in 'basic food', which escalated to $49 billion in the same year. In contrast, Africa maintains a net surplus in agricultural raw materials, although this sector has not grown as well as other export segments over the past decade. Additionally, the continent relies on net imports of agricultural capital, such as machinery and tractors, while being a net exporter of agricultural inputs, notably fertilisers sourced predominantly from North Africa. South of the Sahara, however, Africa remains a net importer of agricultural inputs like fertilisers (author's analysis of United Nations n.d.).

Overall, the collective picture is of the agricultural sector exporting raw materials and commodities in exchange for imports of consumable foods, manufactures and capital goods. Figure 2.3 provides a detailed view of Africa's net trade dynamics within the agricultural sector. In 2021, African countries recorded a net trade deficit of $49 billion for basic foods and $9 billion for agricultural capital, while achieving net surpluses of $16 billion from exports of agricultural raw materials (including cocoa, tobacco, coffee, tea and spices)

Figure 2.3: African countries' net exports by product category in the agricultural sector (US$ billion, current prices), 2002–2021



Source: Author's calculations based on CEPII's BACI database (CEPII 2023; Gaulier and Zignago 2010).
Notes: See Annex A for details on product category composition. Negative values for net exports shown here refer to net imports.

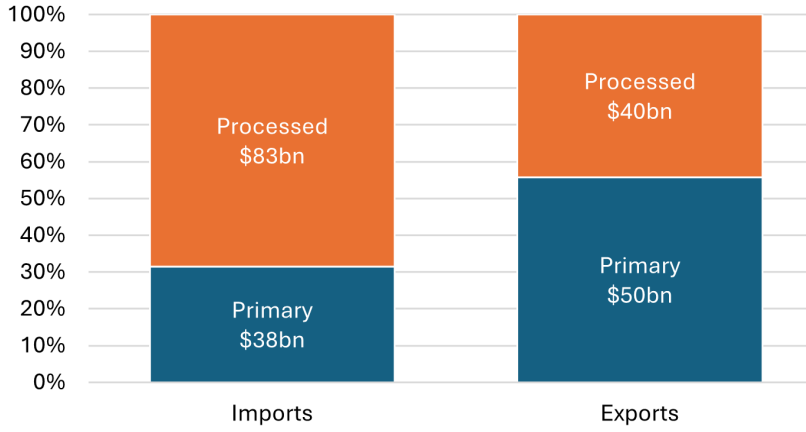
and of $6 billion from exports of agricultural inputs. This deficit widened dramatically from the early 2000s until 2011, before stabilising in the last decade, with the overall sector deficit in 2021 approximately 25 per cent smaller than in 2011. These figures are nominal and not adjusted for inflation, which means they underestimate the magnitude of the deficit observed in 2011.

Exchanging primary exports for processed imports in agricultural trade

Another telling way of making the same point is to redivide Africa's agricultural trade into that which is in its raw and unprocessed form, as opposed to processed goods that have been further worked and to which value has been added. This can be seen in Figure 2.4, which reconstitutes the individual products of Africa's trade using the UN's broad economic categories (BECs) to identify those that are primary or processed. This reformulation, for instance, casts cocoa beans, coffee beans, wheat and oranges as 'primary' goods, while classifying cocoa paste, roasted coffee, wheat flour and orange juice as 'processed'. A far larger share (56 per cent) of exports of agricultural produce from African countries are in a primary form, while 70 per cent of imports are processed.

Africa's agricultural trade is, in many ways, a microcosm of the challenges that Africa faces in its trade more broadly. African countries' exports are disproportionately concentrated in raw materials and unprocessed agricultural

Figure 2.4: Africa's exports and imports of food and agricultural raw materials, by BEC categories of primary and processed goods



Sources: Author's calculations based on CEPII's BACI database (2023), based on a five-year average from 2017 to 2021.

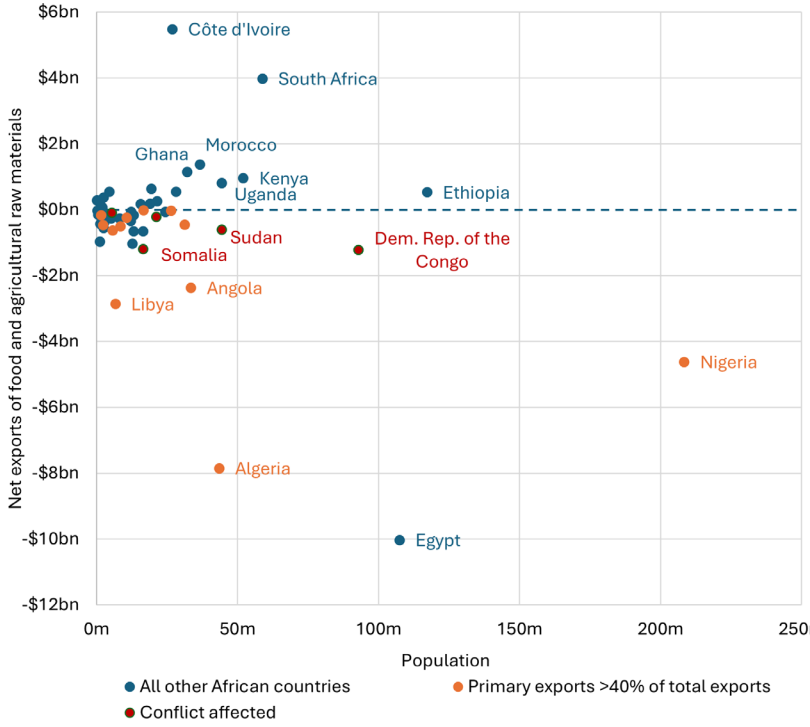
exports. These often represent less value added than processed agricultural goods that have been further worked.

Who drives the agricultural deficit?

The agriculture deficit is of course not uniform across the continent. A large number of African countries have succeeded in emerging as important net exporters of foods and agricultural raw materials, chiefly Côte d'Ivoire, South Africa, Morocco, Ghana, Kenya and Uganda, while others lead very large deficits. This is shown in Figure 2.5, which plots each African country by the size of its net surplus (or deficit) in exports of food and agricultural raw materials along the y-axis. The country population, which is an important amplifying variable for the surplus (or deficit), is shown on the x-axis. The net agricultural exporters are in the top half of the chart.

The African countries in the bottom half of the chart are the culprits of agricultural deficits. The largest agricultural deficits tend to belong to countries with a combination of three things: large populations, like Egypt and Nigeria; a heavy focus on exports of primary commodities, such as Nigeria, Algeria, Angola and Libya; and those that are fragile and undermined by conflicts, like Somalia, Sudan and Democratic Republic of the Congo. The latter two factors (correspondingly shaded orange and red, respectively, in Figure 2.5) are suggestive of what matters for agricultural success: stability and an economy that is not too distracted by the trappings (or curses) of primary resources (Dauvin and Guerreiro 2017).

Figure 2.5: Net exports of food and agricultural raw materials, by country (US$ billion, current prices) and population



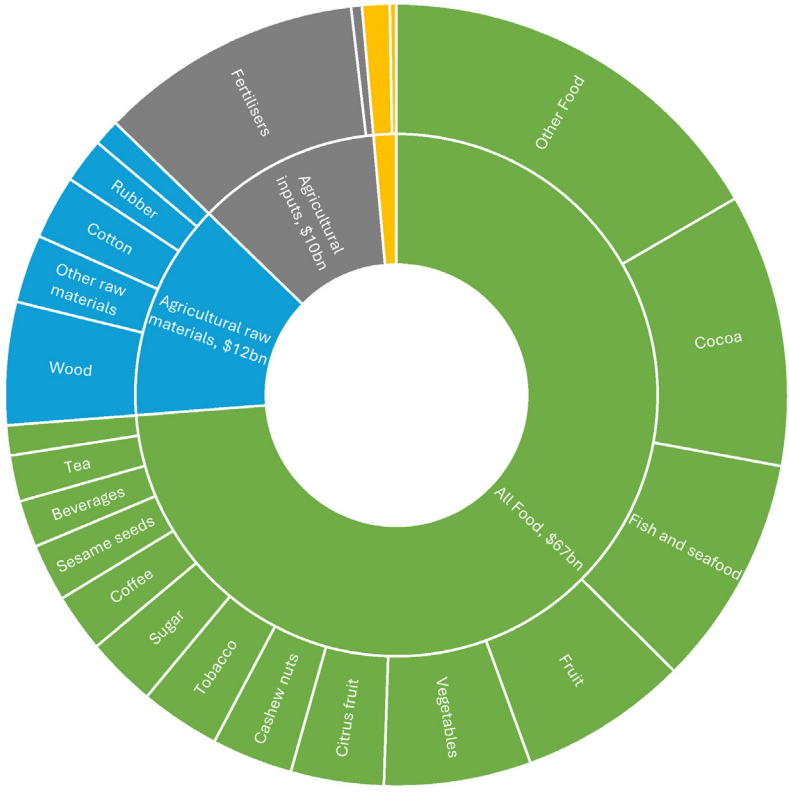
Sources: Author's calculations based on United Nations Department of Economic and Social Affairs (UN-DESA) (2022), CEPII's BACI database (CEPII 2023; Gaulier and Zignago 2010) and the World Bank (n.d) Classification of Fragile and Conflict-Affected Situations.
Note: For simplicity, where a country is conflict-affected and at the same time its primary exports account for more than 40 per cent of total exports, it is classified as a primary exporter.

What exactly are Africa's agriculture sector exports?

Agricultural exports from African countries comprise an interesting blend of unprocessed, and lower-unit-value, agricultural commodities, like cocoa, sugar, cotton and coffee, but also higher-unit-value food products like fruits, nuts and fish.

What exactly are Africa's exports in each of these categories? Figure 2.6 breaks them down, showing the main products driving Africa's agricultural exports. Africa's major food exports, between 2017 and 2021, were fish and seafood ($9 billion); fruits ($7 billion) and citrus fruits ($3 billion); vegetables, roots and tubers ($6 billion); cashew nuts ($3 billion); sesame seeds ($2 billion); palm oil ($0.8 billion); and olive oil ($0.8 billion). Africa's exports of its major food security crops are worth less, with annual exports of maize amounting to $0.8 billion, wheat $0.5 billion and rice $0.4 billion.

Figure 2.6: Decomposition of Africa's average annual agricultural exports, by product category and product, five-year average (2017–2021)



Source: Author's calculations based on CEPII's BACI database (CEPII 2023; Gaulier and Zignago 2010).
Note: See Annex for details on product category composition.

Africa's exports of agricultural commodities are dominated by cocoa ($10 billion), but sugar ($3 billion), cotton ($2 billion), coffee ($2 billion), tobacco ($2 billion), tea ($2 billion), flowers ($1 billion) and vanilla ($0.8 billion) are also important. Fertilisers are a sizeable agricultural input export ($10 billion), while total exports of agricultural capital amounted to just $0.6 billion. This unveils a story of African countries engaging far more in the upstream part of agricultural value chains and less so in the production or preparation of foods and goods for final consumption. This is the case even *within* broader categories of products like 'cashew nuts' or 'cocoa', with Africa's exports being more concentrated in raw cashew nuts than edible cashew kernels, and in cocoa beans and sugar more than processed cocoa or chocolate.

Who are Africa's leading food and agricultural commodity exporters and where do they export to?

Different African countries, and different export destinations, drive different parts of Africa's agricultural trade. The north and south of the continent tend to lead in relatively higher-unit-value food exports, while West and East Africa are more important agricultural commodity exporters.

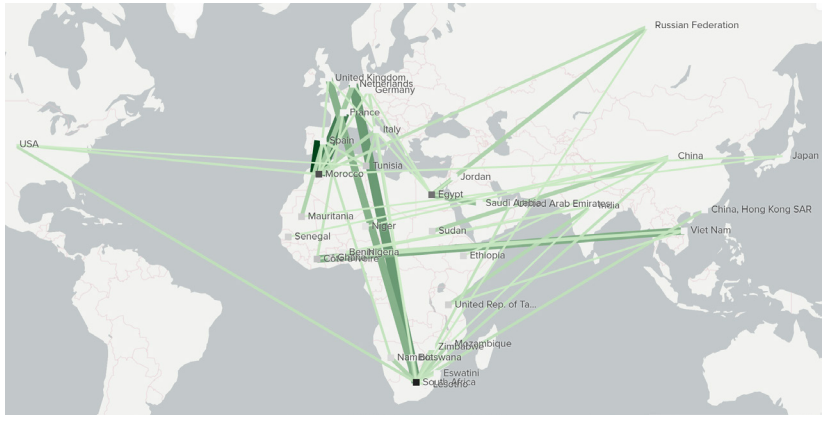
Figures 2.7 and 2.8 illustrate the lead exporters, and destination markets, driving Africa's exports in food and agricultural commodities. This trade is led particularly by Northern and Southern Africa, by the relative agricultural powerhouses of Morocco, Egypt and South Africa, as well as a few countries in West Africa. This is shown by the thicker and darker lines from these countries, showing the relative value of bilateral export flows of foods from these countries.

In North Africa, Morocco is a major exporter of vegetables, fruits and seafood, mostly to Europe but also a few other destinations, like Russia, the United States (US) and Japan. Egypt is also a large exporter of citrus fruit and, to a lesser extent, vegetables to Europe, Russia and Saudi Arabia.

In Southern Africa, South Africa's food exports include citrus fruits (such as oranges and lemons) and other fruits (including avocados, berries and grapes) to Europe, as well as macadamia nuts to the US and several East Asia countries, as well as regional maize exports.

In West Africa, Côte d'Ivoire, Ghana and Nigeria (as well as Tanzania in East Africa) are major exporters of raw cashew nuts to Viet Nam and to India. The former is the world's biggest processor of raw cashew nuts into consumable cashew kernels, while the latter is one of the world's biggest cashew consumer markets.

Figure 2.7: Map showing Africa's top 50 bilateral exports of foods, between country pairs, five-year average (2017–2021)



Source: Author's calculations based on CEPII's BACI database (CEPII 2023; Gaulier and Zignago 2010).
Note: Thicker and darker lines indicate the relative value of bilateral export flows of foods.

Other notable African food exports include olive oil from Tunisia, particularly to Spain and Italy, fish from Namibia and seafood from Mauritania to Spain. Also notable is China, which is a very important destination for sesame seeds from Sudan, Niger, Ethiopia, Togo and Tanzania, and groundnuts from Senegal.

Africa's exports of agricultural commodities are led much more by West Africa and Eastern Africa. This trade is dominated by exports of cocoa beans, from Côte d'Ivoire and Ghana and to a lesser extent Nigeria and Cameroon. This is mostly destined to Europe, but also to the US, Canada, Indonesia and Malaysia. After cocoa, cotton is the next most important agricultural commodity from West Africa, with Burkina Faso, Benin and Mali being notable exporters, especially to textile factories in Europe and Bangladesh.

In Eastern Africa, Kenya is a major exporter of tea to tea drinking markets such as Pakistan, Egypt, the United Arab Emirates and of course the United Kingdom. Kenya is also a major exporter of fresh cut flowers, particularly to the Netherlands, from where they are redistributed within Europe. Ethiopia and Uganda are large coffee exporters, mostly to Europe.

In Southern Africa, Malawi and Zimbabwe are notable tobacco exporters. Madagascar is a significant vanilla exporter, to the US and Europe. South Africa is the destination for regional exports of sugar from Eswatini, tobacco from Zimbabwe, and beef from Namibia and Botswana. South Africa itself also exports a large amount of sugar.

Beyond exports of food and agricultural commodities, African countries also export agricultural inputs and, to a much lesser extent, agricultural capital goods. In terms of agricultural inputs, North Africa (and especially Morocco) is a substantial exporter of fertiliser to countries all over the world.

Figure 2.8: Map showing Africa's top 50 bilateral exports of agricultural commodities, between country pairs, five-year average (2017–2021)

Source: Author's calculations based on CEPII's BACI database (CEPII 2023; Gaulier and Zignago 2010).
Note: Thicker and darker lines indicate the relative value of bilateral export flows of foods.

Table 2.1: Destination of Africa's agricultural exports, five-year average (2017–2021) ($bn)

	Europe	Intra-Africa	Asia	Americas	Other
Food	16	10	9	2	4
Agricultural commodities	12	5	6	3	3
Agricultural inputs	2	2	2	3	1
Agricultural capital	0.1	1	0.1	0.1	0.1
Total	**30**	**18**	**17**	**8**	**8**

Source: Author's calculations based on CEPII's BACI database (CEPII 2023; Gaulier and Zignago 2010).

With agricultural capital, South Africa is the main exporter within the continent, particularly of machinery and tractors to countries in Southern and East Africa. There is very limited regional trade in capital goods beyond those from South Africa.

Table 2.1 shows how these trade flows aggregate into Africa's exports of agricultural goods to different markets. The European Union (EU) remains by far Africa's most important market for exports of food and agricultural commodities. Intra-African trade is also very important, and dominated by trade in food products, while involving less trade in agricultural commodities. This trade also includes a large informal component that is not reflected in the data presented here (informal intra-African food trade is discussed in Chapter 4). In contrast, agricultural commodities comprise a large share of Africa's agricultural exports to countries in Asia, the Americas and elsewhere in the world.

What are Africa's agricultural imports?

Africa's agricultural imports are far more concentrated in foods. Food accounts for two-thirds of all African agricultural imports, with Africa importing far fewer agricultural commodities than it exports. Even Africa's agricultural commodity imports are dominated by sugar, which, while representing a commodity that will be processed further when exported outside the continent, is often a direct consumer good when imported.

From 2017 to 2021, African countries averaged annual food imports totalling $73 billion. This trade is primarily fuelled by substantial imports of low-cost items such as food security cereals, cooking oils and sugar. Additionally, there are imports of higher-value goods like fish, seafood and dairy products. These imports include products that Africa produces competitively but not at a scale sufficient to satisfy its substantial and expanding consumer demand, necessitating significant importation. Figure 2.9 provides a detailed breakdown of Africa's agricultural import patterns.

Figure 2.9: Decomposition of Africa's average annual agricultural imports, by product category and product, five-year average (2017–2021)

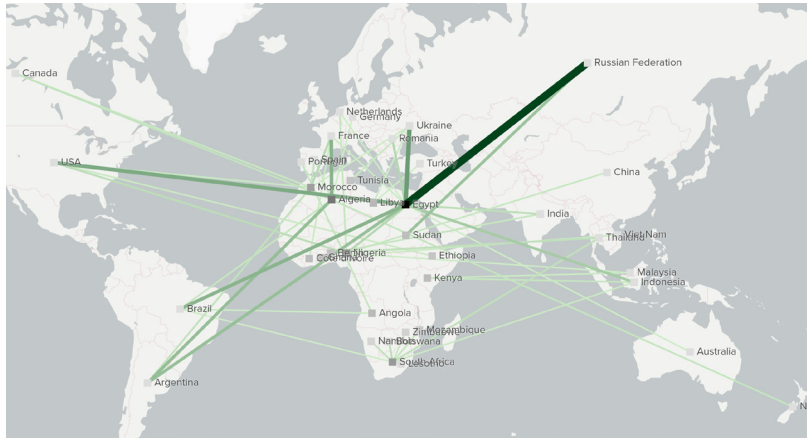
Source: Author's calculations based on CEPII's BACI database (CEPII 2023; Gaulier and Zignago 2010).
Note: See Annex for details on product category composition.

Where do the food imports come from and to which African countries do they go?

Figure 2.10 provides a visual representation of Africa's significant food trade flows, detailing the top 50 bilateral import relationships. It highlights that Africa sources its food from a diverse array of countries across all continents, contrasting with its export focus on foods and agricultural commodities primarily with Europe. While regional trade, particularly in Southern Africa, involves grains like maize exported from South Africa to neighbouring countries, the majority of Africa's major food import partners are located outside the continent.

North Africa plays a pivotal role in Africa's food imports, with Egypt notably importing wheat from Russia and Ukraine, maize from Brazil and Argentina, soya beans from Argentina and the EU, palm oil from Indonesia, and

Figure 2.10: Map showing Africa's top 50 bilateral imports of foods between country pairs, five-year average (2017–2021)



Source: Author's calculations based on CEPII's BACI database (CEPII 2023; Gaulier and Zignago 2010).
Note: Thicker and darker lines indicate the relative value of bilateral export flows of foods.

beef from Argentina. Similarly, Algeria, Morocco, Tunisia and Sudan import substantial quantities of cereals, including wheat sourced from Canada, Russia and the EU, and maize from Argentina.

In West and Central Africa, rice and palm oil are the predominant imports. Rice originates from countries such as India, Viet Nam and Thailand, while palm oil is sourced from Malaysia and Indonesia. Nigeria stands out as the largest importer of food in West Africa, driven by its sizeable population, importing significant quantities of wheat from the US, Canada and Russia, as well as rice and palm oil from Asia. South Africa similarly imports substantial amounts of rice from Thailand and India, palm oil from Indonesia and Malaysia, and beef from Brazil.

East Africa, while representing a smaller share of major food inflows into the continent, sees notable imports of palm oil, particularly by Kenya and to a lesser extent Ethiopia, from Indonesia and Malaysia.

Figure 2.10 does not depict Africa's imports of agricultural commodities, which are dominated by sugar imports, notably from Brazil (the world's largest sugar exporter) and to a lesser extent India. Other noteworthy agricultural commodities include the regional trade in tea, such as from Kenya to Egypt, and the tobacco trade from Zimbabwe to South Africa.

Imports of agricultural capital goods are also important. South Africa is a major destination for tractors imported from Germany, Sweden and Brazil. In West Africa, tractors are predominantly sourced from China, while North African countries rely on European suppliers for their tractor imports.

Table 2.2: Origin of Africa's agricultural imports, five-year average (2017–2021) ($bn)

	Europe	Asia	Americas	Intra-Africa	Other
Food	27	17	13	10	5
Agricultural commodities	4	3	6	5	1
Agricultural inputs	2	2	0	2	1
Agricultural capital	5	3	1.1	1	1
Total	**38**	**25**	**20**	**18**	**8**

Source: Author's calculations based on CEPII's BACI database (CEPII 2023; Gaulier and Zignago 2010).

A striking observation from the data is the substantial role of China as a supplier of agricultural capital goods, including tractors and machinery, to various countries across Africa. Additionally, there is notable regional trade dynamics, with South Africa serving as a supplier of agricultural capital goods to its neighbouring countries.

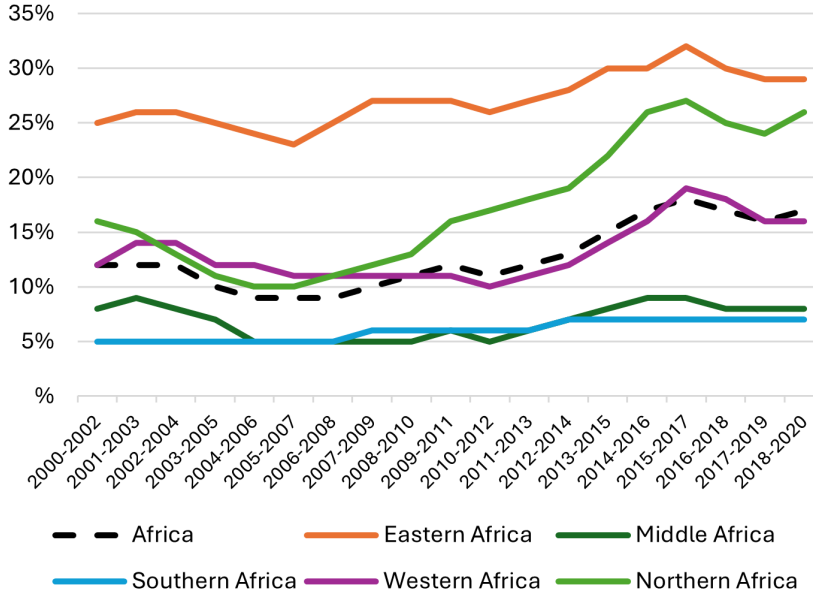
The most significant flows of these are tractors into South Africa from Germany, Sweden and Brazil; tractors into West African countries from China; and tractors into North African countries from Europe. Many African countries also import fertilisers including large quantities of fertilisers sourced primarily from Morocco, the Middle East and Russia, as well as insecticides imported from China.

Table 2.2 summarises the origin of Africa's imports of agricultural goods. Europe is by a large margin the most important source of these, followed by Asia, the Americas and then intra-African trade. However, African countries import mostly food products from Europe and Asia, and especially lower-unit-value food goods like grains and palm oil.

Agricultural imports and Africa's food security

As demonstrated, Africa faces a significant challenge with its substantial food imports, resulting in a large annual net deficit. Often, these imports are financed using foreign exchange earned from other export-competitive sectors of African economies, such as primary commodities. However, dependence on imported foods introduces risks, particularly when these imports constitute a large portion of foreign exchange earnings. Changes in trade terms, such as declines in export prices or increases in global food prices, can jeopardise food security. This risk is amplified when there is a deficit in the trade of basic foods, especially in terms of calories rather than financial value, making it impractical to redirect exported foods to meet domestic consumption needs. In 2023, at least 34 African countries were grappling with such challenges, according to the FAO (n.d.).

Figure 2.11: Value (in percentage) of food imports in total merchandise exports (three-year average)



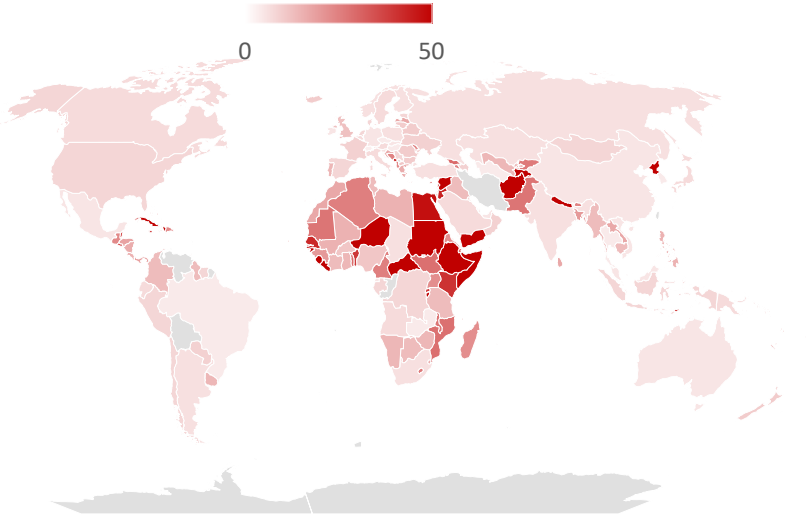
Source: Calculated on the basis of FAO (2023).
Notes: The indicator is calculated in three-year averages, from 2000–2002 to 2018–2020, to reduce the impact of possible errors in estimated trade flows. The aggregates are computed by weighted mean, using total merchandise trade as weighting variable. Value of food (excluding fish).

Figure 2.11 illustrates the value of food imports as a percentage of total merchandise exports for Africa as a whole and its five regions. This metric serves as a gauge of vulnerability, reflecting the adequacy of foreign exchange reserves to cover food imports and its implications for national food security based on production and trade patterns.

Africa's reliance on food imports as a percentage of total merchandise exports has steadily risen since 2003, reaching 17 per cent during the 2018–2020 period. In comparison, the global average for this indicator was 7 per cent during the same period. East Africa emerges as the most vulnerable region, with 29 per cent of export earnings allocated to food imports in recent years. North Africa has experienced the most pronounced deterioration, increasing from 10 per cent in the 2002–2004 period to 26 per cent in 2018–2020. West Africa has also seen a notable increase in the value of food imports as a proportion of total exports. Cumulatively, these trends underscore the heightened susceptibility of Africa's food security to shocks in terms of trade.

As depicted in Figure 2.12, numerous African countries face severe food import insecurity, as evidenced by the high proportion of food imports relative to total merchandise exports. This vulnerability is particularly acute in

Figure 2.12: Map showing worldwide distribution of food import insecurity as reflected in percentage of food imports in total merchandise exports by value, 2018–2020



Source: Calculated on the basis of FAO (2023).
Note: The indicator is capped at >50 to limit the visual impact of outliers.

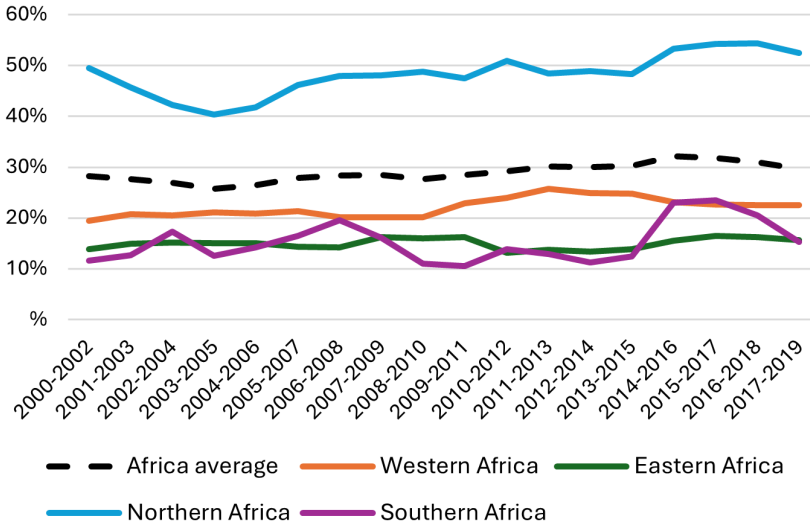
countries across the Horn of Africa (Somalia, Ethiopia and Sudan), North Africa (Egypt) and several smaller nations in West, East and Central Africa (including Sierra Leone, Liberia, Benin, Gambia, Cabo Verde, Sao Tome and Principe, Niger, Senegal, Comoros, Guinea-Bissau, Burundi and Central African Republic). In these countries, more than 40 per cent of their export earnings are allocated to financing food imports. Cereals emerge as the critical crop for food security across most of these nations.

Figure 2.13 illustrates Africa's cereals import dependency ratio over time, offering insights into the extent to which countries rely on imported cereals compared to their domestic production. This ratio is calculated as (cereals imports – cereals exports)/(cereals production + cereals imports – cereals exports) * 100. The indicator's values are capped at 100, indicating complete dependence on imports when exceeded.

These metrics underscore the significant challenges many African countries face in ensuring food security, with a heavy reliance on imported cereals in nations already struggling with high proportions of export earnings allocated to food imports.

Around 30 per cent of the available food supply of cereals in African countries is sourced through imports. This is in stark contrast to the world average,

Figure 2.13: Cereals import dependency, across Africa and over time: value (in percentage) of imported cereals in total available supply of food cereals (three-year average)



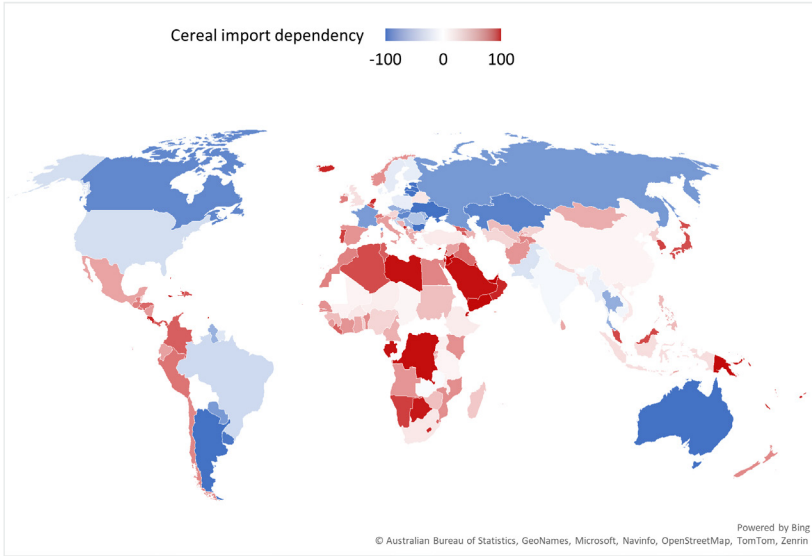
Source: Calculated on the basis of FAO (2023).
Note: The indicator is calculated in three-year averages, from 2000–2002 to 2017–2019, to reduce the impact of possible errors in estimated production and trade, due to the difficulties in properly accounting of stock variations in major food.

which stands at just under zero (–2.8 per cent during 2017–2019, indicating that most countries are net exporters of cereals). The dependency on imported cereals is most pronounced in North Africa, where 52 per cent of the available cereals are imported. This reflects a deterioration of 10 percentage points compared to the period from 2003 to 2005. Figure 2.14 puts the cereals import dependency of African countries in the context of the world. As a continent, it is clear that Africa is the part of the world that struggles most with a dependency on imported cereals, alongside the Arabian Peninsula.

2.3 The impact of climate change on agriculture, food security and trade in Africa

We can think of climate change as interacting with trade and impacting food security and agriculture in Africa through two primary channels. This simplification helps us to think through the key role of trade, though in practice climate change impacts are multidimensional, intersecting with socio-economic, political and environmental factors such as security, migration and labour productivity.

Figure 2.14: Global cereals import dependency as reflected in value (in percentage) of imported cereals in total available supply of food cereals (2017–2019)



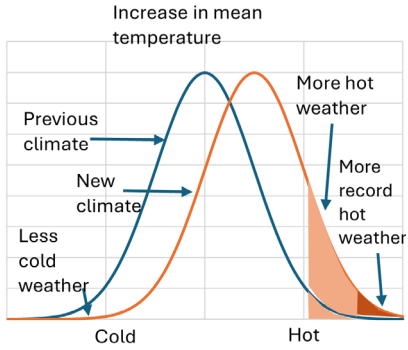
Source: Calculated on the basis of Food and Agriculture Organization of the United Nations (n.d.).
Notes: The indicator is capped at –100 so as not to distort the visualisation with outlier values. Negative values indicate that a country is a net exporter of cereals.

The first is by 'shifting the mean' in weather systems. Climate change is increasing temperatures and altering precipitation patterns. Rising temperatures can lead to changing growing seasons or alter the suitable geographical range for specific crops. In some regions, the temperature increase may more frequently exceed the optimal range for certain crops, negatively impacting yields. The first stylistic histogram of Figure 2.15 shows the frequency of cold and hot weather events under a normal weather distribution function. Climate change shifts the mean temperature, which in turn increases the frequency of hot weather events. In this way, the 'mean' weather system would be considered to have shifted, with consequences for yields of both agricultural commodities and foods. Such changes have already reduced maize and wheat yields in sub-Saharan Africa, with yields projected to fall for most staple crops across most of Africa, alongside declines in livestock production and marine and freshwater fisheries (Intergovernmental Panel on Climate Change (IPCC) 2023).

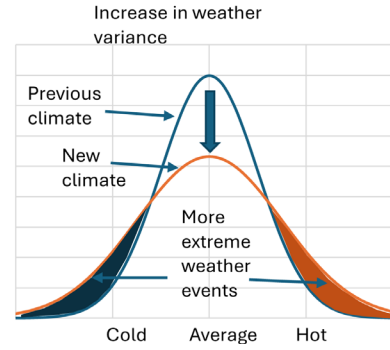
The second channel of impact from climate change to agriculture concerns 'shifting the variance'. This is demonstrated in the second stylistic histogram in Figure 2.15. A larger variance refers to increases in the occurrence of extreme weather events, such as extreme heat stress, floods or droughts.

Figure 2.15: Stylistic weather histogram

a) Weather volatility: shifting the mean



b) Weather volatility: shifting the variance



Source: Author's elaboration.

The increased irregularity of weather patterns, including prolonged droughts and intense rainfall events, poses challenges for crop growth, soil fertility and water availability. Another way we might think of this is as 'weather shocks'. Climate change is causing increases in drought frequency and duration over large parts of Southern Africa, flooding in North Africa, and heat waves across the continent (Intergovernmental Panel on Climate Change (IPCC) 2023).

Each channel of impact affects both the optimum choice of crop and the frequency of adverse supply shocks and, in turn, food security challenges. Trade interacts with these changes in two key ways: by allowing a safety valve for food availability and stability in the presence of adverse supply shocks and by allowing trade to evolve to reflect changing optimum growing parameters.

Gradual changes in climate will see a change in the agricultural comparative advantage of different countries. For instance, rising temperatures may cause certain crops to be less efficiently produced in one country but more efficiently produced in another, thereby changing the comparative advantage of each country with respect to one another. Driving these changes is the impact that climate change has on agricultural productivity. Maize and wheat yields have already decreased an average of 5.8 per cent and 2.3 per cent, respectively, between 1974 and 2008, in sub-Saharan Africa owing to climate change (Intergovernmental Panel on Climate Change (IPCC) 2023). Trade can become an important tool for food security in these instances by allowing consumers to adapt more readily to changing market conditions by tapping world markets while allowing producers to grow what reflects their changing comparative advantage (Baldos and Hertel 2015).

Trade can be used to mitigate the impact of production shocks, including those affecting critical food security crops. This is because adverse supply shocks in certain places can be met by supply surpluses in other, unaffected places, through trade. Staple food crops tend to have greater price volatility the more remote and detached from global markets they are (Burgess et al.

2011, p.26; Moctar et al. 2015). Markets that are better connected and more open can help mitigate the severity of supply shocks for agricultural products, including those that are climate-induced. However, availability is only part of any solution, with food security requiring other aspects of purchasing power to ensure meaningful access.

Beyond trade in actual agricultural produce, trade in agricultural intermediates and inputs, as well as agricultural services and knowledge, can play an important role in agricultural adaptation to climate change. Improving access can help farmers utilise new seed varieties, agricultural machinery, fertilisers and agricultural extension services to address changing climate challenges. African farmers pay considerably more for fertilisers than farmers in countries like Pakistan, Argentina and Brazil do (Keyser 2012). As well as reducing formal tariff barriers, alleviating non-tariff barriers would be important here. Ways to do this include regional harmonisation, or mutual recognition, of standards and seeds certification, improving competition between logistics suppliers, aiding the mobility of agricultural specialists, and reducing opaque and unpredictable trade policies. Policy measures that could be taken to discipline non-tariff barriers are discussed in Chapter 7.

Conclusions

The agricultural sector reflects broader challenges within Africa's trade dynamics, characterised by a pattern of exchanging raw, unprocessed exports for imports of final consumption goods. This scenario is fuelled by the primacy of primary commodities and the persistence of conflict and fragility on the continent.

This trade dynamic primarily benefits value addition and material processing industries outside Africa rather than domestically. The trend is starkly evident in Africa's exports of primary commodities such as fuels and metals in exchange for manufactured goods. Similarly, Africa's agricultural sector follows a parallel trade pattern: while final consumer goods, particularly food items, are imported, exports predominantly consist of intermediate goods such as cocoa beans, cotton, raw cashew nuts and fertilisers – essential inputs for production and agricultural processing elsewhere in the world.

This trade structure, akin to Africa's exports of petroleum oils and metals, does not promote local value addition, job creation or economic growth. Many Africans remain trapped in unproductive or informal employment, missing out on opportunities for higher earnings that could arise from processing Africa's agricultural and food commodities within the continent. Moreover, several of Africa's primary agricultural and food commodities are expected to see declining prices relative to manufactured goods (Harvey et al. 2010).

The current structure of Africa's agricultural trade puts the continent at risk to emerging and continuing threats. Too many African countries are dependent on imports of staple foods for sustenance. Many spend a large

share of their export earnings on these imports. Supply or adverse terms of trade shocks could prove perilous for these countries. These challenges are amplified by the pressures of climate change. Frank questions and bold answers are needed to policies in both trade and agriculture. In order to understand the terrain of Africa's agricultural trade, the chapters of this book now turn to these policy consequences.

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Annex: categorisation of agricultural trade

Category	SITC codes (unless otherwise specified)
Manufactures	5 – Chemicals and related products, except 56 (crude fertilizers) 6 – Manufactured goods classified chiefly by material, except 68 (nonferrous metals) and 667 (pearls, precious and semi-precious stones, worked or unworked) 7 – Machinery and transport equipment 8 – Miscellaneous manufactured articles
Primary commodities	3 – Mineral fuels, lubricants and related materials 667 – Pearls, Precious And Semi-Prec. Stones 68 – Non-Ferrous Metals 971 – Gold, Non-Monetary
Agricultural raw materials	07 – Tobacco, cocoa, tea, coffee and spices 2 – Crude Materials, except 22 (Oil seeds and oleaginous fruits), 27 (fertilizers), and 28 (Metalliferous Ores And Metal Scrap)

(Continued)

Annex: (Continued)

Category	SITC codes (unless otherwise specified)
Basic food	0 – Food and live animals, except 07 (tobacco, cocoa, tea, coffee and spices) 1 – Beverages and tobacco 22 – Oil seeds and oleaginous fruits 4 – Animal and vegetable fats
Agricultural inputs	SITC codes 271/272 – Crude fertilisers 56 – Fertilisers Harmonised System (HS) codes 380810 – Insecticides 380820 – Fungicides 380830 – Herbicides 380890 – Rodenticides
Agricultural capital goods	HS codes 401161 – Tractor tyres 401192 – Tractor tyres 820140 – Hand tools for agriculture, horticulture or forestry 820190 – Hand tools for agriculture, horticulture or forestry (n.e.s.) 820840 – Knives and blades used for agriculture, horticulture or forestry 841931 – Dryers for agricultural products 842121 – Centrifuges for filtering or purifying liquids 842481 – Liquid spraying equipment for agricultural or horticultural use 842890 – Loaders (e.g. for agricultural tractors) 8432 – Agricultural machinery for soil preparation, seeders or cultivation 8433 – Harvesting or threshing machinery 8434 – Milking machines and dairy machinery 8435 – Presses, crushers and similar machinery used in the manufacture of wine, cider, fruit juices or similar beverages 8436 – Other agricultural, horticultural, forestry, machinery used for preparing animal feeding stuffs and poultry incubators 8437 – Machinery for cleaning, sorting or grading seed, grain or dried leguminous vegetables 8438 – Machinery for the industrial preparation or manufacture of food or drink 847920 – Machinery for the extraction or preparation of fats and oils 8701 – Agricultural tractors 871620 – Trailers and semi-trailers for loading agricultural produce 940600 – Greenhouses

Source: Author's calculations.