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# COVID-19 Working Paper: Single Commodity Export Dependence and the Impacts of COVID-19 in Sub-Saharan Africa

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## Abstract

As recent trade disputes have led the United States to broaden export markets, the macroeconomic and developmental characteristics of sub-Saharan Africa (SSA) ostensibly indicate the region will likely be a destination for U.S. agricultural exports in upcoming years. However, many of these characteristics are symptomatic of the economic development struggles prevalent in the region, which present significant challenges to sustained development. Trade in high-value commodities, for example, may offer economic growth, but the benefits are not necessarily diffused throughout the broader economy. Serving as the primary source for economic growth, foreign exchange, and export revenue, exports of high-value commodities can create terms-of-trade shocks during periods of significant fluctuations in international prices. This can limit a country's ability to trade effectively and alter trade flows due to the resultant depreciating exchange rate. The current Coronavirus (COVID-19) crisis has created such a period of intense price volatility, offering a unique opportunity for modeling potential effects of a global shock on trade with these nations. This working paper illuminates the impact that this volatility can have on U.S. agricultural product export values to SSA. By simulating the effects of declining oil prices in 2020 and subsequent years through a shock to gross domestic product (GDP) in oil-dependent nations—i.e., Angola and Nigeria—we can evaluate the impacts of COVID-19 on agricultural trade for key U.S. export commodities to SSA.

**Keywords:** Coronavirus, COVID-19, single-commodity dependence, sub-Saharan Africa, Nigeria, Angola, poultry, wheat, agricultural trade, U.S. agricultural exports, rice

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## What Is the Issue?

Primary U.S. export markets to sub-Saharan Africa (SSA) are concentrated among few countries and commodities. These markets are prone to disruptions from macroeconomic forces that arise due to a series of developmental challenges. Specifically, two of the largest U.S. export markets in SSA—Nigeria and Angola—are reliant on oil exports as the primary source of economic growth, foreign exchange, and export revenue. This dependency leaves these markets vulnerable to exogenous shocks in international commodity prices, which can deplete foreign exchange reserves, thus limiting their ability to trade effectively. Given the frequent declines in oil prices, oil-dependent nations are particularly susceptible to vulnerabilities inherent in single-commodity dependence. The current Coronavirus (COVID-19) crisis resulted in such a period of intense price volatility in which oil prices dropped by 42 percent in March and April 2020—the second largest drop in oil prices since World War II. The resulting terms-of-trade shocks reduce oil-dependent countries' ability to import items from partners such as the United States.

## What Did the Study Find?

This analysis revealed declines in overall trade and consumption stemming from the economic shock across each SSA model. These results aligned with expectations in which the pandemic led to a decline—by varying degrees—across all commodities and indicators in each model. A regional summary is provided below:

- SSA rice consumption saw the largest decline—falling by 4.3 percent from the pre-pandemic projection—which led to a 1.2 percent drop in imports in 2020.
- Scenario results for SSA wheat consumption showed a decline of 1.7 percent in 2020, continuing its decline through 2030. Driven by declining Nigerian wheat imports, total SSA wheat imports likewise fell by 2.1 percent in 2020.
- SSA poultry imports saw the largest drop by commodity, with imports falling by 3.5 percent and consumption falling by 8.5 percent in 2020.
- Despite regional gross domestic product (GDP) recovering in subsequent years, consumption and imports are projected to remain below pre-COVID levels through 2030.
- Comparing these results with ex-post data (i.e., realized data for 2020 and 2021) reveal the pandemic led to even greater declines than those revealed in this analysis.

## How Was the Study Conducted?

This analysis employs a partial equilibrium global agricultural multi-country and regional modeling system maintained by USDA's Economic Research Service, solving for global equilibrium in trade and world prices for major agricultural commodities. A scenario was conducted with declining GDP values based on the anticipated impact from the COVID-19 pandemic beginning in 2020—as well as in subsequent years—across four models representing the Economic Community of West African States (less Nigeria) (ECOWAS), Nigeria, South Africa, and an aggregated model for the remainder of SSA countries.<sup>1</sup> Projections through 2030 are provided for three major commodities (i.e., wheat, rice, and poultry) for agricultural indicators such as production, consumption, and trade. A pre-COVID scenario was then measured against these results to quantify the anticipated impact of the pandemic on agricultural indicators for key commodities in the prime exports markets of SSA.

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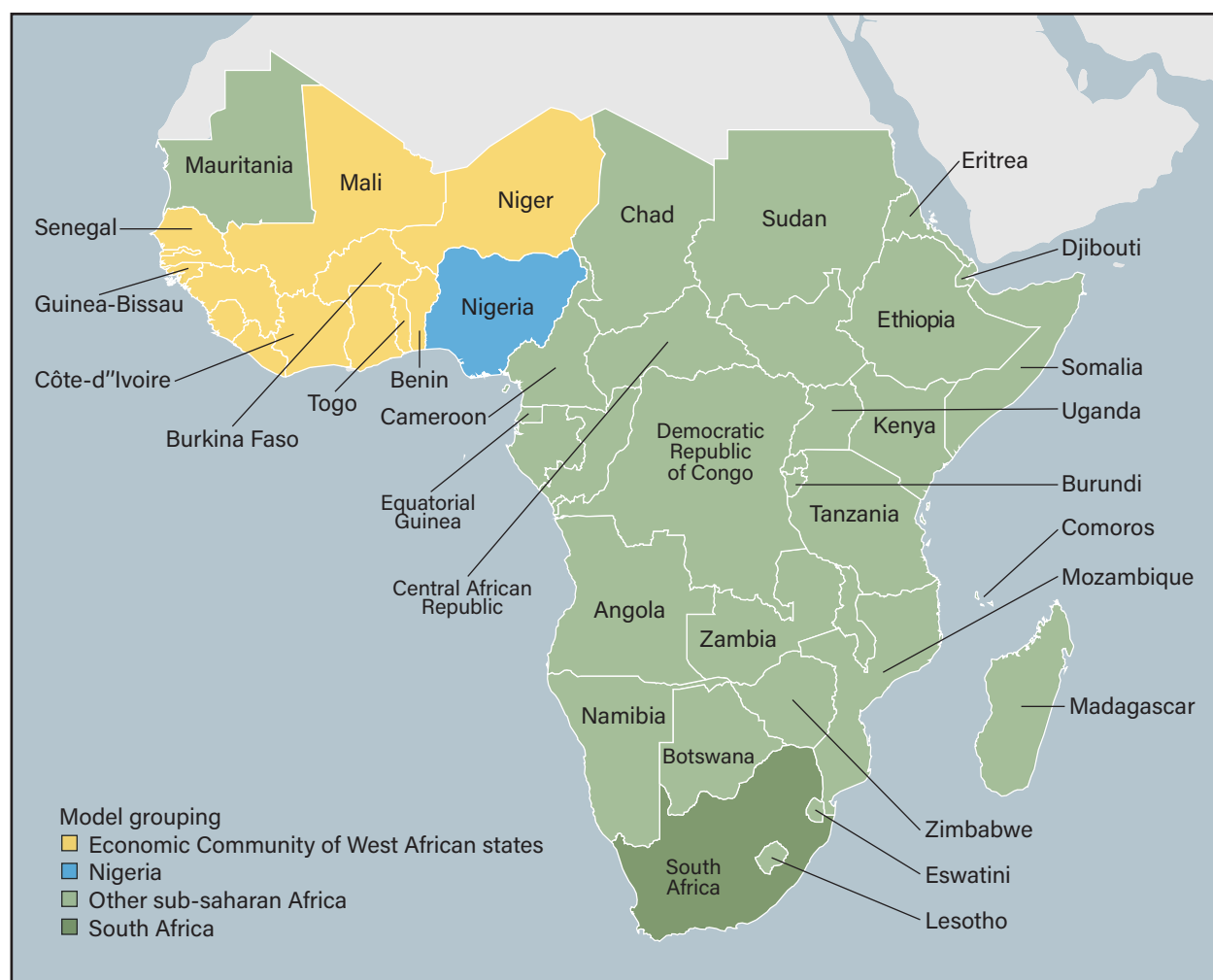
<sup>1</sup> As Nigeria is by far the largest market in the Economic Community of West African States (ECOWAS), both in terms of economy, population, and trade, it is separated from the ECOWAS model as to not distort the results.

# Single-Commodity Export Dependence and the Impacts of COVID-19 in Sub-Saharan Africa

## Introduction

Recent trade volatility has compelled the United States to diversify commodity exports and export markets. Seeking markets that exhibit macroeconomic characteristics indicative of potential market expansion, the United States has sought to increase its presence in many emerging economies. As a region, sub-Saharan Africa (SSA) ostensibly embodies broad macroeconomic and developmental trends that suggest the region is a prospective source for U.S. export growth in upcoming years. According to the 2019 United Nations World Population Prospects report, SSA will account for most of the world's population growth over the coming decades, while other mostly developed regions throughout the world will see a decline (World Population Prospects, 2019). In addition, large U.S. export markets in the region, such as Nigeria and Angola, have some of the highest per capita incomes in SSA.

Figure 1  
**Map of sub-Saharan Africa**



Source: USDA, Economic Research Service.

However, these potentially positive conditions also present significant challenges to sustained development, reflecting the economic volatility prevalent in SSA. Many SSA countries derive significant portions of their economic growth, foreign exchange reserves, and export revenue from the export of high value commodities like petroleum and gas. While trade in such commodities may elicit growth, such a reliance can create broader economic instability. During periods of dramatic fluctuations in international commodity prices, for example, the resultant terms-of-trade shocks diminishes the country's ability to trade effectively due to the depreciating exchange rate (Kassouri et al., 2020). Such conditions can disrupt trade flows of agricultural products, as commodity-dependent importers seek cheaper, alternative sources of agricultural goods.

Previous analyses examined the foundation of this phenomenon, commonly referred to as the “resource curse,” wherein countries with abundant natural resources underperform economically despite a strong demand for such commodities (Sachs et al., 1995). Studies have argued the expansion of such industries has come at the cost of other sectors, primarily agriculture, from which much of the developing world derives employment and income (Mustapha et al., 2016). Oil-dependent countries in SSA are emblematic of this phenomenon, as many maintained robust agricultural sectors prior to the development of their oil industries. Consequently, countries with once-vibrant agricultural sectors, like Nigeria and Angola, have become net importers of agricultural products. Primarily focusing on the developing world, other studies found countries with an abundance of natural resources can elicit broader political corruption, less democracy, and underwhelming economic growth relative to countries lacking such resources (Shaxson et al., 2007). This institutional degradation serves as an impediment, stalling economic progress and slowing development. Poor development conditions perpetuate this cycle, wherein countries reliant on commodities with significant price fluctuations have greater volatility in terms of trade, economic growth, and foreign exchange rates.

Built on this foundation, this analysis presents a case study of single-commodity dependent (SCD) countries in sub-Saharan Africa from the perspective of U.S. agricultural trade interests. Specifically, given the proportion of gross domestic product (GDP) derived from oil, this research illuminates the impacts of international commodity prices' volatility on U.S. agricultural export volumes to SSA by simulating the effects of oil prices via a GDP shock during 2020 and subsequent years across SSA, with a specific focus on Nigeria and Angola. The Coronavirus (COVID-19) pandemic has resulted in a period of intense price volatility. In addition, the data available on the economic disruptions caused by the COVID-19 crisis offer an opportunity for modeling potential effects of a global shock on trade with these nations. An analysis of the volatility created by COVID-19 trade disruptions can inform U.S. approaches to further trade and market development in SSA, offering an occasion to reconsider the potential of SSA as a reliable growth market for U.S. agricultural exports.

The concept of this paper can likewise be extended to current events. Additional global crises related to the topic of this paper are currently transpiring and quickly evolving. The implications of the conflict in Ukraine are certainly applicable to the topic of this paper and its implications are briefly discussed at a peripheral level. However, although dramatic fluctuations brought on by global crises—such as the COVID-19 pandemic, as well as the current conflict in Eastern Europe—elicit shocks to the global economy, the latter is not the focus of this paper. Nevertheless, such shocks illuminate the effects of the single-commodity dependence phenomenon and its impact on global agricultural trade.

This analysis employs a partial equilibrium global agricultural multi-country and regional modeling system maintained by the U.S. Department of Agriculture, Economic Research Service (ERS), solving for global equilibrium in trade and world prices for major agricultural commodities. The model provides key variable estimates—e.g., imports, exports, production, and consumption—for four models representing ECOWAS (less Nigeria), Nigeria, South Africa, and an aggregated model for the remainder of SSA countries (“Other sub-Saharan Africa”). Projections are provided for commodities of interest to U.S. market share in SSA (i.e.,



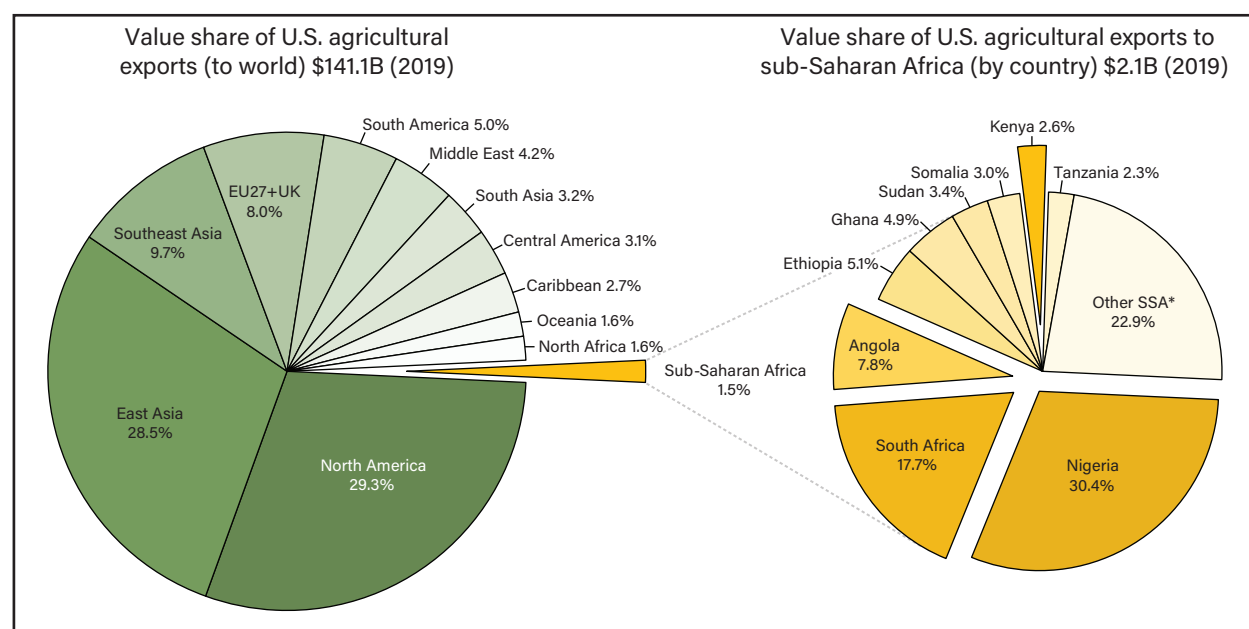
wheat, poultry, and rice) based on GDP values anticipated from the fallout from the pandemic beginning in 2020 through 2030. GDP growth values are expected to be mostly negative in 2020 and early 2021 before returning to pre-COVID-19 growth rates in subsequent years. The impact of the applied scenario is manifested in the projected trends of each variable across each key commodity. By then applying the GDP scenario to the USDA Baseline—absent the pandemic—we can evaluate and quantify the effects of COVID-19 on trends of key agricultural commodities in prime U.S. exports markets of sub-Saharan Africa. Overall, this analysis reveals declines in production, consumption, and trade stemming from the economic shock across each commodity and SSA model.

## U.S. Trade Context in Sub-Saharan Africa

SSA consists of 46 countries with additional islands and territories scattered across the continent's outer regions. Most of these nations are in low- to mid-economic development stages. Across the region, agricultural production serves as a pillar within many economies. Nearly 60 percent of the region's population is engaged in agricultural production with 80 percent of impoverished people deriving their primary income from agriculture (World Bank, 2021).<sup>2</sup> However, such production is largely limited to subsistence agriculture—meeting only a fraction of domestic demand and creating a need for imports.

Prior to the onset of the COVID-19 pandemic, U.S. agricultural exports to SSA had annually increased by nearly 8 percent since 1990, rising from \$513 million to \$2.1 billion in 2019 (Global Agricultural Trade System, 2020).

Figure 2  
Value share of U.S. agricultural exports, by region, 2019



\*Sub-Saharan Africa countries and territories with negligible U.S. market shares of U.S. agricultural exports.

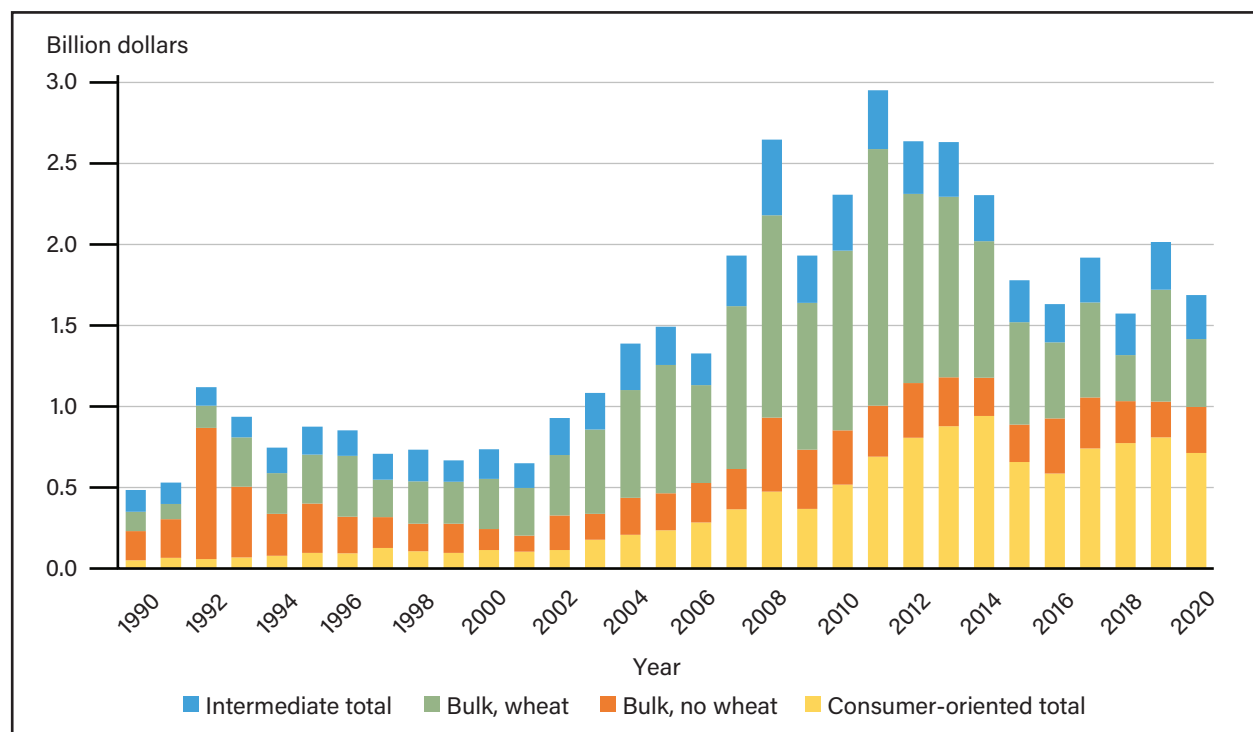
Notes: Value share of U.S. agricultural exports to the world \$141.1 billion in 2019 (left graph); value share of U.S. agricultural exports to sub-Saharan Africa, by country, was \$2.1B in 2019 (right graph).

Source: USDA, Economic Research Service using Global Agricultural Trade System.

<sup>2</sup> The World Bank classifies countries by four stages of development based on Gross National Income per capita using current U.S. dollar value—i.e., low (< \$1,036), low-middle (\$1,036–\$4,045), upper-middle (\$4,046–\$12,535), and high-income (> \$12,535). The classifications are updated annually; for the purposes of this analysis, the 2020 classification was used.

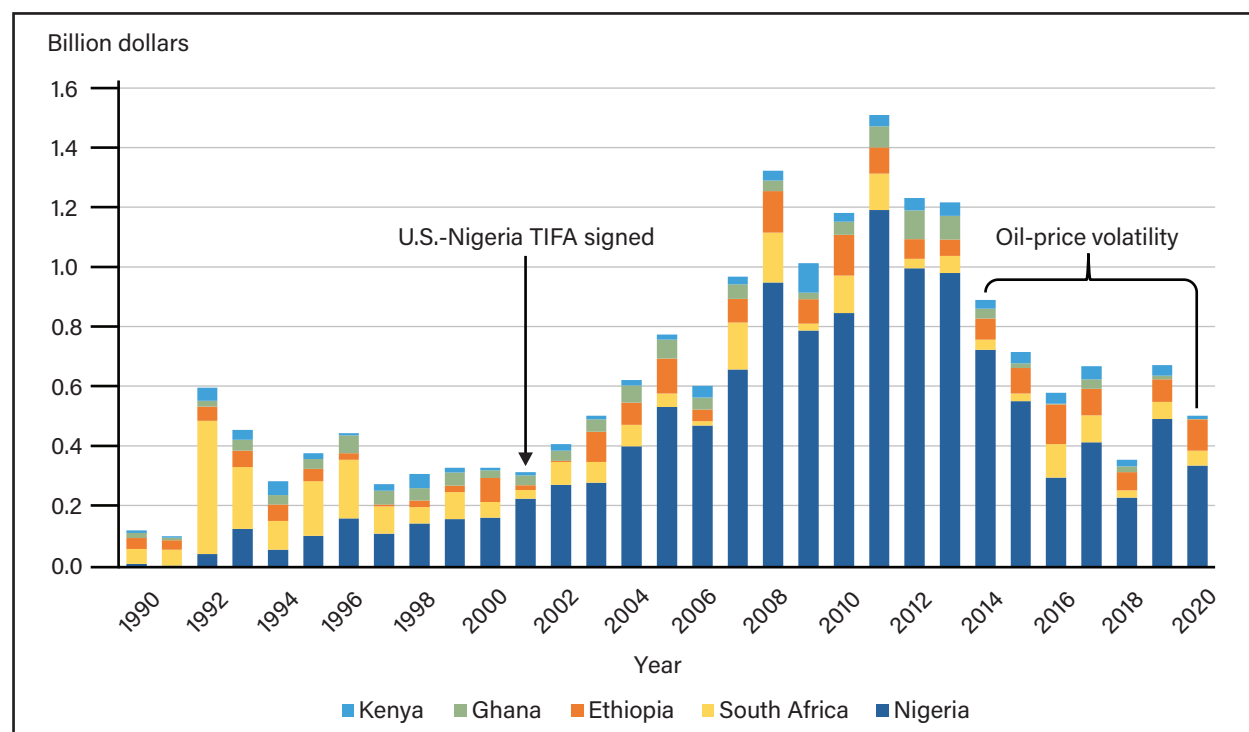
Figure 2 outlines the region’s role in U.S. agricultural exports relative to the rest of the world before the advent of the COVID-19 pandemic. U.S. agricultural exports to SSA account for a small share of U.S. exports relative to other regions of the world. The total value of \$1.97 billion was only 1.44 percent of overall U.S. agricultural exports in 2019. Despite the large size of the SSA region, U.S. agricultural exports to SSA have been concentrated among only a few countries. Nigeria, South Africa, Angola, and Ethiopia accounted for more than half of all U.S. exports to the region in 2019 and are the only SSA countries in which the United States holds at least a 5-percent market share of U.S agricultural exports. In addition, Kenya—among several other SSA markets of interest to the United States—is the third largest importer of agricultural goods in SSA and is currently in talks with the United States seeking to become the first SSA country to establish a bilateral trade agreement with the United States (Williams, 2021). However, SSA countries exhibit idiosyncratic import demands, which arise from the same myriad macroeconomic and development conditions that engender the increased earnings attracting U.S. export interest. Such constraints limit broader export expansion within the region.

Figure 3  
**U.S. agricultural export summary to sub-Saharan Africa**



Notes: Notes: “Intermediate” products include items such as animal fats, essential oils, and sweeteners; “Consumer-oriented” products include beef, pork, and poultry products; and “Bulk, no wheat” commodities include soybeans, rice, and corn.  
Source: USDA, Economic Research Service using Global Agricultural Trade System.

Figure 4  
**U.S. bulk export summary to sub-Saharan Africa**



Notes: Distribution broken out by top sub-Saharan African importers of U.S. bulk commodities. U.S.-Nigeria Trade and Investment Framework Agreement (TIFA).

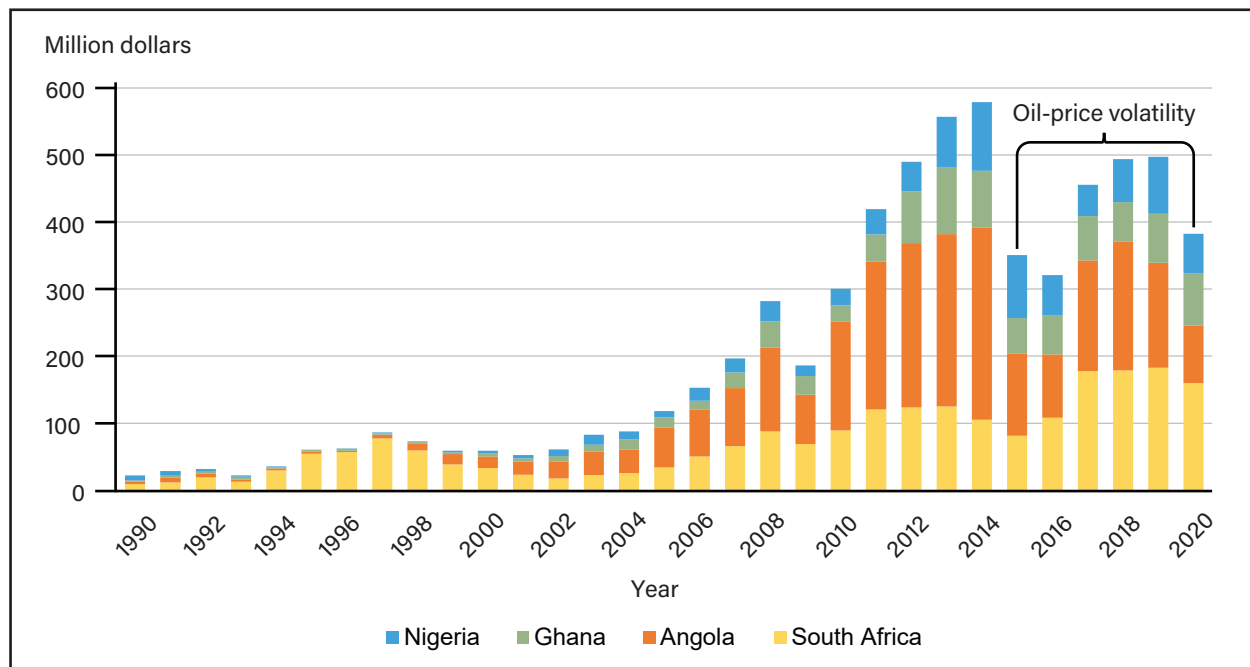
Source: USDA, Economic Research Service using Global Agricultural Trade System.

Increases in U.S. total agricultural exports to SSA are concentrated among a few commodities like wheat and poultry products (GATS, 2020). These commodities are exported to only a few primary markets including Angola, Ethiopia, Ghana, Nigeria, and South Africa. Since 2000, wheat exports have averaged nearly half of all U.S. agricultural exports to SSA. The increases were partly due to the signing of the U.S.-Nigeria Trade and Investment Framework Agreement (TIFA) in 2001. In addition, as the Nigerian economy grew in the early 2000s, consumption patterns began to shift from traditional meals requiring time-consuming preparation to using convenience foods, many of which incorporated U.S. wheat. Since 2000, more than 72 percent of U.S. wheat exports to SSA went to Nigeria, with that share reaching nearly 75 percent in 2020 (GATS, 2020). However, following its peak in the early 2010s, U.S. wheat export volumes became increasingly volatile due to the significant declines in oil prices between 2014 and 2016.

Poultry products—the second largest commodity category the United States exports to SSA—is the most affordable protein source in the region. This has afforded the United States a considerable foothold as a poultry provider to the region. Most U.S. poultry meat exports go to Ghana, South Africa, and Angola. Since 2000, Angola has been the seventh largest export market for U.S. poultry meat in the world (GATS, 2020).<sup>3</sup>

<sup>3</sup> The value of U.S. poultry exports to Angola fell in 2020 to 24 percent of all poultry products exported to the region, largely due to fluctuations in global oil prices limiting foreign exchange reserves and straining Angola's ability to import.

Figure 5  
**U.S. consumer product export summary sub-Saharan Africa**



Note: Distribution broken out by top sub-Saharan African importers of U.S. consumer-oriented commodities.

Source: USDA, Economic Research Service using Global Agricultural Trade System.

Like wheat, poultry meat exports saw an increase in the early 2000s, peaking in 2014. Prior to 2000, both Ghana and Angola had strong poultry sectors, but conflict in Angola and a series of production cost surges in Ghana (e.g., feed, inputs, and energy) led to a steep decline in production capacity (Geller, 2020). Since the collapse of their poultry sectors, foreign exports have provided approximately 90 percent of domestic poultry meat demand in Ghana and Angola. Prior to 2000, the United States was the largest supplier of poultry meats to South Africa. However, following concern over rapidly rising poultry imports, the South African government placed duties on U.S. poultry meat entering the country. In 2015, the South African government implemented a tariff rate quota on U.S. poultry meat, which has steadily increased in recent years (Cochrane et al., 2016). Like wheat markets, however, the plunge in oil prices between 2014 and 2016 created greater volatility primarily in the export of poultry products to Angola.

## Single-Commodity Dependence in SSA Markets

As figures 4 and 5 illustrate, import demand is volatile in SSA agricultural markets, making the U.S. market share and earned export revenue from SSA countries vulnerable. Such volatility is a common feature faced by exporters to SSA markets and arises partly out of SSA dependence on exports of single commodities. In countries where commodity exports are the primary source of economic growth, foreign exchange reserves, and export revenue, such factors are vulnerable to exogenous shocks from significant fluctuations in international commodity prices. This can deplete export revenues and strain foreign exchange reserves during significant downturns in commodity prices (Englama et al., 2010). The United Nations Conference on Trade and Development (UNCTAD) considers a country commodity-dependent if commodities account for more than 60 percent of its total merchandise exports. This condition is pervasive throughout the SSA region wherein 89 percent of countries rely on commodities for most merchandise exports. In fact, most SSA countries are almost entirely reliant, deriving between 80 percent and 100 percent of export revenue from primary commodities (State of Commodity Dependence, 2019).

Table 1

**Single-commodity dependence, by country, 2019**

|                                                                         | Angola | Ethiopia | Ghana | Kenya | Nigeria |
|-------------------------------------------------------------------------|--------|----------|-------|-------|---------|
| Commodity exports (as a percent of total merchandise exports)           | 100    | 85       | 94    | 72    | 98      |
| Commodity exports (as a percent of GDP)                                 | 25.6   | 3.7      | 29.2  | 5.2   | 11.6    |
| Exports by commodity group (as a percent of merchandise exports):       |        |          |       |       |         |
| Agricultural commodities                                                | 0      | 72       | 28    | 61    | 5       |
| Fuels                                                                   | 97     | 4        | 24    | 5     | 92      |
| Ores, metals, precious stones, and non-monetary gold                    | 2      | 10       | 43    | 6     | 2       |
| Leading commodity exports (as a percent of merchandise exports):        |        |          |       |       |         |
| Cocoa                                                                   | -      | -        | 18    | -     | -       |
| Coffee and coffee substitutes                                           | -      | 23       | -     | -     | -       |
| Crude vegetable materials, not elsewhere specified or indicated (NESOI) | -      | -        | -     | 13    | -       |
| Gold, non-monetary (excluding gold ores and concentrates)               | -      | -        | 40    | -     | -       |
| Natural abrasives, NESOI                                                | 2      | -        | -     | -     | -       |
| Natural gas, whether or not liquified                                   | -      | -        | -     | -     | 11      |
| Oilseeds and oleaginous fruits (excluding flour)                        | -      | 12       | -     | -     | -       |
| Petroleum oils, oils from bitumen, materials, crude                     | 96     | -        | 23    | -     | 77      |
| Petroleum oils or bituminous materials, > 70 percent oil                | -      | -        | -     | 5     | 1       |
| Residual petroleum products, NESOI, related matter                      | 2      | -        | -     | -     | -       |
| Tea and mate                                                            | -      | -        | -     | 24    | -       |
| Vegetables                                                              | -      | 16       | -     | -     | -       |

Note: “-” indicates zero or that category is not applicable.

Source: USDA, Economic Research Service calculations using United Nations Conference on Trade and Development, State of Commodity Dependence 2019.

During periods of significant reductions in the price of dependent commodities, contracting revenues inhibit a SCD country’s ability to import through its depreciating exchange rate. Specifically, as revenues from oil-importing countries shrink, so too does the foreign exchange flow from partner countries. Countries with large oil industries are particularly susceptible to economic vulnerabilities inherent in single-commodity dependence, given the frequent declines in oil prices. For example, between January 2014 and June 2021, 37 periods of oil-price declines showed average monthly declines of 9.8 percent with a maximum single-month decline of 42.6 percent. During months of price increases, the increases averaged 7.9 percent. During the 2008–09 Great Recession, the price of crude oil was slashed by more than 25 percent in October 2008. More recently, the onset of the COVID-19 pandemic elicited the second greatest drop in oil prices after post-World War II, falling by more than 42 percent in March and April 2020 (Federal Reserve Economic Data, 2021).<sup>4</sup> The resulting terms-of-trade shocks reduced an oil-dependent country’s ability to import items from partners like the United States.

As SSA’s largest oil producers, Nigeria and Angola experience disruptions in their trade due to global price shocks. Oil exports provide a disproportionate share of Nigerian and Angolan foreign exchange and export revenue, accounting for more than 90 percent of foreign exchange earnings and 70–75 percent of export revenue in both countries (table 1) (International Monetary Fund, 2021). The Nigerian currency—the naira—depreciated by 140 percent between 2010 and 2020 as oil prices fell from \$79.48 to \$39.68 per barrel. Prices had still not recovered to their pre-2014 level when the pandemic began to affect the global oil market

<sup>4</sup> USDA, Economic Research Service calculations.

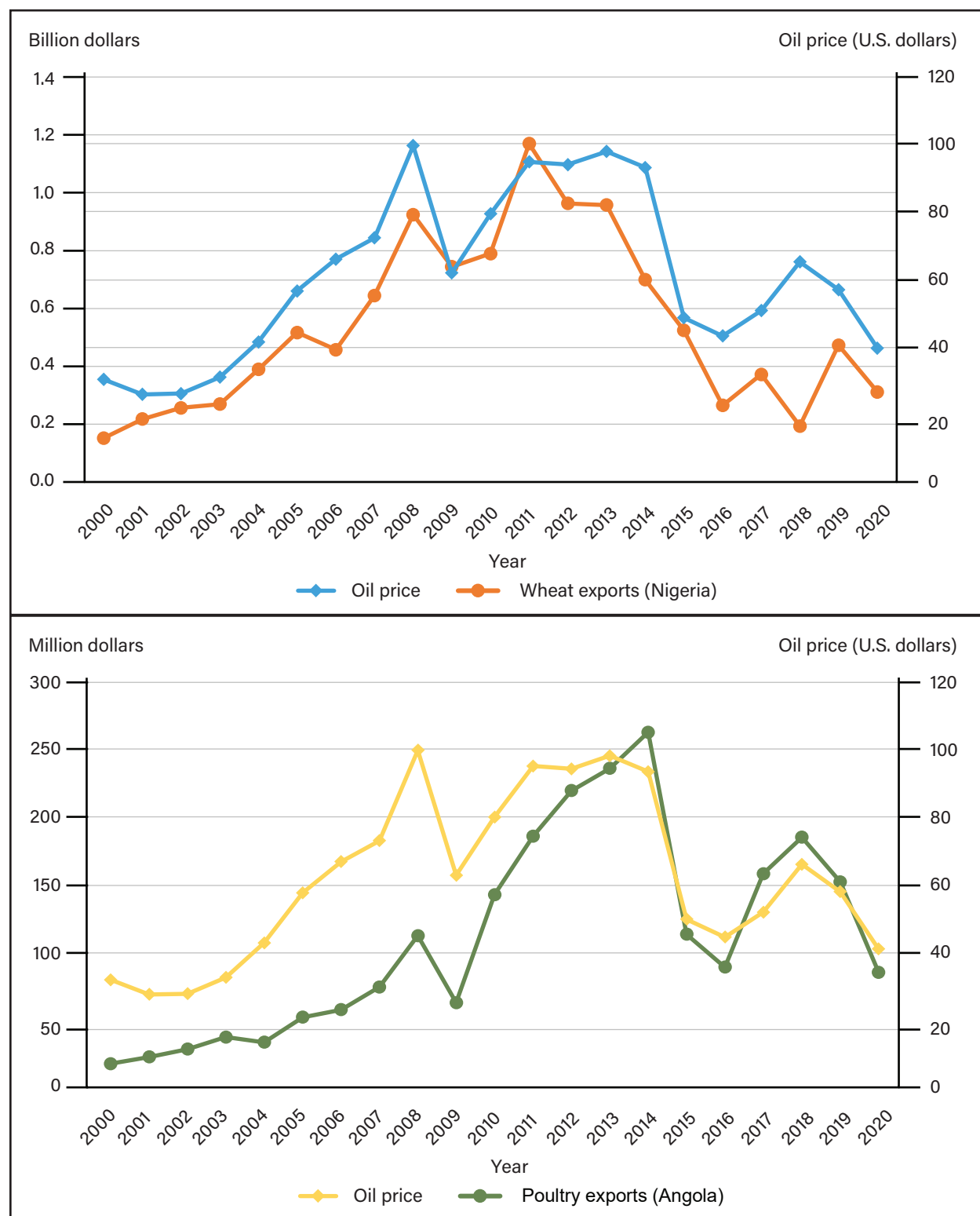
in January 2020. The pandemic further depreciated the currency by more than 7 percent since February 2020. The situation in Angola is even more pronounced, with the Angolan kwanza depreciating by more than 400 percent since 2010 and depreciating an additional 22.5 percent since the beginning of 2020 (XE Currency Exchange Rates). Drops in oil-prices throughout the pandemic depleted U.S. dollar reserves and—since the initial 2014 spike in oil prices—Nigeria and Angola have experienced a severe dollar shortage.<sup>5</sup>

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<sup>5</sup> Dollar shortages are the result of spending more on imports than received for exports. This can limit a country's ability to import dollar-priced goods, as well as products from the United States. Angola and Nigeria have faced a severe dollar shortage since 2014 (Reinhart, 2016).

Figure 6

# **Volatility in global oil prices effect on U.S. wheat and poultry exports**



Note: Oil-price data are average closing costs.

Source: USDA, Economic Research Service using Global Agricultural Trade System data; and Federal Reserve Economic Data.

The effects of the dollar shortage resulting from the fluctuation in oil prices is reflected in the degree of variance in U.S. export volume to Nigeria and to Angola (figure 6). In the Nigerian wheat market, dollar shortages—resulting from the plunge in oil prices in 2014 and again in 2020—appeared to have delivered a competitive advantage to U.S. competitors who are consistently importing Nigerian oil. The European Union’s (EU)—the largest importer of Nigerian oil—share of Nigeria’s wheat market in 2020 grew nearly 5-fold compared with 2019 (Trade Data Monitor (TDM), 2021).<sup>6</sup> Similarly, Russia and Ukraine achieved greater shares in Nigeria’s wheat market in recent years due to their relatively cheaper exports (TDM, 2021). However, given the recent conflict in Eastern Europe, this dynamic may change considerably. In Angola, petroleum exports accounted for 96 percent of total merchandise exports (table 1). China was the largest export destination—accounting for 68 percent of total Angolan oil exports—although China’s market share of the Angolan poultry market has been relatively negligible (TDM, 2021). U.S. exports to Angola and Nigeria will likely continue to mirror changes in global oil prices as they have in the past. If the current trend continues, Angola’s and Nigeria’s dollar shortages will continue to constrain their ability to import U.S. goods.

Although other U.S. trading partners in SSA have also exhibited strong dependence on commodity exports, such as Kenya and Ethiopia, these countries have tended to demonstrate greater economic diversification and a lower reliance on primary commodities as a proportion of GDP. These tendencies have made other SSA countries’ import demand relatively less volatile than single-commodity dependent countries (United Nations Commodity Trade Statistics, 2020). Overall, however, given the disproportionate share of foreign exchange and export revenue derived from commodity exports, most SSA markets are still prone to volatility.

## COVID-19 Impact on Consumption Patterns and Trade

The COVID-19 shock is expected to delay the recovery of SCD countries dependent on energy commodities in particular. The economic slowdown seen throughout the world—particularly in mobility and transportation—will limit demand for oil, reducing economic activity, shrinking incomes, and propelling significant portions of their respective populations into poverty (World Data Lab, 2020).<sup>7</sup> The wider impacts of these economic stresses could be seen in the declining ability of SCD countries to finance imports to meet food needs, reducing import demand. Data available from COVID-19 trade disruptions provide an opportunity to model the probable impacts. However, given the large proportion of economic and budgetary support derived from the production and export of single commodities, any macroeconomic shocks to the SSA region that affect GDP growth could strongly affect food demand. These potential food-demand effects are due to SSA countries having large food-income elasticities as a greater proportion of household incomes are spent on food consumption (Muhammad et al., 2005).

The model employed in this analysis focuses on rice, wheat, and poultry. These three commodities exhibited strong consumption and import growth over the past 10–15 years. In addition, USDA has projected these commodities are likely to exhibit strong growth over the next decade. Since rice, wheat, and poultry are not food staples in SSA, they will be among the first foods to exhibit declining consumption if GDP growth slows or becomes negative. Figures 7, 8, and 9 illustrate USDA’s long-term baseline projections for trade and consumption of rice, wheat, and poultry. The data used in developing these projections include USDA

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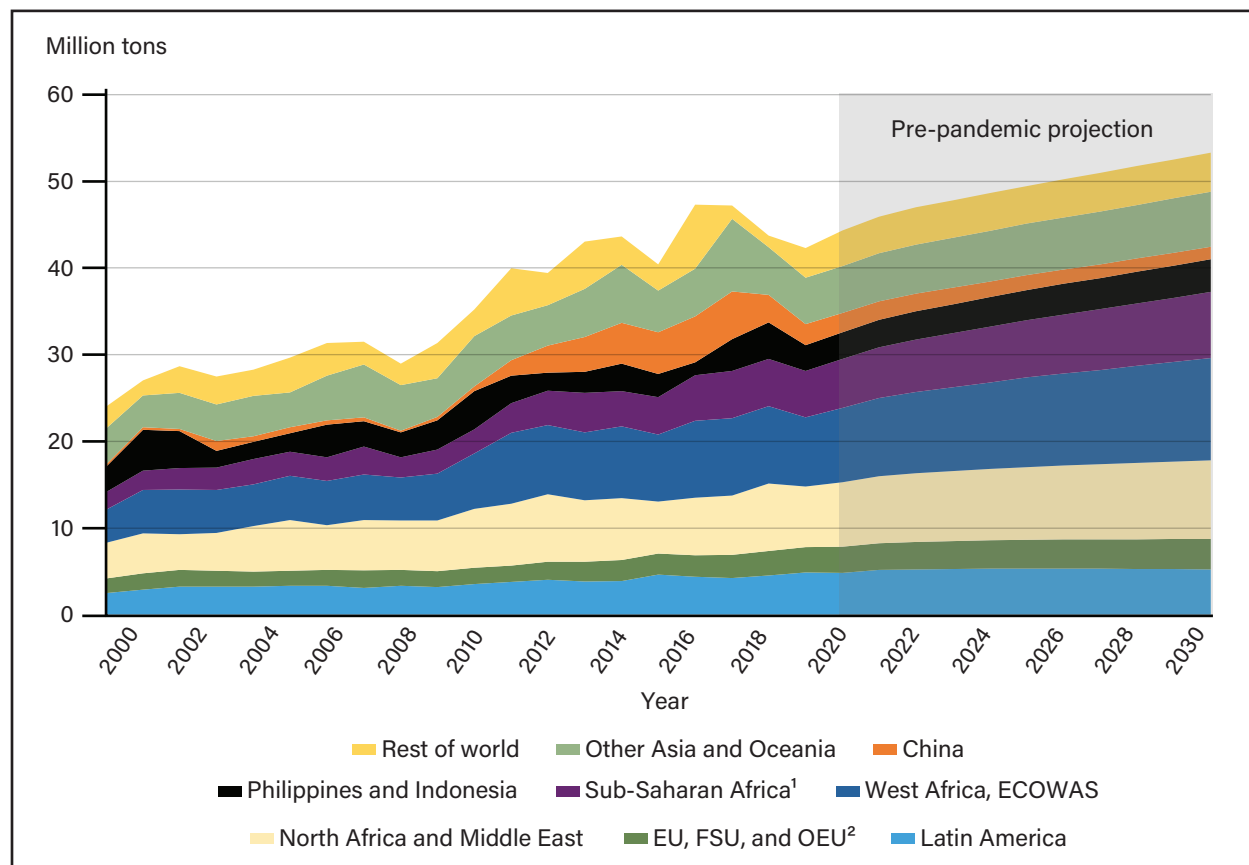
<sup>6</sup> Note: This trend has continued into 2021, with the European Union on pace to exceed 2020 wheat export values to Nigeria.

<sup>7</sup> Nigeria is currently home to the largest share of people living in extreme poverty in the world. In the immediate onset of the COVID-19 outbreak, an estimated 41 percent of the Nigerian population lived below the international poverty line (\$1.90 per day); in Angola, more than half the population is living in extreme poverty.



production, supply, and distribution data for most countries and the United Nations' Food and Agriculture Organization (FAO) livestock data for most African countries. These are baseline projections without a COVID-19 impact on consumption, production, and trade and so they can provide a basis for projecting how the pandemic effects on global GDP growth rates and food consumption patterns could affect import demand.

Figure 7  
**Global rice imports**



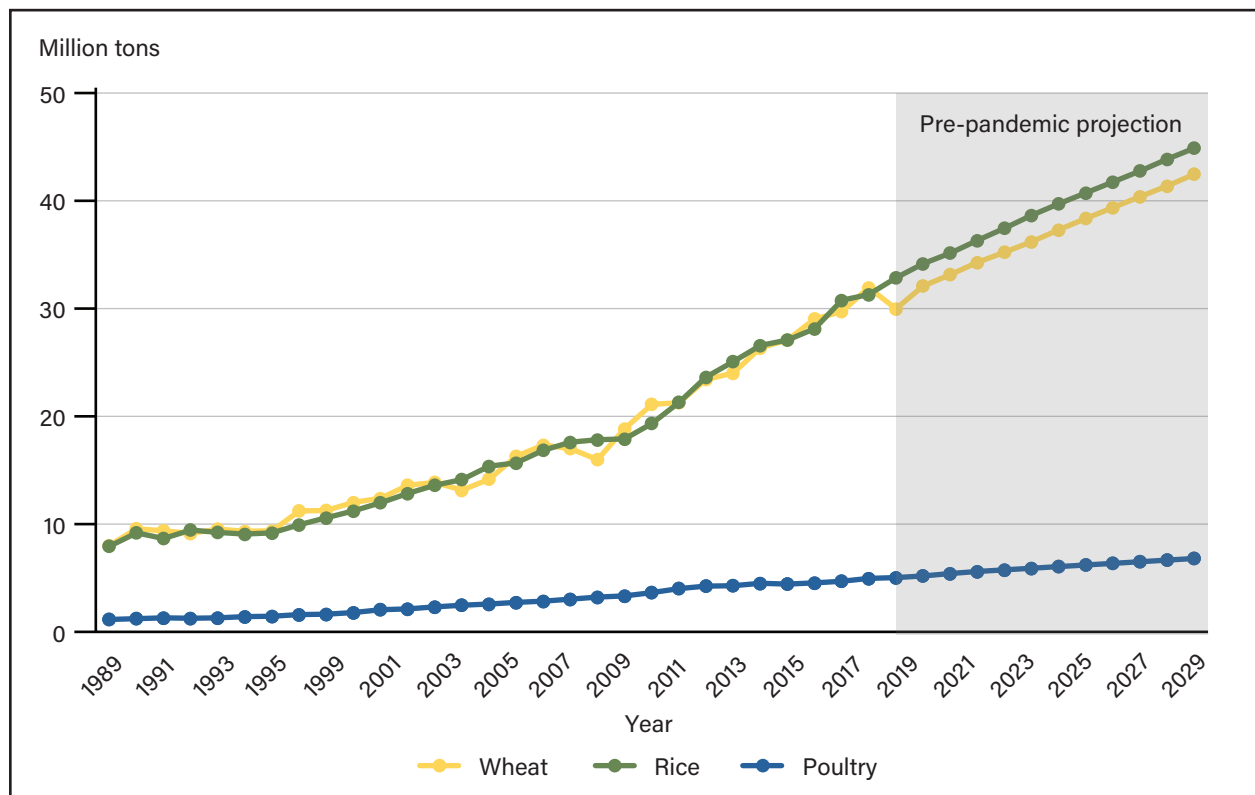
<sup>1</sup> Excludes 15 member countries in Economic Community of West African States (ECOWAS).

<sup>2</sup> European Union (EU), Former Soviet Union (FSU), and Other Europe (OEU).

Source: USDA Economic Research Service and USDA, Interagency Agricultural Projection Committee.

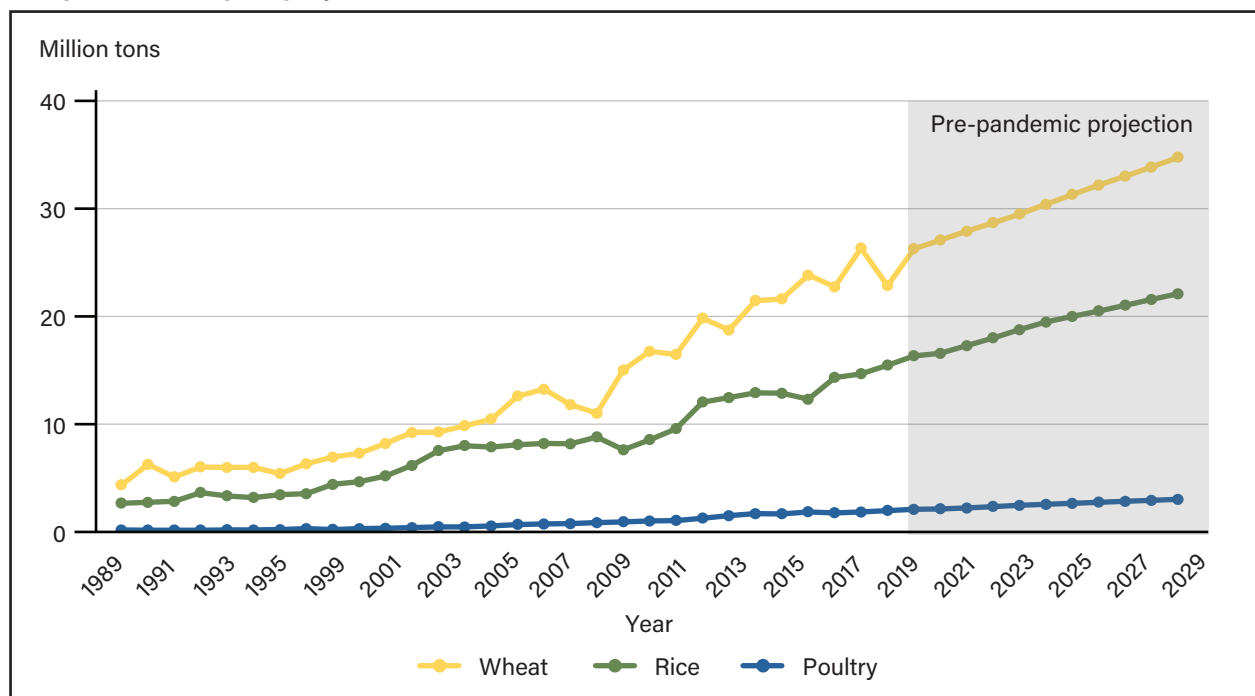
Because sub-Saharan Africa exhibited significant changes in consumption patterns over the past few decades, macroeconomic shocks to the region could affect other countries' economies through both imports and exports. Several import commodities and food products significantly increased over the past 20 to 30 years, including rice, wheat, and poultry. Several factors drove these changes, including increasing household incomes, greater urbanization, improved cold food storage and supply chains, the introduction of fast food, smaller retailers and grocery outlets in major cities, and market liberalization. However, one of the more significant changes among households has been the increasing time constraints that create pressure to spend less time preparing food in an urban setting. Traditional staple foods such as millet and sorghum require more time to prepare than more convenient foods like rice and wheat.

Figure 8  
Pre-pandemic consumption projection: sub-Saharan Africa



Source: USDA, Economic Research Service, USDA Agricultural projections to 2029.

Figure 9  
Pre-pandemic import projection: sub-Saharan Africa



Source: USDA, Economic Research Service, USDA Agricultural projections to 2029.

Since the late 1990s, wheat and rice consumption in SSA exhibited significant increases among households. Wheat consumption increased from 9.4 million metric tons in 1995 to 32.1 million tons by 2019—more than a 3-fold increase. Rice showed an even stronger increase, from 9.2 million tons in 1995 to 34.1 million tons by 2019. Even with increasing rice production in SSA, rice imports more than tripled from 2000 to 2019 to meet growing demand. SSA is the fastest growing region in the world for rice imports and is projected by USDA to account for about 36 percent of global rice imports by 2029 (Hjort et al., 2018).

In addition to changing patterns in grain consumption, animal protein consumption has significantly increased since the late 1990s, especially for lower priced proteins such as eggs and poultry. Combined poultry consumption—primarily from Angola, Ghana, and South Africa—increased from 1.4 million tons in 1995 to 5.2 million tons by 2019 and has been projected to reach 6.8 million tons by 2029—prior to the onset of the pandemic (Hjort et al., 2018).

## Modeling and Results

Due to the effects of the pandemic on SSA countries, GDP growth rates are expected to be negative in 2020 and early 2021 before rebounding to levels commensurate with pre-COVID-19 projected growth rates. The analysis conducted in this report uses two country and two regional models for SSA. A GDP shock is then introduced in each model representing the anticipated effect of COVID-19 to project resulting trends in consumption, production, and trade for each commodity across each model. The country models are Nigeria and the Republic of South Africa, and the regional models are the Economic Community of West African States (ECOWAS) region—excluding Nigeria—and the rest of SSA (“Other sub-Saharan Africa”).<sup>8</sup> The regional models largely serve as a proxy for primary export markets given the volume of consumption in the countries covered (e.g., poultry trends in Angola).

The scenario in each model employs a decrease in GDP growth in 2020 before gradually rebounding in the following years, ultimately to return to the pre-COVID-19 growth rate for all countries by 2024. The effect of the applied scenarios causes a downward shift in GDP, which is maintained throughout the projection period despite GDP growth rates returning to previous levels.

The GDP estimates for this research were developed from scenarios described in the International Monetary Fund’s (IMF) regional economic outlook on SSA (IMF, 2021). Projections for each country’s GDP were aggregated where necessary to fit within the regional models used in the study conducted in this report. IMF projections account for a number of factors when considering the COVID-19 pandemic’s impact on the macroeconomy. These include the anticipated availability of external financing, the resilience of the region’s healthcare systems, as well as the likely availability of vaccines throughout the region. The assumptions underlying the projections presented in this analysis assume no policy changes and no additional shocks (e.g., political crises, major conflicts, disease outbreaks), thus these assumptions do not account for the current conflict in Ukraine. The GDP growth rates used in the scenario for each model are provided in table 2.

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<sup>8</sup> The Economic Community of West African States (ECOWAS) includes the following countries: Benin, Burkina Faso, Cabo Verde, Cote d’Ivoire, Republic of the Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo.

Table 2

**Baseline gross domestic product (GDP) projections for scenario**

| Country                    | 2019/20 baseline projection (pre-COVID-19) | 2019/20 scenario projection (COVID-19 shock)* | 2020/21 projection | 2021/22 projection | 2022/23 projection |
|----------------------------|--------------------------------------------|-----------------------------------------------|--------------------|--------------------|--------------------|
| Percent                    |                                            |                                               |                    |                    |                    |
| ECOWAS (less Nigeria)      | 5.8                                        | 1.1                                           | 5.1                | 6.3                | 5.8                |
| Nigeria                    | 2.0                                        | -1.8                                          | 2.5                | 2.3                | 3.5                |
| South Africa               | 1.6                                        | -7.0                                          | 3.1                | 2.0                | 2.3                |
| Rest of sub-Saharan Africa | 4.0                                        | -4.4                                          | 3.2                | 3.4                | 4.2                |

Economic Community of West African States = ECOWAS

\*GDP growth used to forecast growth rates in subsequent years. Subsequent years indicate projected GDP growth based on marketing year 2019/20 GDP shock.

Source: USDA, Economic Research Service calculations.

For the ECOWAS model (excluding Nigeria), GDP is assumed to decrease from the baseline 5.8 percent growth to a 1.1 percent growth rate in 2020 before returning to a 5.8 percent growth rate in 2023. For the Nigeria model, GDP is assumed to decrease from a 2-percent growth rate to a -1.8 percent growth rate in 2020 and then rebound to a slightly higher growth rate of 3.5 percent in 2023. For the South Africa model, GDP is assumed to decrease from a 1.6 percent growth rate to a -7.0 percent growth rate in 2020 before rebounding to the baseline GDP growth rate of 2.3 percent in 2023. For the rest of SSA model, GDP is assumed to decrease from a 4 percent projected growth rate to a -4.4-percent growth rate in 2020 before returning to the baseline GDP growth rate of 4.2 percent in 2023.

The modeling system used in this analysis is a dynamic non-spatial agricultural partial equilibrium simulation trade model, the same used for the USDA Baseline projections (Hjort et al., 2018). Within this modeling system, 43 countries and regions and 24 commodity markets, crops, and livestock are covered. The model solves for production, consumption, food and feed demand, stocks, trade, and prices for each country and each commodity. World equilibrium in trade and prices are solved for all commodities. Assumptions include continuation of current policies, macroeconomic conditions, population growth rates, and additional assumptions, such as the continuation of energy and fertilizer levels as of October 2019. The 10-year commodity USDA Baseline projection and all assumptions used in this analysis were developed prior to the COVID-19 pandemic and its effects.

The results of the modeled GDP growth shock from COVID-19 on poultry, rice, and wheat for the SSA region are summarized in table 3. Table 4 illustrates the results arranged by country and region. Additionally, ex-post data are provided for the two years of realized values to measure the accuracy of the scenario projections in tables 5 and 6.

Across the region, rice consumption is projected to see the largest effect from lower GDP growth rates, falling by 1,461 thousand metric tons in 2020—a decline of 4.3 percent from the pre-pandemic projection—and continuing to decline through 2030. This is largely fueled by the decline in imports. As such, rice imports are projected to decrease in a range from 1.2 percent to 0.5 percent through 2030, a decline of 951 thousand metric tons. The decline in consumption is significant as West Africa has become the world's leading importer of rice, and lower consumption from this region could affect global markets. Due to the low import demand, the international price decrease ranged from 3.2 percent to 4.7 percent over the projection period. While the United States does not export a significant amount of rice to West Africa, the price margin

among major exporters does affect trade. Accounting for realized data, rice consumption in the scenario for ECOWAS (excluding Nigeria), Nigeria, and South Africa was greater than the ex-post data, which also resulted in scenario imports for these countries greater than the ex-post data. These results may be due to income elasticity, which are not very responsive to income changes as rice is a prevalent staple food for urban populations in SSA.

The decrease in SSA wheat consumption ranged from 1.7 to 0.8 percent throughout the projection leading to a decrease in imports ranging from 2.1 to 2.2 percent. SSA relies mostly on imported wheat, producing only about 25 percent of its consumption. At the country level, this decline was seen most notably in Nigeria, which accounts for 27 percent of the decline in wheat imports across the entire SSA region. The decrease in the international price of wheat ranged from 0.6 percent to 1.2 percent with only marginal effect on the U.S. wheat export market. The wheat consumption scenario to ex-post data exhibited the most consistent results across all SSA countries and regions. The wheat consumption scenario results are less than the ex-post data for all countries, which indicates the scenario decrease in wheat consumption was stronger than realized ex-post data. The average difference from the scenario and observed data ranged from approximately -3 percent for ECOWAS (excluding Nigeria) to -13.8 percent for Nigeria. Imports were consistent with consumption, with the scenario results being less than the actual data. Only the aggregated Other sub-Saharan Africa model had two years with imports from scenario greater than the actual data, which was due to a greater decrease in wheat production for that region.

Imports of poultry to SSA experienced the largest decline, falling more than 8 percent from pre-pandemic projections. Lower GDP in 2020, 2021, and 2022, had the greatest impact, but since GDP maintained a downward shift throughout the projection period—even with rebounding GDP—growth rates, consumption, and imports were lower for all years. The decline in poultry imports was most prominent in the aggregated Other sub-Saharan Africa model—which includes large poultry importers like Angola—falling by 546 thousand metric tons through the projection period. Domestic production in SSA decreased by only 0.2 percent on average, while the global poultry price was only marginally affected, decreasing by 0.9 percent to 1.2 percent with only a marginal impact on the United States. Compared with wheat and rice, poultry results are more mixed. ECOWAS (excluding Nigeria) and Other sub-Saharan Africa exhibit similar outcomes with the scenario results being less than the ex-post data for consumption, imports, and production. This indicates that the scenario results may have overestimated the decline relative to actual ex-post data. Results for South Africa, however, show that the scenario underestimated the impact of the pandemic on imports and consumption of poultry products, while overestimating the effect of COVID on production.

Table 3

## Results from scenario decreasing gross domestic product for total sub-Saharan African region

| Sub-Saharan Africa                       |            |         |         |             |            |          |         |             |            |          |         |             |
|------------------------------------------|------------|---------|---------|-------------|------------|----------|---------|-------------|------------|----------|---------|-------------|
|                                          | Poultry    |         |         |             | Rice       |          |         |             | Wheat      |          |         |             |
|                                          | Production | Imports | Exports | Consumption | Production | Imports  | Exports | Consumption | Production | Imports  | Exports | Consumption |
| Difference from base (percent)           |            |         |         |             |            |          |         |             |            |          |         |             |
| 2020                                     | -0.34      | -8.47   | -0.17   | -3.54       | -0.09      | -1.15    | 300.59  | -4.28       | -0.02      | -2.11    | -0.06   | -1.71       |
| 2021                                     | -0.23      | -8.47   | -0.14   | -3.54       | -0.04      | -1.82    | 348.05  | -4.8        | 1.04       | -2.25    | -0.08   | -1.53       |
| 2022                                     | -0.21      | -8.35   | -0.15   | -3.52       | 0.34       | -1.37    | 398.44  | -4.94       | 3.69       | -2.4     | -0.09   | -1.02       |
| 2025                                     | -0.16      | -8.01   | -0.16   | -3.47       | 0.37       | -0.83    | 452.55  | -5.01       | 3.76       | -2.27    | -0.12   | -0.89       |
| 2030                                     | -0.15      | -8.49   | -0.18   | -3.78       | 0.23       | -0.45    | 570.58  | -5.63       | 3.96       | -2.2     | -0.14   | -0.83       |
| Base (1,000 metric tons)                 |            |         |         |             |            |          |         |             |            |          |         |             |
| 2020                                     | 3,200.0    | 2,039.0 | 54.0    | 5,185.0     | 18,625.0   | 15,750.0 | 395.0   | 34,140.0    | 8,042.0    | 25,410.0 | 1,005.0 | 32,084.0    |
| 2021                                     | 3,284.8    | 2,172.4 | 55.4    | 5,402.1     | 19,399.0   | 15,980.0 | 401.9   | 35,160.0    | 8,176.3    | 26,199.0 | 1,029.2 | 33,157.0    |
| 2022                                     | 3,372.6    | 2,270.5 | 56.6    | 5,585.7     | 19,908.0   | 16,677.0 | 407.5   | 36,301.0    | 8,360.9    | 26,992.0 | 1,041.6 | 34,265.0    |
| 2025                                     | 3,565.1    | 2,553.8 | 60.0    | 6,059.0     | 21,389.0   | 18,794.0 | 421.0   | 39,714.0    | 8,929.8    | 29,418.0 | 1,079.8 | 37,283.0    |
| 2030                                     | 3,835.2    | 2,909.7 | 66.7    | 6,678.1     | 24,023.0   | 21,349.0 | 434.7   | 44,886.0    | 9,825.0    | 33,665.0 | 1,144.9 | 42,472.0    |
| Difference from base (1,000 metric tons) |            |         |         |             |            |          |         |             |            |          |         |             |
| 2020                                     | -10.9      | -172.7  | -0.1    | -183.5      | -17.5      | -180.5   | 1187.3  | -1460.7     | -1.8       | -536.0   | -0.6    | -548.8      |
| 2021                                     | -7.4       | -184.0  | -0.1    | -191.4      | -7.7       | -290.3   | 1398.8  | -1686.7     | 84.7       | -588.9   | -0.8    | -506.4      |
| 2022                                     | -7.0       | -189.6  | -0.1    | -196.6      | 66.9       | -228.7   | 1623.6  | -1791.9     | 308.1      | -648.3   | -1.0    | -350.8      |
| 2025                                     | -5.6       | -204.5  | -0.1    | -210.1      | 78.5       | -156.2   | 1905.2  | -1989.3     | 335.9      | -666.8   | -1.2    | -330.6      |
| 2030                                     | -5.7       | -247.0  | -0.1    | -252.5      | 55.3       | -95.8    | 2480.3  | -2527.4     | 389.0      | -741.1   | -1.7    | -351.1      |

Source: USDA, Economic Research Service calculations.

Table 4

## Results from scenario decreasing gross domestic product for countries/regions of sub-Saharan Africa

| Economic Community of West African States (ECOWAS) |            |         |         |             |            |          |         |             |            |         |         |             |
|----------------------------------------------------|------------|---------|---------|-------------|------------|----------|---------|-------------|------------|---------|---------|-------------|
|                                                    | Poultry    |         |         |             | Rice       |          |         |             | Wheat      |         |         |             |
|                                                    | Production | Imports | Exports | Consumption | Production | Imports  | Exports | Consumption | Production | Imports | Exports | Consumption |
| Difference from base (percent)                     |            |         |         |             |            |          |         |             |            |         |         |             |
| 2020                                               | -0.16      | -4.28   | 0.00    | -2.51       | -0.15      | -1.19    | 0.00    | -0.96       | 0.04       | -1.67   | -0.20   | -1.82       |
| 2021                                               | -0.12      | -4.76   | 0.00    | -2.81       | -0.54      | -2.01    | 0.00    | -1.27       | 0.21       | -1.88   | -0.24   | -1.96       |
| 2022                                               | -0.14      | -3.41   | 0.00    | -2.03       | -0.64      | -0.93    | 0.00    | -0.82       | 0.29       | -1.28   | -0.27   | -1.35       |
| 2025                                               | -0.15      | -2.61   | 0.00    | -1.58       | -0.65      | -0.03    | 0.00    | -0.35       | -0.01      | -0.81   | -0.33   | -0.84       |
| 2030                                               | -0.17      | -2.98   | 0.00    | -1.81       | -0.81      | 0.48     | 0.00    | -0.16       | -0.09      | -0.75   | -0.39   | -0.78       |
| Base (1,000 metric tons)                           |            |         |         |             |            |          |         |             |            |         |         |             |
| 2020                                               | 442.0      | 588.0   | 1.0     | 1,029.0     | 7,705.0    | 8,125.0  | 210.0   | 15,575.0    | 40.0       | 4,450.0 | 325.0   | 4,145.0     |
| 2021                                               | 461.4      | 633.0   | 1.0     | 1,093.0     | 8,000.0    | 8,421.0  | 211.9   | 16,180.0    | 40.8       | 4,575.0 | 338.2   | 4,253.0     |
| 2022                                               | 480.5      | 657.8   | 1.0     | 1,137.0     | 8,244.0    | 8,731.0  | 212.9   | 16,752.0    | 41.3       | 4,743.0 | 347.6   | 4,421.0     |
| 2025                                               | 525.9      | 728.4   | 1.0     | 1,253.0     | 8,993.0    | 9,767.0  | 217.1   | 18,536.0    | 40.6       | 5,207.0 | 375.8   | 4,867.0     |
| 2030                                               | 602.9      | 842.1   | 1.0     | 1,444.0     | 10,282.0   | 10,778.0 | 222.1   | 20,836.0    | 40.5       | 6,088.0 | 423.9   | 5,702.0     |
| Difference from base (1,000 metric tons)           |            |         |         |             |            |          |         |             |            |         |         |             |
| 2020                                               | -0.7       | -25.1   | 0.0     | -25.9       | -11.2      | -96.8    | 0.0     | -149.0      | 0.0        | -74.1   | -0.6    | -75.5       |
| 2021                                               | -0.5       | -30.1   | 0.0     | -30.7       | -43.6      | -169.6   | 0.0     | -205.8      | 0.1        | -85.9   | -0.8    | -83.3       |
| 2022                                               | -0.7       | -22.4   | 0.0     | -23.1       | -52.9      | -81.0    | 0.0     | -136.5      | 0.1        | -60.7   | -1.0    | -59.9       |
| 2025                                               | -0.8       | -19.0   | 0.0     | -19.8       | -58.5      | -3.1     | 0.0     | -64.0       | 0.0        | -42.0   | -1.2    | -41.0       |
| 2030                                               | -1.0       | -25.1   | 0.0     | -26.1       | -83.2      | 51.9     | 0.0     | -33.7       | 0.0        | -45.6   | -1.7    | -44.2       |

Source: USDA, Economic Research Service calculations.

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Table 4

## Results from scenario decreasing gross domestic product for countries/regions of sub-Saharan Africa (continued)

| Nigeria                                  |            |         |         |             |            |          |         |             |            |          |         |             |
|------------------------------------------|------------|---------|---------|-------------|------------|----------|---------|-------------|------------|----------|---------|-------------|
|                                          | Poultry    |         |         |             | Rice       |          |         |             | Wheat      |          |         |             |
|                                          | Production | Imports | Exports | Consumption | Production | Imports  | Exports | Consumption | Production | Imports  | Exports | Consumption |
| Difference from base (percent)           |            |         |         |             |            |          |         |             |            |          |         |             |
| 2020                                     | 3.44       | -89.60  | 0.00    | -2.54       | -0.13      | -0.68    | 0.00    | -0.77       | 0.03       | -2.32    | 0.00    | -2.50       |
| 2021                                     | 3.91       | -91.60  | 0.00    | -2.67       | -0.44      | -2.06    | 0.00    | -0.83       | 0.23       | -2.50    | 0.00    | -2.65       |
| 2022                                     | 0.06       | -120.80 | 0.00    | -3.36       | -0.61      | -2.89    | 0.00    | -1.29       | 0.35       | -3.25    | 0.00    | -3.46       |
| 2025                                     | 0.06       | -113.80 | 0.00    | -3.22       | -0.65      | -2.51    | 0.00    | -1.29       | 0.44       | -3.27    | 0.00    | -3.46       |
| 2030                                     | 0.06       | -113.90 | 0.00    | -3.04       | -0.69      | -1.98    | 0.00    | -1.19       | 0.42       | -3.34    | 0.00    | -3.50       |
| Base (1,000 metric tons)                 |            |         |         |             |            |          |         |             |            |          |         |             |
| 2020                                     | 373.00     | 11.00   | 0.00    | 384.00      | 4,900.00   | 2,200.00 | 0.00    | 7,300.00    | 60.00      | 5,100.00 | 400.00  | 4,760.00    |
| 2021                                     | 384.40     | 11.70   | 0.00    | 396.10      | 5,148.00   | 1,981.00 | 0.00    | 7,344.00    | 64.50      | 5,265.00 | 400.00  | 4,929.00    |
| 2022                                     | 397.10     | 11.55   | 0.00    | 408.70      | 5,292.00   | 2,129.00 | 0.00    | 7,555.00    | 64.60      | 5,471.00 | 400.00  | 5,136.00    |
| 2025                                     | 431.20     | 12.76   | 0.00    | 444.00      | 5,574.00   | 2,615.00 | 0.00    | 8,149.00    | 64.20      | 6,006.00 | 400.00  | 5,669.00    |
| 2030                                     | 493.30     | 13.82   | 0.00    | 507.10      | 6,097.00   | 3,248.00 | 0.00    | 9,298.00    | 64.50      | 7,027.00 | 400.00  | 6,692.00    |
| Difference from base (1,000 metric tons) |            |         |         |             |            |          |         |             |            |          |         |             |
| 2020                                     | 0.1        | -9.9    | 0.0     | -9.7        | -6.4       | -15.0    | 0.0     | -55.9       | 0.0        | -118.4   | 0.0     | -118.7      |
| 2021                                     | 0.2        | -10.7   | 0.0     | -10.6       | -22.9      | -40.8    | 0.0     | -61.0       | 0.1        | -131.5   | 0.0     | -130.4      |
| 2022                                     | 0.2        | -14.0   | 0.0     | -13.7       | -32.3      | -61.4    | 0.0     | -97.4       | 0.2        | -178.0   | 0.0     | -177.8      |
| 2025                                     | 0.3        | -14.5   | 0.0     | -14.3       | -36.0      | -65.6    | 0.0     | -105.2      | 0.3        | -196.5   | 0.0     | -196.2      |
| 2030                                     | 0.3        | -15.7   | 0.0     | -15.4       | -41.9      | -64.1    | 0.0     | -110.7      | 0.3        | -234.4   | 0.0     | -234.1      |

Source: USDA, Economic Research Service calculations.

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Table 4

## Results from scenario decreasing gross domestic product for countries/regions of sub-Saharan Africa (continued)

| Other sub-Saharan Africa                 |            |         |         |             |            |         |         |             |            |          |         |             |
|------------------------------------------|------------|---------|---------|-------------|------------|---------|---------|-------------|------------|----------|---------|-------------|
|                                          | Poultry    |         |         |             | Rice       |         |         |             | Wheat      |          |         |             |
|                                          | Production | Imports | Exports | Consumption | Production | Imports | Exports | Consumption | Production | Imports  | Exports | Consumption |
| Difference from base (percent)           |            |         |         |             |            |         |         |             |            |          |         |             |
| 2020                                     | -0.28      | -9.36   | 0.00    | -4.57       | 0.00       | -0.82   | 1983.00 | -11.87      | 0.01       | -2.12    | 0.00    | -1.58       |
| 2021                                     | -0.22      | -10.35  | 0.00    | -5.08       | 0.94       | -1.19   | 2204.00 | -13.04      | 1.42       | -2.34    | 0.00    | -1.27       |
| 2022                                     | -0.22      | -11.01  | 0.00    | -5.41       | 2.39       | -1.28   | 2437.00 | -13.89      | 4.88       | -2.51    | 0.00    | -0.39       |
| 2025                                     | -0.20      | -11.07  | 0.00    | -5.58       | 2.54       | -1.18   | 2723.00 | -14.90      | 4.86       | -2.41    | 0.00    | -0.28       |
| 2030                                     | -0.20      | -11.38  | 0.00    | -5.94       | 2.36       | -0.94   | 3533.00 | -17.18      | 5.01       | -2.27    | 0.00    | -0.16       |
| Base (1,000 metric tons)                 |            |         |         |             |            |         |         |             |            |          |         |             |
| 2020                                     | 959.0      | 854.0   | 6.0     | 1,807.0     | 6,020.0    | 4,375.0 | 60.0    | 10,340.0    | 6,027.0    | 14,160.0 | 130.0   | 19,749.0    |
| 2021                                     | 994.0      | 909.0   | 6.1     | 1,897.0     | 6,251.0    | 4,518.0 | 63.5    | 10,704.0    | 6,139.0    | 14,639.0 | 130.0   | 20,501.0    |
| 2022                                     | 1,034.0    | 955.0   | 6.0     | 1,983.0     | 6,372.0    | 4,747.0 | 66.7    | 11,053.0    | 6,298.0    | 15,038.0 | 130.0   | 21,178.0    |
| 2025                                     | 1,114.0    | 1,082.0 | 6.1     | 2,190.0     | 6,822.0    | 5,312.0 | 70.1    | 12,064.0    | 6,820.0    | 16,405.0 | 130.0   | 23,118.0    |
| 2030                                     | 1,191.0    | 1,210.0 | 6.1     | 2,395.0     | 7,644.0    | 6,173.0 | 70.3    | 13,746.0    | 7,628.0    | 18,650.0 | 130.0   | 26,280.0    |
| Difference from base (1,000 metric tons) |            |         |         |             |            |         |         |             |            |          |         |             |
| 2020                                     | -2.7       | -79.9   | 0.0     | -82.6       | 0.1        | -36.0   | 1,190.0 | -1,227.0    | 0.5        | -300.5   | 0.0     | -312.3      |
| 2021                                     | -2.2       | -94.1   | 0.0     | -96.3       | 58.7       | -54.0   | 1,401.0 | -1,396.0    | 86.9       | -342.2   | 0.0     | -259.9      |
| 2022                                     | -2.3       | -105.0  | 0.0     | -107.3      | 152.1      | -61.0   | 1,626.0 | -1,535.0    | 307.3      | -378.0   | 0.0     | -81.7       |
| 2025                                     | -2.3       | -119.8  | 0.0     | -122.1      | 173.0      | -62.6   | 1,908.0 | -1,798.0    | 331.5      | -394.6   | 0.0     | -63.7       |
| 2030                                     | -2.5       | -147.6  | 0.0     | -150.1      | 180.4      | -57.9   | 2,484.0 | -2,361.0    | 381.9      | -423.9   | 0.0     | -42.4       |

Source: USDA, Economic Research Service calculations.

Continues on next page.

Table 4

## Results from scenario decreasing gross domestic product for countries/regions of sub-Saharan Africa (continued)

| South Africa                             |            |         |         |             |            |         |         |             |            |         |         |             |
|------------------------------------------|------------|---------|---------|-------------|------------|---------|---------|-------------|------------|---------|---------|-------------|
|                                          | Poultry    |         |         |             | Rice       |         |         |             | Wheat      |         |         |             |
|                                          | Production | Imports | Exports | Consumption | Production | Imports | Exports | Consumption | Production | Imports | Exports | Consumption |
| Difference from base (percent)           |            |         |         |             |            |         |         |             |            |         |         |             |
| 2020                                     | -0.53      | -9.86   | 0.00    | -3.32       | 0.00       | -3.11   | -2.14   | -3.11       | -0.12      | -2.53   | 0.00    | -1.24       |
| 2021                                     | -0.33      | -7.93   | 0.00    | -2.67       | 0.00       | -2.44   | -1.73   | -2.57       | -0.12      | -1.70   | 0.00    | -0.95       |
| 2022                                     | -0.29      | -7.47   | 0.00    | -2.55       | 0.00       | -2.37   | -1.85   | -2.45       | 0.02       | -1.81   | 0.00    | -0.89       |
| 2025                                     | -0.19      | -7.01   | 0.00    | -2.49       | 0.00       | -2.26   | -2.08   | -2.29       | 0.20       | -1.87   | 0.00    | -0.82       |
| 2030                                     | -0.16      | -6.94   | 0.00    | -2.61       | 0.00       | -2.23   | -2.60   | -2.18       | 0.33       | -1.95   | 0.00    | -0.80       |
| Base (1,000 metric tons)                 |            |         |         |             |            |         |         |             |            |         |         |             |
| 2020                                     | 1,426.0    | 586.0   | 47.0    | 1,965.0     | 0.0        | 1,050.0 | 125.0   | 925.0       | 1,915.0    | 1,700.0 | 150.0   | 3,430.0     |
| 2021                                     | 1,445.0    | 618.7   | 48.3    | 2,016.0     | 0.0        | 1,060.0 | 126.5   | 932.0       | 1,932.0    | 1,720.0 | 161.0   | 3,474.0     |
| 2022                                     | 1,461.0    | 646.1   | 49.6    | 2,057.0     | 0.0        | 1,070.0 | 127.9   | 941.0       | 1,957.0    | 1,740.0 | 164.0   | 3,530.0     |
| 2025                                     | 1,494.0    | 730.6   | 52.9    | 2,172.0     | 0.0        | 1,100.0 | 133.8   | 965.0       | 2,005.0    | 1,800.0 | 174.0   | 3,629.0     |
| 2030                                     | 1,548.0    | 843.8   | 59.6    | 2,332.0     | 0.0        | 1,150.0 | 142.3   | 1,006.0     | 2,092.0    | 1,900.0 | 191.0   | 3,798.0     |
| Difference from base (1,000 metric tons) |            |         |         |             |            |         |         |             |            |         |         |             |
| 2020                                     | -7.6       | -57.8   | -0.1    | -65.3       | 0.0        | -32.7   | -2.7    | -28.8       | -2.3       | -43.0   | 0.0     | -42.4       |
| 2021                                     | -4.8       | -49.1   | -0.1    | -53.8       | 0.0        | -25.9   | -2.2    | -23.9       | -2.4       | -29.2   | 0.0     | -32.9       |
| 2022                                     | -4.3       | -48.3   | -0.1    | -52.5       | 0.0        | -25.3   | -2.4    | -23.0       | 0.5        | -31.6   | 0.0     | -31.5       |
| 2025                                     | -2.8       | -51.2   | -0.1    | -54.0       | 0.0        | -24.9   | -2.8    | -22.1       | 4.1        | -33.7   | 0.0     | -29.7       |
| 2030                                     | -2.4       | -58.5   | -0.1    | -60.8       | 0.0        | -25.6   | -3.7    | -22.0       | 6.8        | -37.1   | 0.0     | -30.4       |

Source: USDA, Economic Research Service calculations.

Table 5  
Ex-post data for sub-Saharan Africa compared to scenario projection

| Sub-Saharan Africa                                      |            |         |         |             |            |          |         |             |            |          |         |             |
|---------------------------------------------------------|------------|---------|---------|-------------|------------|----------|---------|-------------|------------|----------|---------|-------------|
|                                                         | Poultry    |         |         |             | Rice       |          |         |             | Wheat      |          |         |             |
|                                                         | Production | Imports | Exports | Consumption | Production | Imports  | Exports | Consumption | Production | Imports  | Exports | Consumption |
| Difference of scenario to ex-post (percent)             |            |         |         |             |            |          |         |             |            |          |         |             |
| 2020                                                    | -1.75      | -2.12   | -25.95  | -1.57       | -6.25      | 14.93    | 16.60   | -2.90       | -5.29      | -7.04    | 9.17    | -4.83       |
| 2021                                                    | -1.15      | 1.28    | -24.03  | 0.03        | 1.61       | 5.85     | 46.17   | -1.58       | -7.78      | -4.11    | -7.18   | -5.01       |
| 2022                                                    | -2.51      | 3.96    | -27.35  | 0.21        | 0.64       | 6.36     | 32.71   | -1.00       | -4.69      | -1.19    | -6.33   | -3.07       |
| Ex-post data (1,000 metric tons)                        |            |         |         |             |            |          |         |             |            |          |         |             |
| 2020                                                    | 3,180.0    | 1,827.0 | 62.0    | 4,945.0     | 19,849.0   | 13,547.0 | 285.0   | 33,654.0    | 8,490.0    | 26,758.0 | 920.0   | 33,136.0    |
| 2021                                                    | 3,249.0    | 1,907.0 | 61.1    | 5,095.0     | 19,083.0   | 14,823.0 | 230.0   | 34,012.0    | 8,957.0    | 26,707.0 | 1,108.0 | 34,373.0    |
| 2022                                                    | 3,382.0    | 1,967.0 | 64.0    | 5,285.0     | 19,848.0   | 15,465.0 | 255.0   | 34,860.0    | 9,095.0    | 26,660.0 | 1,111.0 | 34,987.0    |
| Difference (scenario minus ex-post) (1,000 metric tons) |            |         |         |             |            |          |         |             |            |          |         |             |
| 2020                                                    | -55.6      | -38.8   | -16.1   | -77.7       | -1,241.0   | 2,022.0  | 47.3    | -974.8      | -449.0     | -1,884.0 | 84.4    | -1,600.0    |
| 2021                                                    | -37.5      | 24.5    | -14.7   | 1.6         | 308.0      | 867.0    | 106.2   | -538.1      | -696.6     | -1,097.0 | -79.6   | -1,721.0    |
| 2022                                                    | -84.8      | 77.9    | -17.5   | 11.0        | 128.0      | 983.0    | 83.4    | -350.1      | -426.7     | -317.0   | -70.3   | -1,074.0    |

Source: USDA, Economic Research Service calculations.

Table 6

## Ex-post data for each model compared to scenario projection

| Economic Community of West African States (ECOWAS)      |            |         |         |             |            |         |         |             |            |         |         |             |
|---------------------------------------------------------|------------|---------|---------|-------------|------------|---------|---------|-------------|------------|---------|---------|-------------|
|                                                         | Poultry    |         |         |             | Rice       |         |         |             | Wheat      |         |         |             |
|                                                         | Production | Imports | Exports | Consumption | Production | Imports | Exports | Consumption | Production | Imports | Exports | Consumption |
| Difference of scenario to ex-post (percent)             |            |         |         |             |            |         |         |             |            |         |         |             |
| 2020                                                    | -4.07      | -2.44   | 0       | -3.19       | -8.02      | 15.68   | 23.53   | 0.96        | 400.25     | -2.63   | 13.03   | -0.61       |
| 2021                                                    | -3.17      | -7.81   | 0       | -5.85       | 1.51       | 12.2    | 84.26   | 3.98        | 10.41      | -2.65   | 25.43   | -3.63       |
| 2022                                                    | -2.48      | -7.91   | 0       | -5.67       | -3.9       | 16.26   | 52.07   | 5.85        | 3.42       | -0.59   | 1.97    | -3.13       |
| Ex-post data (1,000 metric tons)                        |            |         |         |             |            |         |         |             |            |         |         |             |
| 2020                                                    | 460.0      | 577.0   | 1.0     | 1,036.0     | 8,365.0    | 6,940.0 | 170.0   | 15,279.0    | 8.0        | 4,494.0 | 287.0   | 4,095.0     |
| 2021                                                    | 476.0      | 654.0   | 1.0     | 1,129.0     | 7,838.0    | 7,355.0 | 115.0   | 15,364.0    | 37.0       | 4,611.0 | 269.0   | 4,327.0     |
| 2022                                                    | 492.0      | 690.0   | 1.0     | 1,181.0     | 8,523.0    | 7,440.0 | 140.0   | 15,698.0    | 40.0       | 4,710.0 | 340.0   | 4,502.0     |
| Difference (scenario minus ex-post) (1,000 metric tons) |            |         |         |             |            |         |         |             |            |         |         |             |
| 2020                                                    | -18.7      | -14.1   | 0.0     | -33.0       | -671.0     | 1,088.0 | 40.0    | 147.0       | 32.0       | -118.0  | 37.4    | -25.0       |
| 2021                                                    | -15.1      | -51.1   | 0.0     | -66.0       | 118.0      | 897.0   | 96.9    | 611.0       | 3.9        | -122.0  | 68.4    | -157.0      |
| 2022                                                    | -12.2      | -54.6   | 0.0     | -67.0       | -332.0     | 1,210.0 | 72.9    | 918.0       | 1.4        | -28.0   | 6.7     | -141.0      |
| Nigeria                                                 |            |         |         |             |            |         |         |             |            |         |         |             |
| Difference of scenario to ex-post (percent)             |            |         |         |             |            |         |         |             |            |         |         |             |
| 2020                                                    | 50.44      | -91.23  | 0.00    | 43.41       | -2.90      | 56.07   | 0.00    | 5.75        | 0.00       | -6.67   | 0.00    | -5.29       |
| 2021                                                    | 53.84      | -93.00  | 0.00    | 46.06       | 4.81       | 2.11    | 0.00    | 5.55        | 17.45      | -22.06  | -33.33  | -13.53      |
| 2022                                                    | 57.70      | -117.14 | 0.00    | 48.50       | 5.20       | 3.35    | 0.00    | 7.31        | 18.00      | -8.74   | -20.00  | -13.77      |
| Ex-post data (1,000 metric tons)                        |            |         |         |             |            |         |         |             |            |         |         |             |
| 2020                                                    | 248.0      | 13.0    | 0.0     | 261.0       | 5,040.0    | 1,400.0 | 0.0     | 6,850.0     | 60.0       | 5,338.0 | 400.0   | 4,900.0     |
| 2021                                                    | 250.0      | 14.0    | 0.0     | 264.0       | 4,890.0    | 1,900.0 | 0.0     | 6,900.0     | 55.0       | 6,586.0 | 600.0   | 5,550.0     |
| 2022                                                    | 252.0      | 14.0    | 0.0     | 266.0       | 5,000.0    | 2,000.0 | 0.0     | 6,950.0     | 55.0       | 5,800.0 | 500.0   | 5,750.0     |
| Difference (scenario minus ex-post) (1,000 metric tons) |            |         |         |             |            |         |         |             |            |         |         |             |
| 2020                                                    | 125.1      | -11.9   | 0.0     | 113.3       | -146.0     | 785.0   | 0.0     | 394.0       | 0.0        | -356.0  | 0.0     | -259.0      |
| 2021                                                    | 134.6      | -13.0   | 0.0     | 121.6       | 235.0      | 40.0    | 0.0     | 383.0       | 9.6        | -1453.0 | -200.0  | -751.0      |
| 2022                                                    | 145.4      | -16.4   | 0.0     | 129.0       | 260.0      | 67.0    | 0.0     | 508.0       | 9.9        | -507.0  | -100.0  | -792.0      |

Source: USDA, Economic Research Service calculations.

Continues on next page.

Table 6

## Ex-post data for each model compared to scenario projection (continued)

| Other sub-Saharan Africa                                |            |         |         |             |            |         |         |             |            |          |         |             |
|---------------------------------------------------------|------------|---------|---------|-------------|------------|---------|---------|-------------|------------|----------|---------|-------------|
|                                                         | Poultry    |         |         |             | Rice       |         |         |             | Wheat      |          |         |             |
|                                                         | Production | Imports | Exports | Consumption | Production | Imports | Exports | Consumption | Production | Imports  | Exports | Consumption |
| Difference of scenario to ex-post (percent)             |            |         |         |             |            |         |         |             |            |          |         |             |
| 2020                                                    | -6.69      | -10.08  | -133.33 | -7.77       | -6.58      | 2.17    | 0.00    | -14.43      | -12.47     | -6.97    | 20.37   | -5.35       |
| 2021                                                    | -6.75      | -6.99   | -147.52 | -6.39       | -0.71      | -1.20   | 0.00    | -14.20      | -7.69      | 5.05     | 46.07   | -2.52       |
| 2022                                                    | -6.59      | -4.12   | -165.78 | -4.96       | 3.16       | -6.75   | 0.00    | -15.78      | -4.28      | 2.88     | 17.12   | 0.67        |
| Ex-post data (1,000 metric tons)                        |            |         |         |             |            |         |         |             |            |          |         |             |
| 2020                                                    | 956.0      | 774.0   | 6.0     | 1,724.0     | 6,444.0    | 4,247.0 | 0.0     | 10,650.0    | 6,887.0    | 14,897.0 | 108.0   | 20,536.0    |
| 2021                                                    | 992.0      | 815.0   | 6.1     | 1,801.0     | 6,355.0    | 4,518.0 | 0.0     | 10,848.0    | 6,745.0    | 13,610.0 | 89.0    | 20,766.0    |
| 2022                                                    | 1,032.0    | 849.0   | 6.0     | 1,875.0     | 6,325.0    | 5,025.0 | 0.0     | 11,302.0    | 6,900.0    | 14,250.0 | 111.0   | 20,955.0    |
| Difference (scenario minus ex-post) (1,000 metric tons) |            |         |         |             |            |         |         |             |            |          |         |             |
| 2020                                                    | -64.0      | -78.0   | -8.0    | -134.0      | -424.0     | 92.0    | 0.0     | -1537.0     | -859.0     | -1038.0  | 22.0    | -1099.0     |
| 2021                                                    | -67.0      | -57.0   | -8.9    | -115.0      | -45.0      | -54.0   | 0.0     | -1540.0     | -519.0     | 687.0    | 41.0    | -524.0      |
| 2022                                                    | -68.0      | -35.0   | -10.0   | -93.0       | 200.0      | -339.0  | 0.0     | -1784.0     | -295.0     | 410.0    | 19.0    | 141.0       |
| South Africa                                            |            |         |         |             |            |         |         |             |            |          |         |             |
| Difference of scenario to ex-post (percent)             |            |         |         |             |            |         |         |             |            |          |         |             |
| 2020                                                    | -6.46      | 14.08   | -14.71  | -1.25       | 0.00       | 5.94    | 6.35    | 2.42        | 24.63      | -18.33   | 20.00   | -6.02       |
| 2021                                                    | -5.88      | 34.34   | -10.61  | 3.21        | 0.00       | -1.52   | 8.09    | 0.88        | -9.01      | -11.00   | 7.33    | -7.75       |
| 2022                                                    | -9.34      | 44.42   | -13.21  | 2.14        | 0.00       | 4.50    | 9.13    | 0.87        | -6.81      | -10.11   | 2.50    | -7.46       |
| Ex-post data (1,000 metric tons)                        |            |         |         |             |            |         |         |             |            |          |         |             |
| 2020                                                    | 1,516.0    | 463.0   | 55.0    | 1,924.0     | 0.0        | 960.0   | 115.0   | 875.0       | 1,535.0    | 2,029.0  | 125.0   | 3,605.0     |
| 2021                                                    | 1,531.0    | 424.0   | 54.0    | 1,901.0     | 0.0        | 1,050.0 | 115.0   | 900.0       | 2,120.0    | 1,900.0  | 150.0   | 3,730.0     |
| 2022                                                    | 1,606.0    | 414.0   | 57.0    | 1,963.0     | 0.0        | 1,000.0 | 115.0   | 910.0       | 2,100.0    | 1,900.0  | 160.0   | 3,780.0     |
| Difference (scenario minus ex-post) (1,000 metric tons) |            |         |         |             |            |         |         |             |            |          |         |             |
| 2020                                                    | -98.0      | 65.2    | -8.1    | -24.0       | 0.0        | 57.0    | 7.3     | 21.2        | 378.0      | -372.0   | 25.0    | -217.0      |
| 2021                                                    | -90.0      | 145.6   | -5.7    | 61.0        | 0.0        | -16.0   | 9.3     | 7.9         | -191.0     | -209.0   | 11.0    | -289.0      |
| 2022                                                    | -150.0     | 183.9   | -7.5    | 42.0        | 0.0        | 45.0    | 10.5    | 7.9         | -143.0     | -192.0   | 4.0     | -282.0      |

Source: USDA, Economic Research Service calculations.

## Conclusion

Modeling results described in this analysis indicate the shock of the COVID-19 pandemic will have varied effects on sub-Saharan Africa's import demand for non-staple commodities such as rice, wheat, and poultry, with implications for current and potential future U.S. exports to the region. Given recent U.S. interest in expanding markets, these results may suggest a need to reconsider market and trade development scenarios, particularly from the perspective of broader economic development investment to promote more stable growth in potential markets. The global economic shock of the COVID-19 pandemic will have profound effects on the macroeconomic stability of SSA, compounding many of the developmental challenges already faced throughout SSA and further entrenching negative macroeconomic effects inherent in countries dependent on exports of one or few primary commodities.

The volatility associated with single-commodity dependence can disrupt trade flows during periods of significant declines in international commodity prices. Such periods restrict SCD countries' abilities to import due to depreciating exchange rates resulting from their disproportionate reliance on commodity exports as a source of foreign exchange. These components limit the potential reliability of markets for U.S. agricultural exports to commodity-dependent countries. Particularly, the domestic economic instability brought on by the poorly distributed benefits of the oil industry has further reinforced poor economic conditions such as low human capital development and underemployment. This is evident in the insufficient human capital conditions in countries such as Nigeria and Angola compared with relatively robust economies such as Kenya and Ghana.

This study is seeking to account for the primary variables that serve to capture the economic costs of the COVID-19 pandemic in the global economy. However, world events produce a series of economic costs that are difficult to capture given their perpetually shifting nature. Based on the modeled impacts of the COVID-19 economic shock on SSA import demand for agricultural commodities, further analysis of the interrelationships of commodity-export dependence, domestic economic development, and sustained import demand is warranted. Although this study sought to provide insight into the effects of the evolving COVID-19 pandemic on agricultural trade, the divergences in the model results and the realized outcomes are potentially due to the modelling techniques. By using a non-spatial trade model, this study is unable to determine how trade could be affected between countries, but rather merely how total imports and exports for an individual country could be affected. In further refining this study, additional factors will need to be considered beyond strictly the effect of GDP changes. The COVID-19 pandemic affected individuals and nations beyond the variables that GDP measures. Likewise, future analysis will need to consider the effects of particular development challenges to better understand the challenges facing growth in U.S. agricultural exports to SSA. Additional international factors—such as the current conflict in Eastern Europe—stands to shift the trade dynamics in SSA, particularly in the Nigerian wheat market. The loss of relatively cheap and abundant Russian and Ukrainian wheat exports will likely increase global wheat prices. Along with a commensurate rise in global oil prices, the conflict could create market opportunities to major wheat exporters such as Canada, the United States, and the European Union to expand market share in the SSA region, while also leading to greater food insecurity throughout SSA.

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