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# U.S. Export Competitiveness in Select Crop Markets

Samantha Padilla, Danielle J. Ufer, Stephen Morgan, and Noah Link



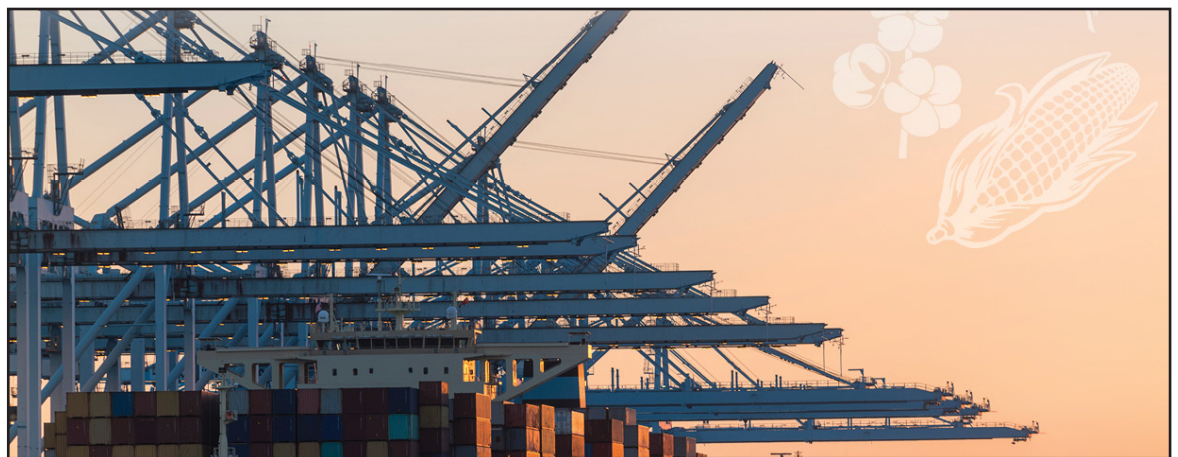


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# U.S. Export Competitiveness in Select Crop Markets

Samantha Padilla, Danielle J. Ufer, Stephen Morgan, and Noah Link

## Abstract

The United States has historically been one of the largest exporters of agricultural crops in terms of volume and value. In recent decades, increased competition from countries, such as Argentina and Brazil, have threatened the current U.S. standing in the global arena. The purpose of this study is to examine export competitiveness—in terms of value—of the top five crop commodity groups exported: corn, soybean products, cotton, wheat products, and tree nuts. These commodities are widely produced in the United States and, in 2021, represented 38 percent of total U.S. agricultural exports. The first section of the report broadly discusses U.S. competitiveness, current trade agreements, and world events that impacted global markets. The report notes that not having signed new free trade agreements (FTA) from mid-2012 to 2020 has limited the U.S. presence in emerging economies such as those in Africa. The second section focuses on a commodity-specific analysis using export shares and trade indices for each of the five crop groups. Using data from the Trade Data Monitor (TDM) and the Production, Supply and Distribution (PSD) database of USDA, Foreign Agricultural Service (FAS), this report identifies major competitors and trends in U.S. exports over the last 20 years. Within each commodity section, there is a detailed overview of the U.S. export position, a list of the top five competitors in that commodity, export-to-production ratios over time, and a history of significant changes within each market, such as the entry of a new competitor or reductions in exports to a particular country.

**Keywords:** corn, soybeans, cotton, wheat, tree nuts, U.S. agricultural exports

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## About the Authors

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## What Is the Issue?

The emergence of new competitors, new and amended trade agreements, and changing export markets have influenced the trade performance of U.S. agricultural commodities over the past two decades. Although the United States remains a major exporter of corn, soybeans (including soybean products), cotton, wheat, and tree nuts, competition from countries such as Brazil and Argentina has limited the presence of U.S. products in certain markets. This report provides information about challenges and opportunities in these five crop markets, as well as a commodity-specific analysis of U.S. export competitiveness.

## What Did the Study Find?

Export shares and exports-to-production ratios indicate the United States continues to be the top exporter of corn, tree nuts, and cotton, while other competitors have penetrated the global wheat and soybean markets. Over the last decade, the United States lost its position in the global wheat market as the European Union (EU), Russia, and Ukraine gained market shares. Similarly, Brazil and Argentina continue to pose a challenge to U.S. soybean exports. For instance, since 2021, Brazil has been the largest exporter of soybean oilseed. The United States' involvement in trade agreements, particularly with emerging markets, contributes to its export competitiveness. However, from 2012 through 2020, the United States did not establish any new free trade agreements (FTAs), potentially limiting U.S. export opportunities in some emerging markets while other competitors signed multiple FTAs during that same period.

The results of the study highlight U.S. export competitiveness for five focal product groups:

- **Corn:** The United States remains the world leader in corn exports, though competition from Brazil, Argentina, and Ukraine has increased in the last decade. U.S. corn exports were valued at over \$9.2 billion in calendar year (CY) 2020 and \$18.7 billion in CY 2021. U.S. corn represents a large share of the corn imported by China, Japan, South Korea, Mexico, and Colombia—all countries with a U.S. trade agreement in place.
- **Soybeans and derivative products:** Soybeans continue to be the most valuable commodity exported by the United States, valued at \$25.5 billion in CY 2020 and \$27.4 billion in CY 2021. Though U.S. soybean



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(including soybean meal and oil) trade has trended upward since 2000, it faces competition from Brazil and Argentina. China remains the largest market for U.S. soybean oilseed, which accounted for over \$50 billion of U.S. soybean exports from 2016 to 2020. A potential threat to U.S. soybean exports is the heavy dependence on China for purchase.

- **Wheat products:** The United States is one of six major global wheat exporters—the others being the EU, Russia, Canada, Australia, and Ukraine. Jointly these exporters accounted for over 70 percent of global wheat exports by value in CY 2021. However, the U.S. wheat market share has trended downward since 2000. In CY 2021, U.S. exports of wheat products were valued at \$7.7 billion. Major U.S. wheat export destinations shifted since 2000, with U.S. wheat exports to Egypt declining and wheat exports to Mexico and the Philippines increasing over the last decade. Drought and producer preference for higher value crops (e.g., corn and soybean oilseed) may reduce U.S. wheat production and exports.
- **Tree nuts:** U.S. total tree nut production and exports remain the largest in the world, with specialized advantages in almonds, walnuts, and pistachios. Total tree nut exports totaled \$8.4 billion in CY 2020 and \$8.8 billion in CY 2021. Other major tree nut exporters include Turkey, China, Iran, and the EU. Climate-related threats of water shortage and wildfire in major producing regions put U.S. tree nut competitiveness at risk, but production growth in other regions presents opportunities for diversified exports.
- **Cotton:** U.S. cotton exports fluctuated over the past 20 years, most recently accounting for nearly 30 percent of the global cotton trade, valued at \$5.7 billion in CY 2021. U.S. cotton faces increasing export competition from Brazil, India, and Australia.

## **How Was the Study Conducted?**

The report drew on two main sources of data to study the export performance of the United States. First, this report relied on the Production, Supply and Distribution (PSD) online database from USDA, Foreign Agricultural Service (FAS) to calculate exports-to-production indices for five crop commodities and describe the exports of other competing countries. Second, this report used Trade Data Monitor (TDM) to access export data from the U.S. Department of Commerce's Bureau of the Census. Export shares for the United States and other countries were calculated using TDM.

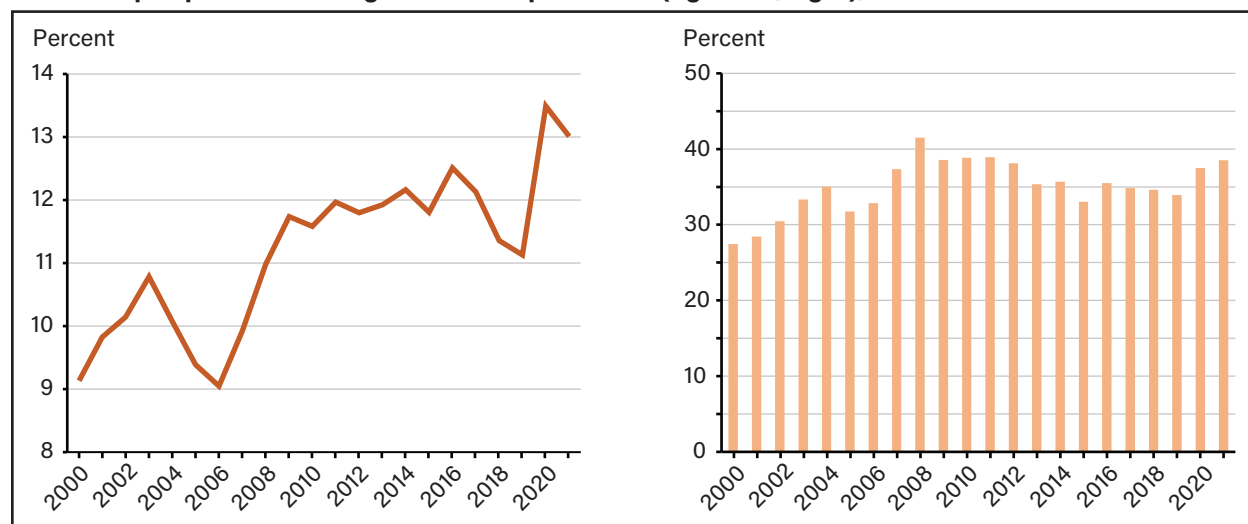
# U.S. Export Competitiveness in Select Crop Markets

## Introduction

The United States has produced and sold a wide variety of agricultural goods across the country and the world. In 2020, U.S. agricultural, food, and related industries contributed \$1.055 trillion to the gross domestic product (GDP), a 5-percent share (Zahniser, 2022). Over the last 20 years, the share of U.S. agricultural exports to U.S. total exports has continued to grow, demonstrating the importance of agricultural trade to the U.S. economy. Figure 1a shows that agricultural exports as a proportion of total U.S. exports increased from 2006 to 2016 and then declined from 2017 to 2019. This estimate recovered in 2020 when it reached 13.5 percent, the highest point in the last 20 years.

Figures 1a and 1b

**Share of U.S. agricultural export value to U.S. total export value (figure 1a, left) and the share of U.S. select crop export value to agricultural export value (figure 1b, right), CYs 2000–2021**



CYs = calendar years.

Note: U.S. crop exports comprise five crop commodities: corn, soybeans and derivative products, wheat products, tree nuts, and cotton; USDA, Foreign Agricultural Service, Production, Supply and Distribution (PSD) product categories are used for each of the commodities in figure 1b.

Source: USDA, Economic Research Service using Trade Data Monitor data and USDA, Foreign Agricultural Service, Global Agricultural Trade System data.

When looking at the top five U.S. crop exports—corn, soybeans and derivative products, wheat products, cotton, and tree nuts—in terms of value, these exports comprise a large share of total U.S. agricultural exports. Over the last 20 years, this share has fluctuated between 27 and 42 percent (figure 1b), and in recent years, the relative importance of these crops has increased, with an export value representing close to 40 percent of total agricultural exports. While the United States has remained the largest exporter of some of these crop commodities, changes in global patterns of production and agricultural markets affected U.S. export competitiveness during the last two decades. For example, the United States has continued to face

increasing competition from highly productive agricultural producers such as Brazil, Argentina, the European Union (EU), and Australia across multiple products. Conversely, emerging markets and changes in trade agreements have represented new opportunities for the United States to retain and strengthen its position in the global market.

This report examines U.S. export competitiveness in the context of five major commodity markets: corn, soybeans (including derivative products), wheat (including processed wheat products), tree nuts, and cotton exports. These commodity groups are the U.S. top five crop exports in terms of value. First, the report presents an overview of U.S. competitiveness in global crop trade. More specifically, this report discusses the U.S. top export competitors, changes in the trade space impacting the United States—such as the Coronavirus (COVID-19) pandemic and recent trade conflicts—and the emergence of new markets with growing populations. The second section of this report is a commodity-specific analysis of U.S. export competitiveness and performance. Using data from the Trade Data Monitor (TDM) interface and the USDA, Foreign Agricultural Service (FAS) Production, Supply and Distribution (PSD) database, this research calculates export shares and exports-to-production ratios to describe major exporters from 2000–2021. The exports-to-production ratio or export propensity is a trade-cum-production index, which places trade performance in the context of a country's size and agricultural productivity overall and displays the degree to which each country produces for export markets (Mikic and Gilbert, 2009).

As with any major entity in a market, understanding the competitive placement of the United States has remained critical to maintaining and capitalizing on market opportunities and responding to current and future pressures in crop commodity markets. An understanding of rising competitors, their potential advantages—including production advantages, policies and trade relationships, and even geographic advantages—and key destination markets could be helpful in responding to a changing global trade environment. This comprehension could help to preserve the United States' trade opportunities and presence in key markets for U.S. farmers, and this could help expand markets where growth opportunities exist. This report reviews these opportunities and pressures and provides an in-depth discussion of the competition that major U.S. crop exports face in the global market.

## Pressures and Opportunities for U.S. Competitiveness in Select Crop Markets

In this section, an overview of the factors that impacted U.S. performance in crop exports is provided. The ways that Brazil, Argentina, and the EU—the largest U.S. competitors in these select crop markets—advanced their export position are also explored. U.S. involvement in trade agreements, as well as changes in trade policy and the global export landscape that impacted export competitiveness, is discussed. Finally, emerging markets, some of which have been a source of opportunity for U.S. commodity exports over the past two decades, are reviewed.

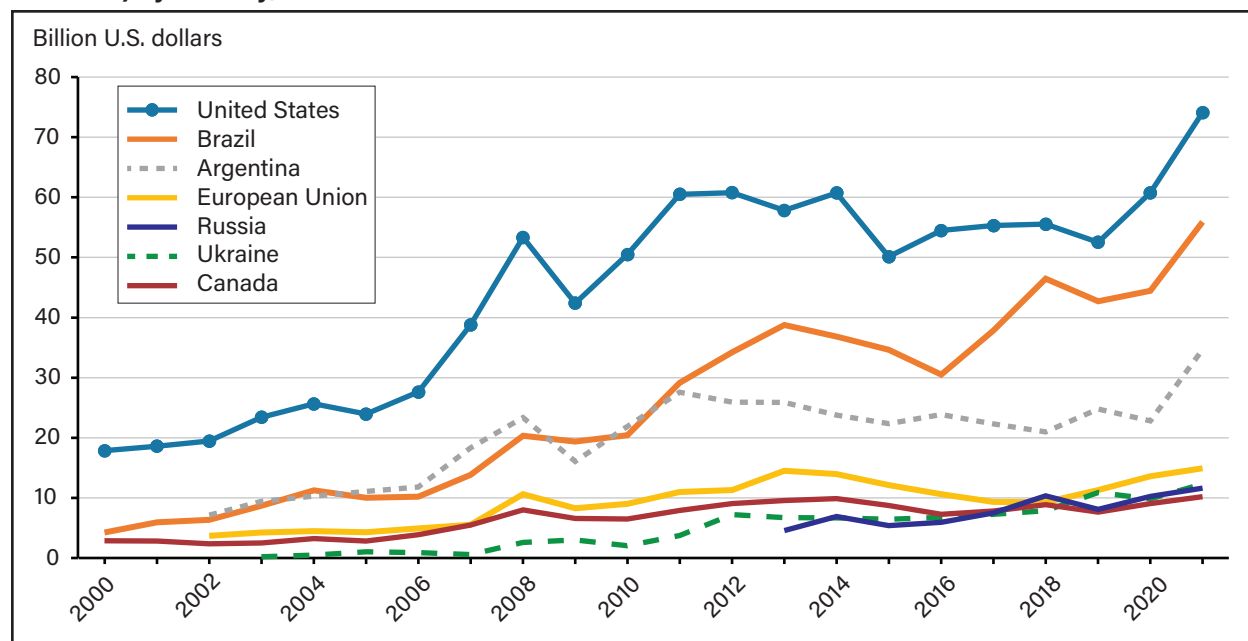
### Major U.S. Competitors in Select Crop Markets

The United States is the largest exporter by value of corn, cotton, and tree nuts (figure 2). In recent years, U.S. wheat production and participation in the global wheat market lagged behind the EU and Russia. Similarly, Brazil surpassed the United States as the top exporter of soybean oilseed and dramatically increased its participation in the global corn and cotton markets as well. Since 2018, Brazil's select crop export values have followed closely behind the United States (figure 2).



Figure 2

**Value of select crop exports (corn, soybeans and derivative products, cotton, wheat products, and tree nuts) by country, CYs 2000–2021**



CYs = calendar years.

Note: The USDA, Foreign Agricultural Service’s Production, Supply and Distribution (PSD) product categories are used for each of the commodities. For soybeans, the PSD categories of soybean meal, soybean oilseed, and soybean oil are aggregated. Similarly, for tree nuts, the PSD categories of almonds, pistachios, and walnuts are aggregated. No data are available through the Trade Data Monitor (TDM) interface on European Union (EU) and Argentina values for 2000 and 2001. The EU comprises 27 member countries and excludes the United Kingdom.

Source: USDA, Economic Research Service using TDM data.

Argentina also surfaced as a major participant in the export market, with the export value of the country’s crops more than tripling since 2002 (figure 2). In 2021, Argentina was the largest exporter of soybean oil and meal, the second largest exporter of corn, and the fourth largest exporter of soybean oilseed, in terms of value.

Crop export values for the EU, Canada, Ukraine, and Russia were roughly equal over the last 5 years (figure 2). The EU and Russia are major exporters of wheat, and both surpassed the United States in wheat exports.

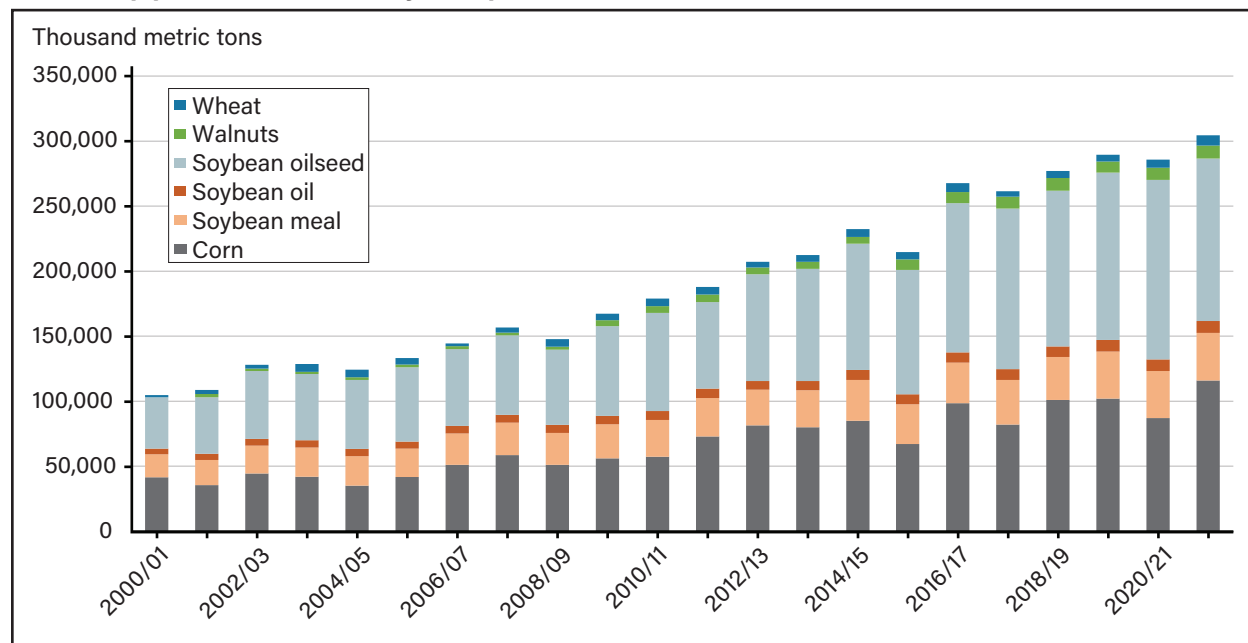
Brazil and Argentina are the primary U.S. competitors in the corn and soybean global market. Similarly, Brazil is the largest competitor in the cotton export market, and the European Union is the leader in the export of wheat products.

### *Brazil*

Brazil is the fourth largest agricultural producer after China, India, and the United States (International Fund for Agricultural Development, 2021). Over the last two decades, Brazil’s agricultural economy transformed from exporting tropical goods (e.g., cacao, sugar, coffee) to being a major global supplier of corn and soybeans products, among other crop and livestock products (Valdes et al., 2020). Brazil’s emergence as a major competitor can be attributed to several factors, including investments in agronomic research and technology that led to increased yields (Rada and Valdes, 2012), the conversion of range, pasture, and other land into arable cropland (Valdes et al., 2016), crop-specific policy incentives, and the devaluation of the Brazilian real (BRL) in the late 1990s and early 2000s (Valdes et al., 2020).

Figure 3 shows the growth in Brazil’s agricultural production, by crop, over the last two decades.<sup>1</sup> Soybean oilseed production greatly increased, particularly after Brazil’s currency devaluation in 1999 and 2001 (Valdes et al., 2020), surpassing the production of other crops and highlighting the importance of soybeans to the Brazilian crop sector. In 2021, Brazil was the largest global exporter of soybean oilseed, with exports valued at \$38.6 billion. The level of corn production was consistent over this period, with slight increases over the last 10 years compared with production between 2000 and 2010. From 2014 to 2016, Brazil experienced an economic recession with high depreciation against the U.S. dollar, inflation, and high interest rates. While the industrial sector struggled, agricultural output growth increased by 8.5 percent during this period, and Brazil maintained an agricultural trade surplus (Valdes et al., 2020).

Figure 3  
**Brazil crop production (corn, soybean products, wheat, and walnuts), MYs 2000/2001–2020/2021**



MYs = marketing years.

Note: All MYs are local marketing years and differ by country and by commodity. The local MY for each commodity can be found in USDA, Foreign Agricultural Service’s Production, Supply and Distribution database, data availability section. Production, Supply and Distribution (PSD) product categories are used for each of the commodities. Pistachios and almonds are omitted from the figure because there is no reported production in the PSD database. Cotton is measured in different units (480-pound bales) and is therefore also omitted.

Source: USDA, Economic Research Service using USDA, Foreign Agricultural Service, PSD data.

Since 2017, Brazil has been the major global exporter of soybean oilseed—surpassing the United States and Argentina. The majority of Brazil’s soybean exports are destined for China (table 1)—the largest importer of soybeans in the world, accounting for over 60 percent of global soybean imports (Gale et al., 2019).

<sup>1</sup> Figure 3 includes the production numbers of four of the major crops studied in this report that share common units of measurements. We omit pistachios and almonds from the figure because there are no reported production data in the USDA, Foreign Agricultural Service, Production, Supply and Distribution (PSD) database. Cotton is measured in 480-pound bales and is—therefore—also omitted.

Table 1

**Top destinations of Brazil soybean and corn exports, CYs 2017–2021**

Destination of soybean products exports					
Country	Percent				
	2017	2018	2019	2020	2021
China	65	67	63	60	58
European Union	14	13	15	16	15
Thailand	4	3	4	5	5
Vietnam	1	1	1	1	2
Turkey	0	1	1	2	2
ROW	16	15	16	16	18
Destination of corn exports					
Country	Percent				
	2017	2018	2019	2020	2021
Iran	17	27	13	13	17
Egypt	11	9	8	9	16
European Union	16	16	12	12	15
Japan	10	1	15	12	8
South Korea	6	5	8	7	5
Taiwan	6	2	6	7	5
ROW	34	40	38	40	34

CYs = calendar years; ROW = rest of the world.

Note: The European Union comprises 27 member countries and excludes the United Kingdom. “Soybeans” is a grouping of the Production, Supply and Distribution categories of soybean meal, soybean oilseed, and soybean oil.

Source: USDA, Economic Research Service using Trade Data Monitor data.

Both the United States and Brazil rely on China’s soybean market, making both countries vulnerable to changes in China’s trade policy. In 2018, China imposed tariffs of 25 percent on U.S. soybeans, allowing Brazilian soybean imports to increase (Morgan et al., 2022). In contrast, Brazilian corn exports are not concentrated in specific markets. In 2021, the two largest corn export markets for Brazil—Iran and Egypt—comprised less than 35 percent of total corn exports (table 1).

## *Argentina*

Argentina is well-endowed with natural resources and a net exporter of many agricultural products, such as soybeans (oilseed, meal, and oil), corn, wheat, beef, rice, and milk. Over the last two decades, agricultural production in Argentina has grown at an annual rate of 2.8 percent, and the sector’s development was primarily driven by investments in improved technologies and high international commodity prices (Organization for Economic Cooperation and Development, 2019). Although Argentina’s macroeconomic policies and volatility affected the country’s long-term economic performance, agriculture remains the dominant economic driver.

Many of the structural changes and growth in the sector are concentrated in the production of grains and soybeans. Along with the United States and Brazil, Argentina dominates corn and soybean production and exports. In 2021, Argentina was the second largest exporter of corn and the fourth largest exporter of soybean oilseed by value. Argentina was also the largest exporter of soybean oil and meal, both intermediate products that carry higher prices than unprocessed soybeans. Table 2 shows the top export destinations for Argentinian soybean products and corn.

Table 2

**Top destinations of Argentinian soybean products and corn exports, CYs 2017–2021**

Destination of soybean products exports					
Country	Percent				
	2017	2018	2019	2020	2021
India	12	10	10	14	15
European Union	17	12	8	8	10
China	15	10	19	14	9
Vietnam	8	8	8	10	7
Indonesia	6	7	6	5	6
ROW	42	53	49	49	53
Destination of corn exports					
Country	Percent				
	2017	2018	2019	2020	2021
Vietnam	18	19	20	20	17
South Korea	7	1	9	6	12
Egypt	12	11	7	10	8
Malaysia	8	9	6	7	8
Peru	1	1	8	8	7
ROW	54	59	50	49	48

CYs = calendar years; ROW = rest of the world.

Note: The European Union comprises 27 member countries and excludes the United Kingdom. For both corn and soybeans, one of the export countries was identified as confidential. Approximately 32 percent of soybeans and 8 percent of corn exports were destined for this country in 2021. Soybean data are derived from a grouping of the USDA, Foreign Agricultural Service, Production, Supply and Distribution categories of soybean meal, soybean oilseed, and soybean oil.

Source: USDA, Economic Research Service using Trade Data Monitor data.

Although Argentina has improved its position in these markets and agricultural production represents a major source of growth, the Government has imposed export taxes and sometimes bans on many agricultural goods since 2001. The export tariffs have varied, but the Government modified its export tax regime through Decree 230/2020 as of March 2020 (Boroughs, 2020). With the decree, the tax on soybean products increased from 30 to 33 percent for farms producing more than 1,000 tons of soybeans (77 percent of farms). For smaller farms—23 percent of soybean farms—this tax rate is between 20 and 30 percent, depending on the amount produced. Commodities such as wheat flour, paddy rice, lentils, and peanuts saw reductions in the export tax, while corn and wheat remain taxed at 12 percent (Boroughs, 2020). These taxes burden the agricultural sector, distort domestic production decisions (OECD, 2019), and limit Argentina's competitiveness in the global trade arena.

### *The European Union (EU)*

The EU is collectively the world's largest exporter of wheat and wheat products, with 2021 EU exports totaling over \$10 billion or 16 percent of global wheat exports (TDM, 2022).<sup>2</sup> The main wheat exporting countries in the EU are France, Romania, Germany, Poland, and the Baltic States (USDA, FAS, 2022c), whereas Italy is the main exporter of processed wheat products globally (TDM, 2022).

<sup>2</sup> Includes the following Harmonized System (HS) wheat products: 1001 (wheat and meslin), 1101 (wheat or meslin flour), 190219 (pasta, uncooked, not stuffed or otherwise prepared), 190230 (pasta, prepared), 190240 (couscous), and 190430 (bulgur wheat, pre-cooked or otherwise prepared).

The EU has historically exported a significant amount of wheat and wheat flour to the Middle East and North Africa region. For example, in 2021, 19 percent of external EU wheat exports were to Algeria, with Nigeria, Egypt, and Morocco each accounting for 7–8 percent of wheat exports (table 3). Over the past 5 years, China has become an increasingly important destination for EU wheat exports, accounting for as much as 8 percent in 2020.

Table 3

**Top destinations of European Union wheat and flour exports, CYs 2017–2021**

Country	Destination of wheat and flour exports				
	Percent				
	2017	2018	2019	2020	2021
Algeria	15	25	16	17	19
Nigeria	4	2	2	6	8
Egypt	6	6	8	4	7
Morocco	5	3	6	8	7
China	0	1	3	8	6
ROW	70	63	65	57	52

CYs = calendar years; ROW = rest of the world.

Note: The European Union comprises 27 member countries and excludes the United Kingdom. Wheat and flour is a group category that comprises Harmonized System (HS) codes 1001 (wheat and meslin) and 1101 (wheat or meslin flour).

Source: USDA, Economic Research Service using Trade Data Monitor data.

The EU is also a top exporter of processed wheat products, including pasta (cooked/uncooked), couscous, and prepared bulgur wheat. Compared with unprocessed wheat and wheat flour, EU-processed wheat products are primarily exported to developed markets. For example, the United Kingdom and the United States were the largest markets for EU-processed wheat products, accounting for 26 percent and 23 percent, respectively, of 2021 exports (table 4).

Table 4

**Top destinations of European Union processed wheat exports, CYs 2017–2021**

Country	Destination of processed wheat exports				
	Percent				
	2017	2018	2019	2020	2021
United Kingdom	24	23	24	24	26
United States	22	23	23	27	23
Switzerland	6	6	6	5	6
Japan	7	6	6	6	5
Canada	3	3	3	3	3
ROW	39	38	38	35	37

CYs = calendar years; ROW = rest of the world.

Note: The European Union comprises 27 member countries and excludes the United Kingdom. Processed wheat is a group category that comprises Harmonized System (HS) codes 190219 (pasta, uncooked, not stuffed or otherwise prepared), 190230 (pasta, prepared), 190240 (couscous), and 190430 (bulgur wheat, pre-cooked or otherwise prepared).

Source: USDA, Economic Research Service using Trade Data Monitor data.

EU competitiveness in global wheat exports was bolstered with the accession of wheat-producing member states, including the Baltic States (Estonia, Latvia, and Lithuania) in 2004 and Romania and Bulgaria in 2007. Additionally, the EU's Common Agricultural Policy (CAP) has also supported wheat production as part of the grains commodity regime through a variety of policy tools, including direct payments and price supports (Normile et al., 2004). With the 2003 CAP reform, CAP shifted away from price supports and toward direct payments to farmers (Normile et al., 2004; USDA, ERS, 2021c). Additionally, after the 2003 CAP reforms, durum wheat was allowed a 40-percent coupled payment in traditional areas to retain producers on land (USDA, ERS, 2021c). CAP has accounted for approximately one-third of the EU budget, and recent developments for CAP 2023–2027 have included new provisions aligning CAP with other EU climate and sustainability agendas, as well as a decentralization of funding to the member states (USDA, FAS, 2022d).

## Changes in Trade Environment

When the United States engages in trade agreements with other countries, the enhanced market access can potentially make the United States more competitive, as imports will face reduced or eliminated tariffs, whereas the imports of other countries might not do so. Conversely, disputes with other countries and disruptive global events can hinder U.S. export competitiveness.

### *U.S. Trade Agreements*

The global trade environment is also impacted by the framework of bilateral and multilateral trade agreements among major trading partners. These agreements often entail duty-free entry, reduced tariffs, or tariff-rate quotas (TRQ) for specified products. Tariff reductions, especially alongside reductions of non-tariff barriers, can lead to expanded market access and potentially reduce export costs. This translates into more competitive pricing for the United States.

The United States has entered into free trade agreements (FTA) and trade promotion agreements (TPA) with 19 countries since 2000 (Office of the U.S. Trade Representative, 2022). A large portion of these countries are in Central and South America. Figure 4 shows the timeline of each of these agreements, with the majority of the agreements coming into force prior to 2010. After the start of the Colombia TPA, Panama TPA, and U.S.-Korea FTA in 2012, the United States took 8 years to implement another trade agreement. In 2020, the United States entered into a trade agreement with Japan (USJTA) and replaced the North American Free Trade Agreement (NAFTA) with the United States-Mexico-Canada Agreement (USMCA) (figure 4).

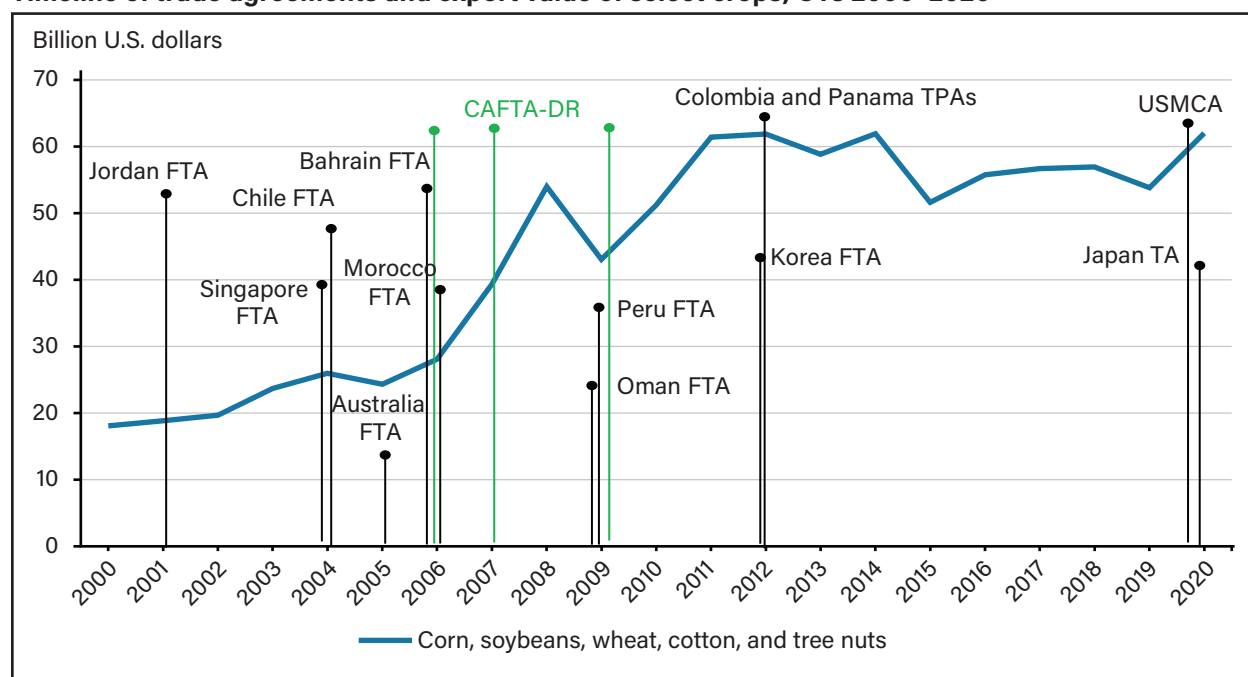
Although the United States did not enter into any trade agreements between mid-2012 and 2020, other countries implemented their own agreements to enhance market access. For example, since 2010, Chile has engaged in 11 FTAs with countries in South America and Southeast Asia (Organization of American States, 2022b)—both regions with rising incomes<sup>3</sup> (World Bank, 2020a) and growing populations (World Bank, 2020b). Similarly, Canada has had 12 agreements come into force since 2010 (OAS, 2022a). It is important to note the value of select U.S. field crop exports increased over the period when many trade agreements were implemented (figure 4) and these increases may have been affected by other factors unrelated to trade agreements such as growing soybean exports to China, trade with other partners, shifting consumer preferences, etc.

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<sup>3</sup> Incomes in these regions were consistently rising prior to the COVID-19 pandemic.

Figure 4

**Timeline of trade agreements and export value of select crops, CYs 2000–2020**



CYs = calendar years; CAFTA-DR = Dominican Republic-Central America-United States Free Trade Agreement; USMCA = United States-Mexico-Canada Agreement; FTA = free trade agreement; TPA = trade promotion agreement; TA = trade agreement.

Note: The CAFTA-DR is displayed in green across three bullets because it was implemented in different years depending upon the country. This report uses the USDA, Foreign Agricultural Agreement, Production, Supply and Distribution (PSD) product categories for each of the commodities in this table. For soybeans, we aggregated the PSD categories of soybean meal, soybean oilseed, and soybean oil. Similarly, for tree nuts, we aggregated the PSD categories of almonds, pistachios, and walnuts.

Source: USDA, Economic Research Service using Office of the United States Trade Representative data and Trade Data Monitor data.

FTAs can increase bilateral trade between two countries (Baier and Bergstrand, 2007) and improve market access for commodities and goods for which agreement provisions apply. Table 5 summarizes some of the recent FTAs between the United States and other countries. Many of these agreements eliminated tariffs on U.S. crop commodities either immediately or through staging schedules where there is a TRQ in place for a number of years and the out-of-quota tariff is eventually phased out. For most FTAs between the United States and developing countries, data indicate that implementing the FTA was associated with improvements in agricultural trade (Ajewole et al., 2022). In addition to the direct benefit of duty-free entry of products, these trade agreements also enhance U.S. competitiveness. For example, the U.S.-Peru agreement, known as the Peru Trade Promotion Agreement (PTPA), gave U.S. cotton a price advantage over Brazilian and Argentinian cotton in Peru for 12 years (Christ and Polly, 2006).

Table 5

**Trade agreements involving major U.S. crops (corn, soybeans and derivative products, wheat and wheat products, tree nuts, cotton), CYs 2006–2021**

Agreement	Date	Provisions related to major U.S. crops	U.S. ranking in 2021 (percent of imports)
Morocco Free Trade Agreement (MAFTA)	2006	TRQs for durum wheat, non-durum wheat, and almonds. Provision (“preference clause”) that will afford U.S. exporters of products, such as wheat, corn, and soybeans, better market access to Morocco than other trade partners.	#2 in corn (24 percent) #19 in cotton (0 percent) #3 in soybeans (20 percent) #23 in wheat (0 percent) #1 in tree nuts (73 percent)
Bahrain Free Trade Agreement (BHFTA)	2006	All U.S. industrial and agricultural products will receive duty-free access, except 80 products, of which the duties will be phased out over 10 years.	#3 in corn (20 percent) #5 in cotton (5 percent) #2 in soybeans (8 percent) #15 in wheat (0.33 percent) #1 in tree nuts (73 percent)
Central America and Dominican Republic Free Trade Agreement (CAFTA-DR)	2006 2007 2009	Immediate duty-free access for soybeans, cotton, and wheat. Costa Rica: Yellow corn was duty-free in 2009, while the tariff on white corn will phase out within 15 years. El Salvador: The tariff on yellow corn was phased out in 2020, with a TRQ on white corn growing at 2 percent per year. Guatemala: Yellow corn became duty-free in 2015 (year 10 of the agreement being in force). For white corn, there is a TRQ in place growing at 2 percent per year. Honduras: Yellow corn became duty-free in 2020. For white corn, there is a TRQ in place growing at 2 percent per year. Dominican Republic: Corn was duty-free when the agreement came into force.	Costa Rica: #1 in corn (89 percent) #1 in cotton (100 percent) #1 in soybeans (94 percent) #2 in wheat (22 percent) #1 in tree nuts (94 percent) El Salvador: #1 in corn (91 percent) #1 in cotton (100 percent) #1 in soybeans (86 percent) #2 in wheat (38 percent) #1 in tree nuts (98 percent) Guatemala: #1 in corn (89 percent) #1 in cotton (100 percent) #1 in soybeans (81 percent) #2 in wheat (38 percent) #1 in tree nuts (95 percent) Honduras: #1 in corn (91 percent) #1 in cotton (100 percent) #1 in soybeans (86 percent) #2 in wheat (78 percent) #1 in tree nuts (94 percent)
Peru Trade Promotion Agreement (PTPA)	2009	A 17-percent tariff on U.S. wheat was removed immediately. Initial TRQ (25 percent over quota tariff) on yellow corn above current export volume. Duty-free, quota-free trade in cotton fiber.	#2 in corn (15 percent) #1 in cotton (100 percent) #4 in soybeans (23 percent) #2 in wheat (9 percent) #1 in tree nuts (55 percent)
U.S.-Korea Free Trade Agreement (KORUS)	2012	Wheat, corn, and soybeans for crushing, and pistachio, almonds, and cotton became duty-free immediately. Soybeans for consumption had immediate duty-free access within new TRQs.	#2 in corn (26 percent) #2 in cotton (34 percent) #2 in soybeans (27 percent) #1 in wheat (36 percent) #1 in tree nuts (99 percent)
Colombia Trade Promotion Agreement	2012	U.S. wheat, soybean, and cotton exports became duty-free immediately. A total of 2.1 million metric tons of U.S. yellow corn enter Colombia duty-free (TRQ with 5-percent annual growth). The out-of-quota tariff of 25 percent will phase out on January 1, 2023.	#1 in corn (69 percent) #2 in cotton (23 percent) #1 in soybeans (60 percent) #2 in wheat (29 percent) #1 in tree nuts (96 percent)

continued on next page ►



Agreement	Date	Provisions related to major U.S. crops	U.S. ranking in 2021 (percent of imports)
Panama Trade Promotion Agreement	2012	U.S. wheat, soybean, and cotton exports enter Panama duty-free. Specified volumes of U.S. yellow corn will enter Panama duty-free (TRQ with 5-percent annual growth). The out-of-quota tariff of 25 percent will phase out on January 1, 2023.	#1 in corn (96 percent) #1 in soybeans (75 percent) #1 in wheat (83 percent) #1 in tree nuts (94 percent)
U.S.-Japan Trade Agreement (USJTA)	2020	Immediately eliminates tariffs for almonds, walnuts, corn, and soybeans. Specified quantity of U.S. wheat and wheat products will face a preferential tariff rate and a reduction in Japan's "mark-up" on price.	#1 in corn (73 percent) #1 in cotton (48 percent) #1 in soybeans (57 percent) #1 in wheat (39 percent) #1 in tree nuts (96 percent)

CYs = calendar years; TRQ = tariff-rate quota.

Note: The USDA, Foreign Agricultural Service, Production, Supply and Distribution (PSD) product categories are used for each of the commodities in this table. For soybeans, the PSD categories of soybean meal, soybean oilseed, and soybean oil are aggregated. Similarly, for tree nuts, the PSD categories of almonds, pistachios, and walnuts are aggregated.

Source: USDA, Economic Research Service using information from USDA, Foreign Agricultural Service, Production, Supply and Distribution database; the United States International Trade Commission; Trade Data Monitor (TDM); and the Office of the United States Trade Representative.

Similarly, the U.S.-Korea Free Trade Agreement (KORUS) has benefited the United States' agricultural sector. Import tariffs on agricultural products in South Korea averaged 57 percent; however, with the implementation of the KORUS agreement, almost two-thirds of U.S. agricultural products enter South Korea duty-free (USDA, FAS, 2022a; Hopkinson, 2018). For example, since 2011, U.S. tree nut exports to South Korea have increased by 54 percent (Hopkinson, 2018).

In 2021, countries in a trade agreement with the United States represented major crop import markets (table 5). For example, the United States is the leading supplier of corn, soybeans (including derivative products), cotton, wheat, and tree nuts to Panama and Japan and ranked first in tree nuts for all countries with agreements established during the period 2006–21 (table 5). The enhanced access through FTAs helped cement U.S. export competitiveness of major crops in these markets.

### *United States-Mexico-Canada Agreement*

USMCA came into effect on July 1, 2020, and replaced NAFTA, an FTA first implemented in 1994. Under NAFTA, 99 percent of U.S. food and agriculture exports had duty-free access to Canada and Mexico (Anderson and Costello, 2021). This resulted in a \$1.8 billion increase in U.S. exports of corn and corn-based products to Mexico from 2007 to 2017. During marketing year (MY) 2018/2019, U.S. corn accounted for 98 percent of Mexico's total corn imports (Capehart et al., 2020).

USMCA will continue to place zero tariffs on the same agricultural products as NAFTA, with some new key provisions affecting wheat and cotton. Under the new agreement, U.S. wheat is no longer subject to discriminatory grading in Canada. Prior to USMCA, U.S. wheat was graded as "feed wheat," which generally yields a lower price. To realize the benefits of this provision, U.S. wheat varieties will need to be registered and approved in Canada, a process that might take years (Regmi, 2020). In addition, no country of origin statement will be required on Canada's wheat quality grade certificates. This may enhance the competitiveness of U.S. wheat in Canada.

U.S. cotton growers might benefit from the new textile and apparel chapter in the agreement. Chapter 6 of USMCA includes new provisions that seek to incentivize the use of regional inputs of production—called “yarn-forward” rules of origin—and improve customs enforcement to prevent fraud (Regmi, 2020).

### *Retaliatory Tariffs and the Phase One Agreement*

In 2018, the United States implemented Section 232 tariffs<sup>4</sup> on steel and aluminum imports from Canada, China, the European Union, India, Mexico, and Turkey, and Section 301 tariffs<sup>5</sup> on several imports from China. In response, these countries imposed retaliatory tariffs on almost all U.S. agricultural exports. The agricultural products targeted for retaliation experienced tariff increases ranging from 5 to 140 percent (Regmi, 2019).

From mid-2018 to 2019, retaliatory tariffs reduced the value and volume of U.S. agricultural exports, resulting in \$27 billion in losses (Morgan et al., 2022). These losses were heavily concentrated among soybean oilseed, sorghum, and pork. Soybeans accounted for the majority of the losses, making up nearly 71 percent of the share of estimated trade damages. Corn, wheat, cotton, and tree nuts jointly comprised 9 percent of the losses. Two main reasons for this concentration in losses were the large share of soybean exports to total agricultural exports and the 25-percent tariff that China, the largest export market for U.S. soybeans, imposed in July 2018 (Morgan et al., 2022).

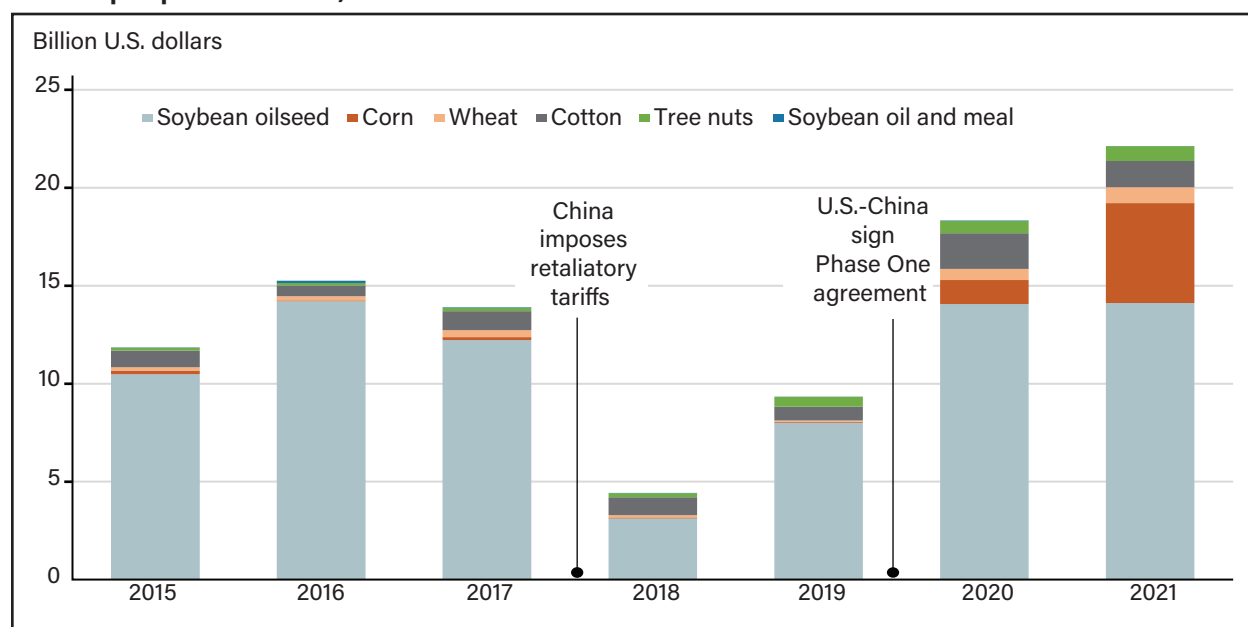
Figure 5 shows the value of U.S. crop exports to China from 2015 to 2021. Soybean oilseed exports were increasing over the last decade until the start of the retaliatory tariffs in 2018. This commodity is the largest U.S. crop export (by value) to China, followed by cotton and wheat, although the export value of the latter two is drastically smaller than that of soybean oilseed.

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<sup>4</sup> Section 232 allows the U.S. president to impose import restrictions (such as tariffs) based on an investigation and affirmative determination by the Department of Commerce that certain imports threaten to impair national security (Fefer, 2021).

<sup>5</sup> Section 301 of the Trade Act of 1974 gives the Office of the United States Trade Representative (USTR) the authority to investigate and take action to enforce U.S. rights under trade agreements and respond to certain foreign trade practices (Schwarzenberg, 2022).

Figure 5  
**U.S. crop exports to China, CYs 2015–2021**



CYs = calendar years.

Note: The USDA, Foreign Agricultural Service, Production, Supply and Distribution (PSD) product categories are used for each of the commodities in this table. For tree nuts, the PSD categories of almonds, pistachios, and walnuts are aggregated.

Source: USDA, Economic Research Service using Trade Data Monitor data.

On January 15, 2020, the United States and China signed the Phase One agreement to address changes to China’s economic and trade regime, further opening the Chinese market to U.S. agricultural goods. Through this agreement, China committed to purchasing an average of at least \$40 billion of U.S. food and agricultural goods annually in 2020 and 2021, twice the amount prior to the trade dispute. China also agreed to comply with the World Trade Organization (WTO) obligations and improve its administration of the TRQs on corn and wheat (USDA, 2020).

Following the start of the Phase One agreement, China announced it would exempt 696 U.S. agricultural products from retaliatory tariffs. These products included corn, soybean oilseed, cotton, wheat, and pistachios, and excluded almonds, soybean oil, and walnuts. Since the signing of Phase One and the tariff exceptions on certain commodities, exports of corn, wheat, tree nuts, and cotton to China have exceeded export levels in years prior to the start of the retaliatory tariffs (Morgan et al., 2022).

### *The COVID-19 Pandemic*

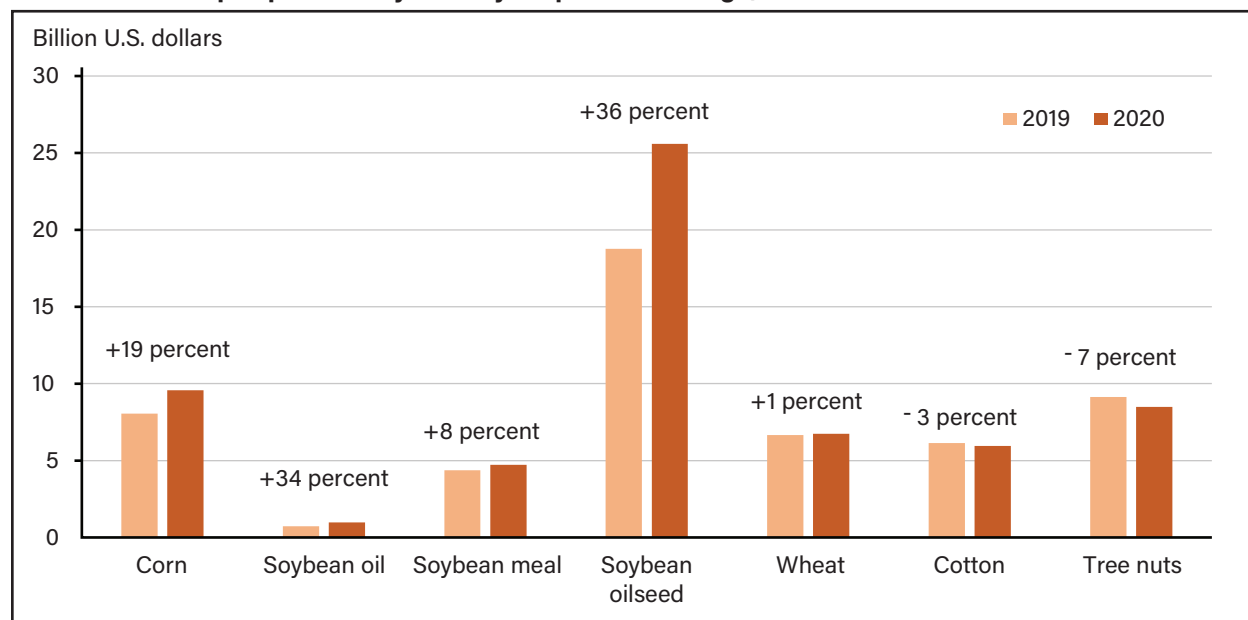
On March 11, 2020, the World Health Organization (WHO) declared COVID-19 a global pandemic. Liefert et al. (2021) found that U.S. agricultural exports in 2020 were negatively impacted by the COVID-19-induced drop in countries’ GDPs. However, changes in other macroeconomic factors and events unrelated to COVID-19 (e.g., an increase in China’s demand, other countries’ currency appreciation against the dollar, and weather-induced poor grain harvests in Russia and Ukraine) resulted in overall U.S. agricultural export growth of 7 percent in 2020 compared with 2019.

Figure 6 depicts the value of U.S. crop exports in 2019 and 2020, the years the COVID-19 pandemic started and surged globally. For the majority of these crops—corn; soybean oil, meal, and oilseed; and wheat—the change in export value between 2019 and 2020 was positive. The value of soybean oilseed exports increased

by 36 percent in 2020 compared with 2019. This was the largest change among these major crops, followed by increases in soybean oil (34 percent), corn (19 percent), soybean meal (8 percent), and wheat (1 percent) export values.

Figure 6

**Value of U.S. crop exports and year-to-year percent change, CYs 2019 and 2020**



CYs = calendar years.

Note: The USDA, Foreign Agricultural Service, Production Supply and Demand (PSD) categories are used for all commodities. For tree nuts, the PSD category for almonds, pistachios, and walnuts are aggregated.

Source: USDA, Economic Research Service using Trade Data Monitor data.

Zahniser (2022) found that emergency closures of textile plants, especially during the beginning of the pandemic, resulted in a decrease in U.S. cotton exports to Mexico of approximately \$110 million in 2020 compared with 2019.

While U.S. tree nut exports increased in India (11 percent), China (23 percent), and Canada (6 percent) in 2020, the decline in exports can be attributed to lower sales to Hong Kong, the EU, and the United Arab Emirates. These three markets accounted for 41 percent of U.S. tree nut exports in 2020 (USDA, FAS, 2021b).

In summary, the COVID-19 pandemic negatively affected U.S. agricultural exports, but other events unrelated to the pandemic helped the United States maintain its export competitiveness and increase total agricultural exports. For specific crops discussed in this report, U.S. exports increased for three crops—corn, soybeans (including derivative products), and wheat—suggesting the agricultural provisions in the Phase One agreement with China, as well as other events, helped maintain export competitiveness during the pandemic.

*The Russia-Ukraine Conflict*

Russia’s invasion of Ukraine in February 2022 generated uncertainty for global agricultural markets by disrupting production and trade patterns. Both Russia and Ukraine are major agricultural exporters of some of the commodities considered in this report, including soybeans, corn, and wheat. For example, Russia and Ukraine together accounted for 23 percent of global wheat exports in 2021 (TDM, 2022). Uncertainty surrounding the ability of Russia and Ukraine to continue exporting wheat and the implications for Ukraine’s spring planting drove wheat prices higher (Sowell and Swearingen, 2022a; Sowell and Swearingen, 2022b).

These market disruptions may create opportunities for other exporters, including the United States, to fill any shortfalls in exports due to Russia's invasion of Ukraine. As a result, more research is needed to understand the impacts of Russian actions on production and exports moving forward. However, in this report, all export shares are calculated using data through the end of calendar year 2021, before Russia's invasion of Ukraine.

## Emerging Markets and Changing Populations

As developing countries continue to experience positive income and population growth, these markets have represented new opportunities for U.S. crop exports. Over the last 5 years, imports of grains and tree nuts greatly increased in some of the regions with emerging economies and growing populations. For example, from 2016 to 2021, global imports of soybean oilseed increased in South Asia (133 percent), North Africa (121 percent), and South America (57 percent).<sup>6</sup> In 2020, these regions saw population growth rates between 1.0–1.7 percent, above the global growth rate (World Bank, 2020b).

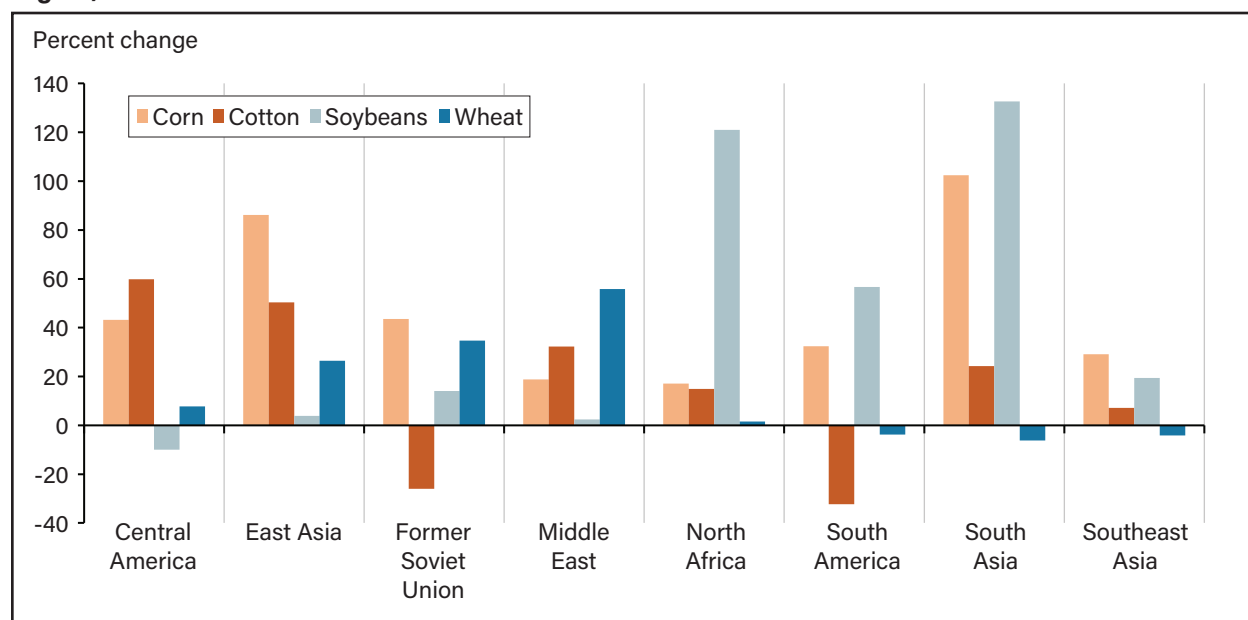
Similarly, in the same timeframe, global corn exports destined for the regions of South Asia, East Asia, and the former Soviet Union increased 102 percent, 86 percent, and 44 percent, respectively (figure 7). Cotton imports in Central America increased 60 percent in the last 5 years, while the Middle East saw the largest increase in wheat imports (56 percent) during this period.

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<sup>6</sup> Central America comprises Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama; East Asia includes China, Hong Kong, Japan, Macau, Mongolia, North Korea, South Korea, and Taiwan; former Soviet Union comprises Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan; North Africa comprises Algeria, Egypt, Libya, Morocco, and Tunisia; South America comprises Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Falkland Islands (Islas Malvin), French Guiana, Guyana, Paraguay, Peru, Suriname, Uruguay, and Venezuela; South Asia comprises Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka.

Figure 7

### Percent change in total corn, cotton, soybeans and derivative products, and wheat imports by region, MYs 2016/2017–2021/2022



MYs = marketing years.

Note: All MYs are local marketing years and differ by country and by commodity. The local MY for each commodity can be found in the USDA, Foreign Agricultural Service, Production, Supply and Distribution database, data availability section. Central America comprises Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama; East Asia comprises China, Hong Kong, Japan, Macau, Mongolia, North Korea, South Korea, and Taiwan; former Soviet Union comprises Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan; Middle East comprises Bahrain, Gaza Strip, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates, and Yemen; North Africa comprises Algeria, Egypt, Libya, Morocco, and Tunisia; South America comprises Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Falkland Islands (Islas Malvin), French Guiana, Guyana, Paraguay, Peru, Suriname, Uruguay, and Venezuela; South Asia comprises Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka; and Southeast Asia comprises Brunei, Burma, Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, and Vietnam.

Source: USDA, Economic Research Service using data from the USDA, Foreign Agricultural Service, Production, Supply and Distribution database.

Many of these regions have had positive population growth and rising incomes. The Middle East and North Africa (MENA) region has accounted for a significant portion of food and grain imports, as demand is increasing due to higher incomes and the region's climactic constraints (Nigatu and Motamed, 2015). U.S. exports of wheat and corn to the MENA region fell in the last two decades due to growing competition from the Black Sea countries and the EU. Proximity to these other competing markets results in lower transportation costs and more competitive prices (Nigatu and Motamed, 2015).

The presence of U.S. exports in South and Central America was secured through trade agreements in force. The United States has a plurilateral FTA with several Central American countries and bilateral agreements with Colombia, Peru, Chile, and Panama. These markets continue to have positive population growth (World Bank, 2020b) coupled with increases in food imports (USDA, FAS, 2022b). The expansion of U.S. exports to these regions contributes to export competitiveness and strengthens the U.S. position as the largest exporter of corn and cotton.

Tree nut imports have also considerably increased in the last 5 years, with the largest percent change concentrated in North Africa and the former Soviet Union regions (table 6). Almond, pistachio, and walnut imports in the North Africa region increased over 200 percent since 2016. This growth in imports presents an opportunity for the United States to continue to be the major exporter of tree nuts.

Table 6

**Percent change in total tree nut imports by region, MYs 2016/2017-2021/2022**

Region	Percent change		
	Almonds	Pistachios	Walnuts
East Asia	46	1	-12
Former Soviet Union – 12 countries	154	62	524
Middle East	36	23	27
North Africa	263	1,775	264
South America	89	0	10
South Asia	37	59	93
Southeast Asia	88	0	0
Sub-Saharan Africa	43	0	0

MYs = marketing years.

Note: All MYs are local marketing years and differ by country and by commodity. The local MY for each commodity can be found in USDA, Foreign Agricultural Service's Production, Supply and Distribution database, data availability section. East Asia comprises China, Hong Kong, Japan, Macau, Mongolia, North Korea, South Korea, and Taiwan; Former Soviet Union comprises Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan; Middle East comprises Bahrain, Gaza Strip, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates, and Yemen; North Africa comprises Algeria, Egypt, Libya, Morocco, and Tunisia; South America comprises Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Falkland Islands (Islas Malvin), French Guiana, Guyana, Paraguay, Peru, Suriname, Uruguay, and Venezuela; South Asia comprises Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka; Southeast Asia comprises Brunei, Burma, Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, and Vietnam; Sub-Saharan Africa comprises Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Congo (Brazzaville), Congo (Kinshasa), Cote d'Ivoire, Djibouti, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Reunion, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Tanzania, Togo, Uganda, Zambia, Zimbabwe.

Source: USDA, Economic Research Service using data from the USDA, Foreign Agricultural Service, Production, Supply and Distribution database.

# Evolution of Export Competitiveness in Specific Crop Markets

Under each commodity section, we discuss major trade and world events, competitors, and the position of the United States in the global market from 2000–21. Exports-to-production ratios and export shares are used to strengthen the commodity-level analysis.

## Trade Indices and Data Sources

The Revealed Comparative Advantage (RCA) index, first developed by Balassa (1965) and later adapted and refined in various ways (Bojnec and Ferto, 2012; Serin and Civan, 2008; Yu et al., 2009), is the most frequently used index applied to studies of trade performance. In this study, however, alternative measures of trade are used for several reasons. First, Balassa (1965) specifically qualified RCA for application to manufactured goods, not primary agricultural products, “because a large number of primary products are subject to subsidies, quotas, and special arrangements, so that the ensuing trade pattern can hardly reflect comparative advantage.” Second, Iapadre (2001) noted “economic theory does not give clear support to single-flow indicators” like RCA. Lastly, Siggel (2006) clarified that RCA measures “cost competitiveness” rather than “comparative advantage” since all the factors of production could not be sufficiently observed and measured.

This report builds on Ballance et al. (1987) and their examination of consistency among RCA and other trade measures. While RCA uses only export values in global trade, alternative indices were found to produce greater consistency when accounting for net trade. Thus, in this report and throughout each commodity analysis, two trade measures were used:

- Exports-to-production ratio: A trade-cum-production index, which places trade performance in the context of a country’s size and overall agricultural productivity. The exports-to-production ratio, or export propensity, measures the degree to which each country produces for export markets (Mikic and Gilbert, 2009). The ratio is calculated for each commodity and country using volumes of both exports and total production data from the USDA, Foreign Agricultural Service’s Production, Supply and Distribution (PSD) database.
- Export shares: For each commodity, export shares are calculated as the ratio of total exports for a given country to total global exports. These shares are computed for select countries using data from the Trade Data Monitor (TDM) database.

## Corn

Corn has been the leading U.S. crop in terms of production and acreage and is second only to soybeans in terms of export value.<sup>7</sup> Globally, corn is produced and traded as a staple food, animal feed component, or converted into ethanol fuel. The United States has led the world in corn exports (figure 8), but exports from Brazil, Argentina, and Ukraine have increased in the last decade. More specifically, the U.S. share of global corn exports fell from 71 percent in 2006 to just 30 percent—by value—in 2020, while Brazil, Argentina, Ukraine, and other countries expanded exports (TDM, 2022). In 2021, the value of U.S. corn exports was up 100 percent from 2020 (figure 8), an increase that can be partly attributed to strong feed demand in China and the Phase One agreement (USDA, FAS, 2021).

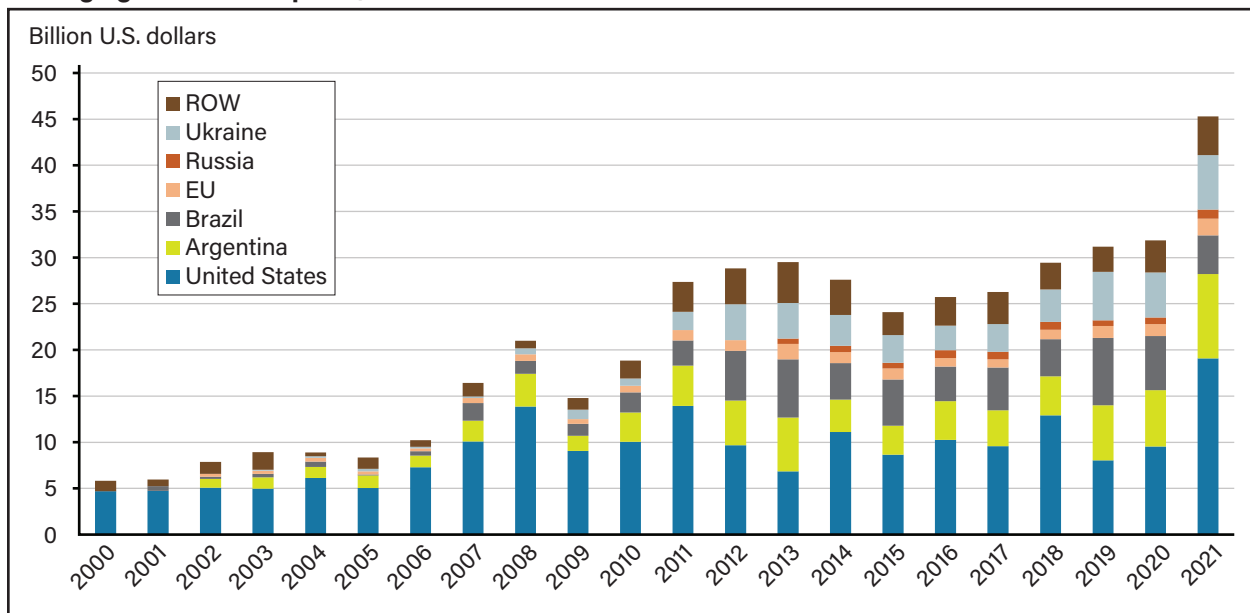
<sup>7</sup> In this section and throughout the report, the authors used the PSD group category for corn, which is HS code 1005.



Since 2000, the corn prices received by farmers have risen from an average of \$1.85 per bushel to over \$4.00 in 2020, peaking in 2012 at nearly \$7.00 per bushel (USDA, NASS, 2021). Increasing livestock production in China, Europe, and around the world has been responsible for much of the increased demand, while the price increase can be attributed to the use of corn-derived ethanol as a fuel substitute (Westcott, 2007). Since 2000, U.S. farmers have increased the area planted to corn by 17 percent (USDA, NASS, 2021), and yields have increased nearly 30 percent, raising overall production by half.

Approximately 40 percent of U.S. corn is currently supplied to ethanol production (USDA, ERS, 2021). U.S. corn exports grew from \$4.7 billion in 2000 to \$19.1 billion in 2021 (figure 8). This represents a 300-percent increase in terms of value and a 52-percent increase in export volume.

Figure 8  
Average global corn exports, CYs 2000–2021



CYs = calendar years; EU = European Union; ROW = rest of the world.

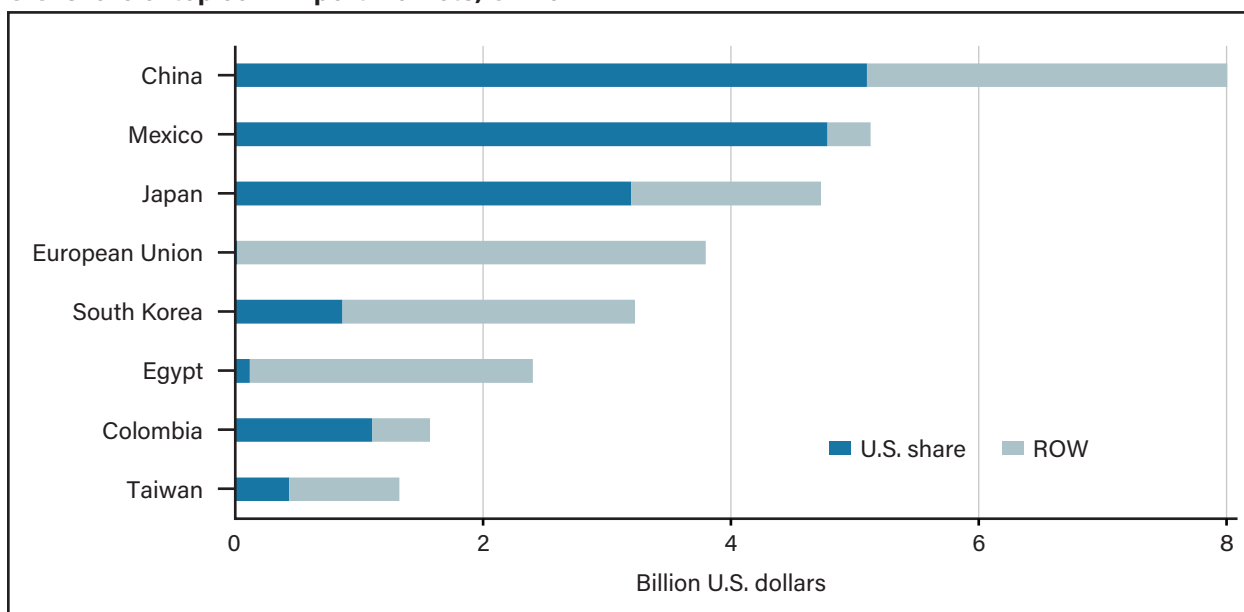
Note: The Trade Data Monitor (TDM) interface has no data for Russia prior to 2012.

Source: USDA, Economic Research Service using TDM data.

Corn exports have varied partly due to the strength of the U.S. dollar on global markets. When the dollar is strong relative to other currencies, U.S. corn becomes more expensive for consumers in foreign markets, and corn from other competing exporters is less expensive.

Under NAFTA, Mexican TRQs on U.S. corn expired and there was unlimited duty-free access in 2008, and the updated agreement (USMCA) continues the open trade relationship. Mexico remains the top destination for U.S. corn, and the United States supplied nearly all of Mexico's corn imports in 2021 (figure 9). Similarly, in 2012, the South Korean FTA (KORUS) eliminated high tariffs on U.S. commodities, including corn. In 2019, the United States negotiated a trade deal with Japan that included sales of corn and wheat in response to U.S. trade disputes with China and in the absence of a wider trans-Pacific trade deal.

Figure 9  
**U.S. share of top corn import markets, CY 2021**



CY = calendar year; ROW = rest of the world.

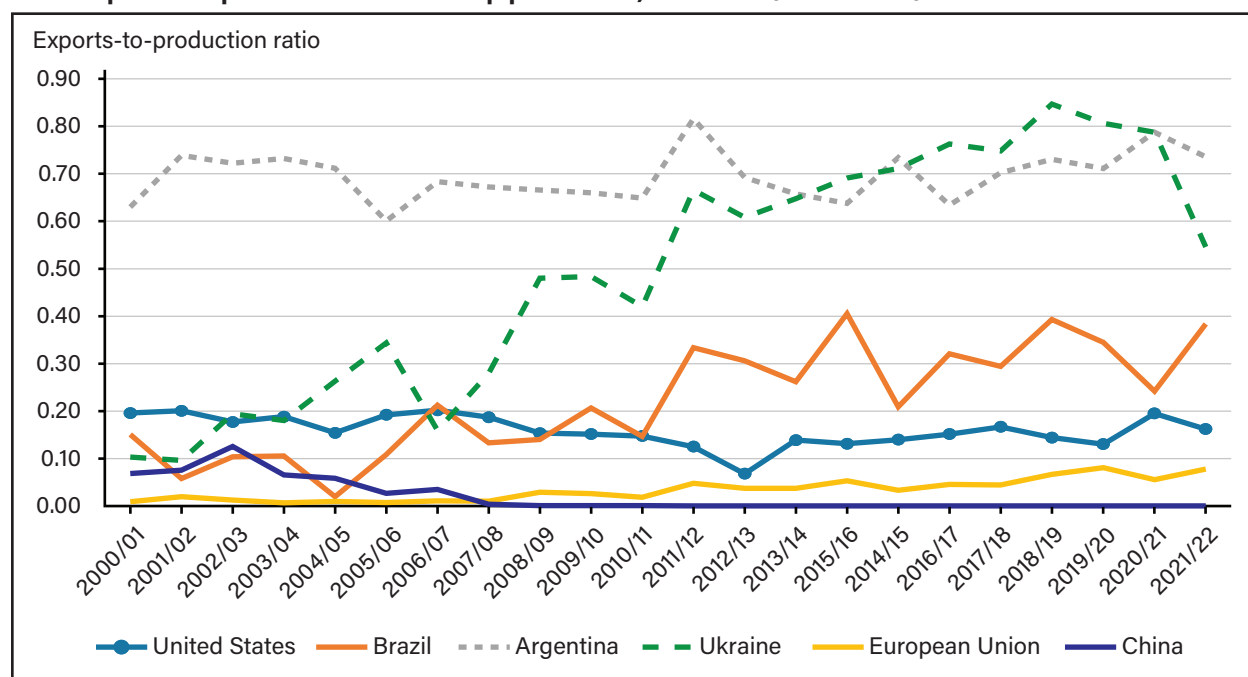
Source: USDA, Economic Research Service using Trade Data Monitor data.

The importance of trade agreements to U.S. corn exports cannot be overstated. Using a 3-year average of U.S. corn exports from 2019–21, the largest export markets for the United States are Mexico (\$3.43 billion), Japan (\$2.36 billion), Colombia (\$889.8 million), South Korea (\$595.2 million), and Canada (\$575.3 million). As previously discussed, the United States has trade agreements with all these countries.

Compared with other major exporters, the United States maintains a relatively low exports-to-production ratio for corn (figure 10). Around 15 percent of production is exported, while at least two-thirds of production is destined for domestic ethanol and livestock production. The ratio declined between MYs 2007/2008–2013/2014 with the expansion of ethanol production, while partially rebounding since. Ukraine and Brazil were the two main entrants into the global corn market over the last 10 years. Ukraine has risen as a top exporter of corn, surpassing Argentina in MY 2013/2014 as the most export-oriented producer. In MY 2020/2021, Ukraine exported close to 79 percent of all corn produced (figure 10), while this figure declined to 55 percent in MY 2021/2022. This decline is related to the ongoing Russian aggression in Ukraine. Argentina has stood out for its strong ongoing orientation toward exports as its domestic beef industry is mainly grass-fed rather than corn-fed.

Figure 10

**Corn exports-to-production ratio of top producers, MYs 2000/2001–2021/2022**



MYs = marketing years.

Note: All MYs are local marketing years and differ by country and by commodity. The local MY for each commodity can be found in USDA, Foreign Agricultural Service’s Production, Supply and Distribution database, data availability section.

Source: USDA, Economic Research Service using data from the USDA, Foreign Agricultural Service, Production, Supply and Distribution database.

Evaluating the competitiveness of corn between producers depends on the consideration given to yield rates, land costs, transportation, exchange rates, efficiency, labor, and other factors. The average U.S. corn-growing farm has continued to increase in size—from an average of 501 acres per farm in 1997 to an average of 725 acres in 2017 (Saavoss et al., 2021). While U.S. corn acreage grew over the last two decades, the number of farms producing corn declined by nearly 50,000 because of consolidation. Most fields (92 percent) grow biotech varieties engineered for multiple traits, including herbicide resistance and insecticidal compounds (Zahniser et al., 2019).

Large corn farms in Brazil, Argentina, and elsewhere are comparable with those in the United States; however, yields, land costs, transportation, and marketing differ (Meade et al., 2016). Farms in the U.S. Midwestern Corn Belt, or Heartland region, achieve the highest yields and thus the lowest cost per bushel compared with the Argentine Northern Heartland and the Paraná region in Brazil. Lower transportation costs also drive U.S. competitiveness. However, including the (opportunity) costs of land reveals a Brazilian advantage, with new areas opened to agriculture in recent decades at low—or externalized—costs (Meade et al., 2016).

### Soybean Oilseed and Intermediate Products

In the United States, soybeans are the highest value agricultural commodity export, grossing more than all corn, wheat, rice, and cotton exports combined in 2020. Although traditionally grown for food in East Asia, soybeans—a nutrient dense oilseed—are now grown globally, with over 75 percent of global production used for livestock and poultry feed. In addition, soybeans are crushed for oil, converted to biodiesel fuel, and consumed as finished products (e.g., tofu and soy milk).

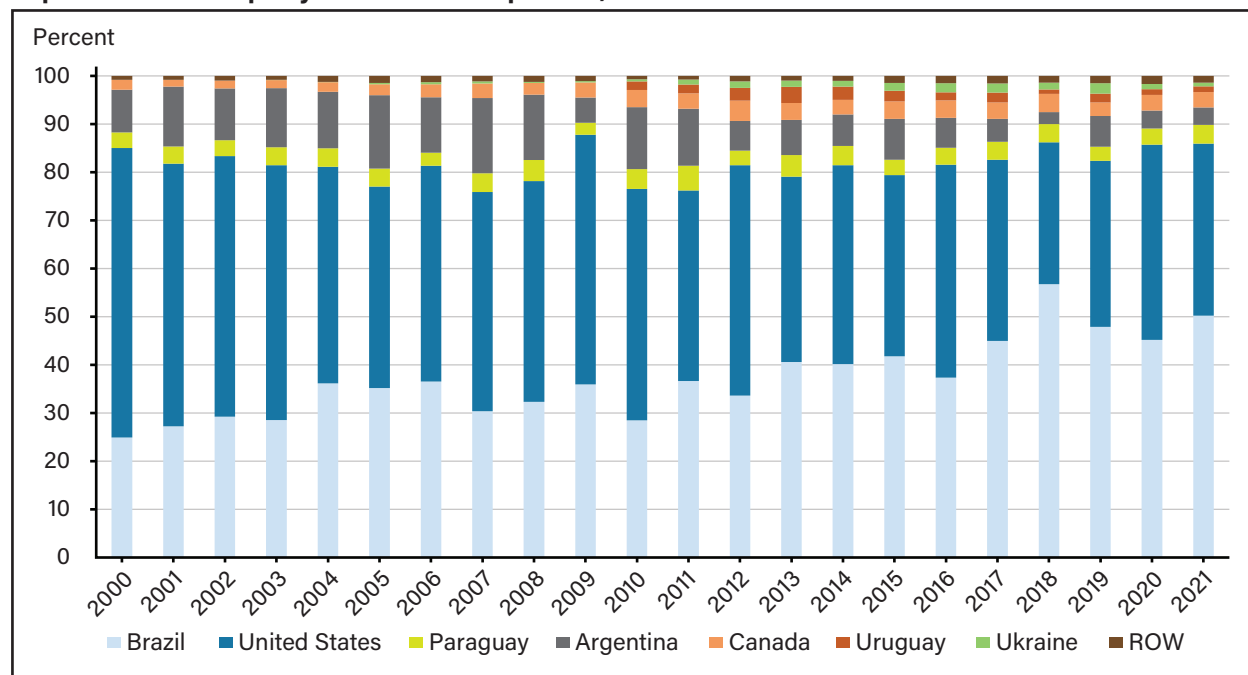
Soybean oilseed alternates with corn as the primary crop on much U.S. farmland, with soybean acreage increasing over the past 25 years in part due to yield improvements and low production costs. Soybeans comprise approximately 90 percent of U.S. oilseed production (USDA, ERS, 2021).

Since the 1990s, production in South America has expanded to meet growing global demand—much of it on deforested land in the Brazilian Amazon, Cerrado, and other landscapes cleared for agriculture (Lima et al., 2019). Brazil and Argentina, along with the United States, have been among the top producers of soybean oilseed, soymeal, and oil. Although China has remained a major producer, its large and growing domestic demand for soybean oilseed accounts for most global imports. The EU has been another major importer of soybeans, using soybeans to support their domestic livestock production.

Figure 11 shows global soybean oilseed export shares from 2000 to 2021. The United States and Brazil accounted for most soybean oilseed exports, capturing over 80 percent of export shares in 2021. In terms of value, Brazil was the largest exporter from 2007 to 2018 as its export shares steadily increased, surpassing the United States in the global arena. As noted earlier, Brazil has implemented a portfolio of strategies to secure its competitiveness in soybean exports.

Although Argentina lags behind Brazil, the United States, and in some years Paraguay, in soybean oilseed exports, Argentina has been the largest exporter, in terms of value, of soybean meal and oil. In 2021, Argentinian soybean oil exports were valued at \$7.1 billion—more than three times larger than soybean oil exports from Brazil and eight times larger than exports from the United States. Similarly, Argentinian soybean meal exports reached \$12.11 billion in 2021, followed by Brazil and the United States (TDM, 2022).

Figure 11  
Export shares of top soybean oilseed exporters, CYs 2000–2021

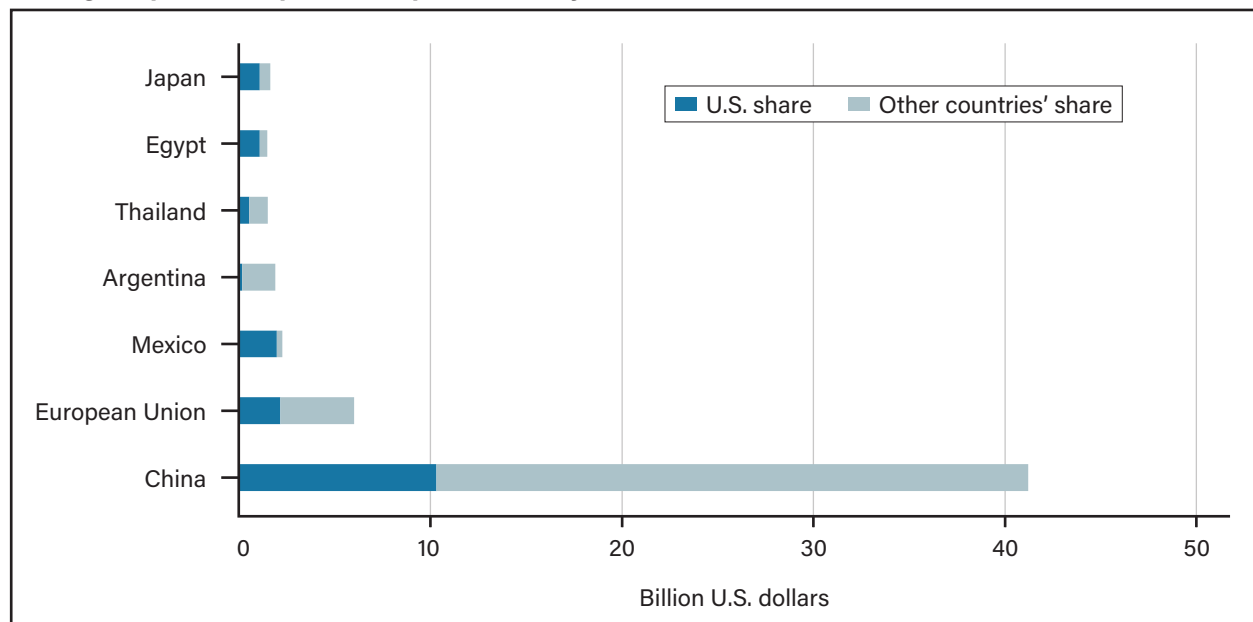


CYs = calendar years; ROW = rest of the world.  
Source: USDA, Economic Research Service using Trade Data Monitor data.

The largest markets for soybean oilseed include China, which has imported four times the value of any other U.S. trading partner over the last 5 years—followed by the EU, Mexico, Argentina, several East Asian nations (Japan, Indonesia, the Philippines, Taiwan, Thailand, South Korea), and Egypt.

Figure 12 shows the 5-year average soybean oilseed imports (2016–2021) of the top importers in 2021. China has remained the top destination for U.S. soybean oilseed exports; however, the United States has accounted for a larger market share of imports from Mexico and Japan, longtime partners with whom new trade agreements were negotiated in 2020 (USMCA and USJTA).

Figure 12  
Average imports of top seven importers of soybean oilseed, CYs 2016–2021



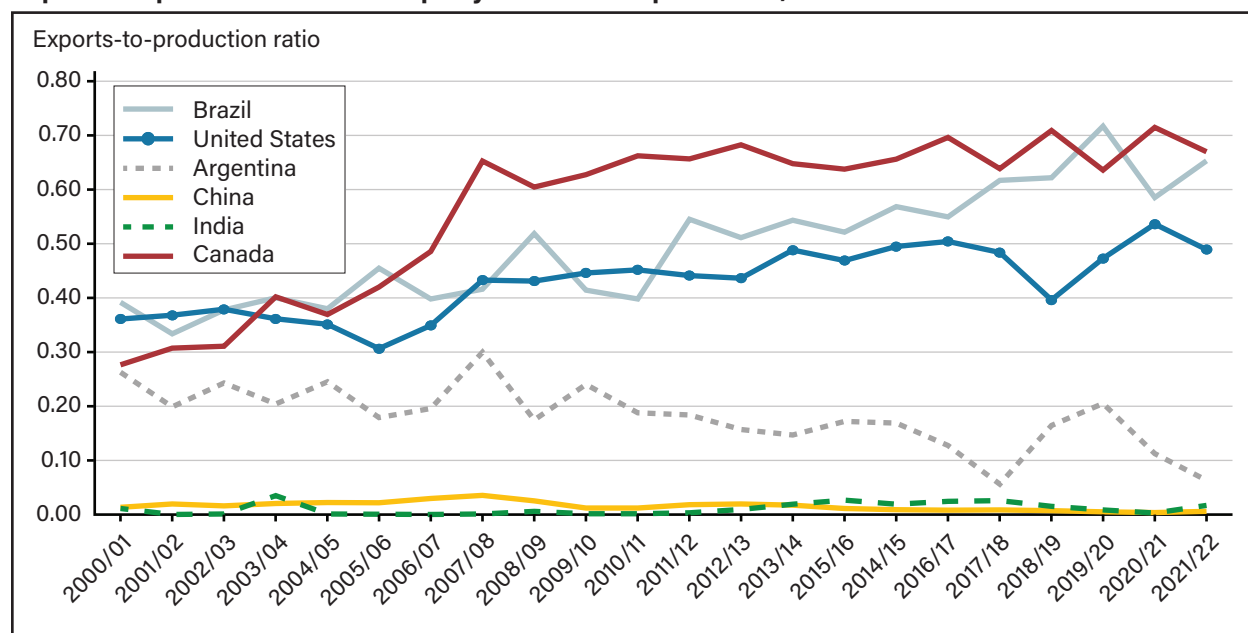
CY = calendar year.

Source: USDA, Economic Research Service using Trade Data Monitor data.

Figure 13 shows the soybean exports-to-production ratio, or export propensity, for the United States and other top soybean oilseed producers. From 2000 to 2021, the United States remained both a major exporter and producer of soybean oilseed while increasing its average export propensity from around 0.49 to 0.60. Meanwhile, Brazil has produced soybeans mainly for export, with ratios ranging from 0.40 to 0.72 and trending upward in the last decade. Conversely, Argentina’s soybean export propensity has trended downward since MY 2007/2008. This can be attributed to Argentina processing soybean oilseed into soybean meal and oil. Both China and India have been large producers of soybean oilseed in terms of volume but largely have used their production to support domestic livestock industries. China has exported relatively little, less than 20 percent of production.

Figure 13

**Exports-to-production ratio of top soybean oilseed producers, MYs 2000/2001-2021/2022**



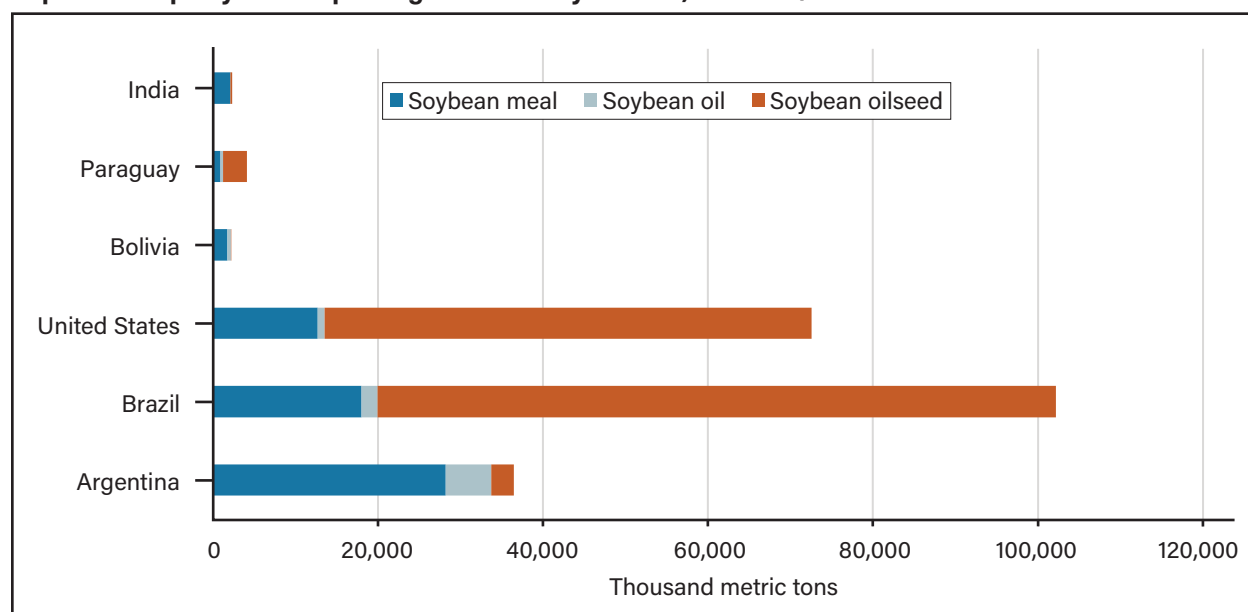
MYs = marketing years.

Note: All MYs are local marketing years and differ by country and by commodity. The local MY for each commodity can be found in USDA, Foreign Agricultural Service's Production, Supply and Distribution database, data availability section. Production is given by volume of soybeans harvested; exports include volumes of unprocessed soybeans.

Source: USDA, Economic Research Service using data from USDA, Foreign Agricultural Service, Production, Supply and Distribution database.

Processed soybeans generally yield around 78–80 percent meal and 18 percent oil, with a small amount of residual. Aggregated trade in soybeans has masked some major differences in processing between producers and figures that have included only trade in unprocessed beans omit part of the market for soy intermediate products. Although over 80 percent of Brazilian soy exports are raw soybeans, Argentina has exported more than 70 percent of its product as soybean meal and 13 percent as oil after crushing and processing most of its yield domestically. With global prices for soybean oil around twice the prices for raw beans or meal, this discrepancy has raised the value of exports relative to volume. Figure 14 shows the breakdown of exports from the top exporting countries.

Figure 14

**Exports in top soybean exporting countries by volume, MY 2021/2022**

MY = marketing year.

Note: All MYs are local marketing years and differ by country and by commodity. The local MY for each commodity can be found in USDA, Foreign Agricultural Service's Production, Supply and Distribution database, data availability section.

Source: USDA, Economic Research Service using data from USDA, Foreign Agricultural Service, Production, Supply and Distribution database.

Until 2018, the Chinese Government imposed relatively low tariff levels on soybean oilseed imports of just 3 percent, which encouraged imports of unprocessed soybeans over imports of intermediate, processed products such as soybean meal and oil (Gale et al., 2019). In addition, import growth has been fueled by excess capacity within China's crushing sector, where hundreds of firms have competed to capture market share and now face low profit margins and unused processing capacity (Gale et al., 2019).

In 2018, China imposed retaliatory tariffs on nearly all U.S. agricultural products. The trade dispute was projected to have the greatest impact on soybean oilseed due to the high concentration of trade among both exporters and importers. Chinese imports shifted heavily to Brazil and other producers, while the United States increased exports to Europe, Southeast Asia, and other regions to make up the difference. The average price for U.S. soybean exports to China fell from \$385 per ton in 2017 to \$354 in 2019. As previously discussed, U.S. exports to China improved in 2020 because of the Phase One agreement.

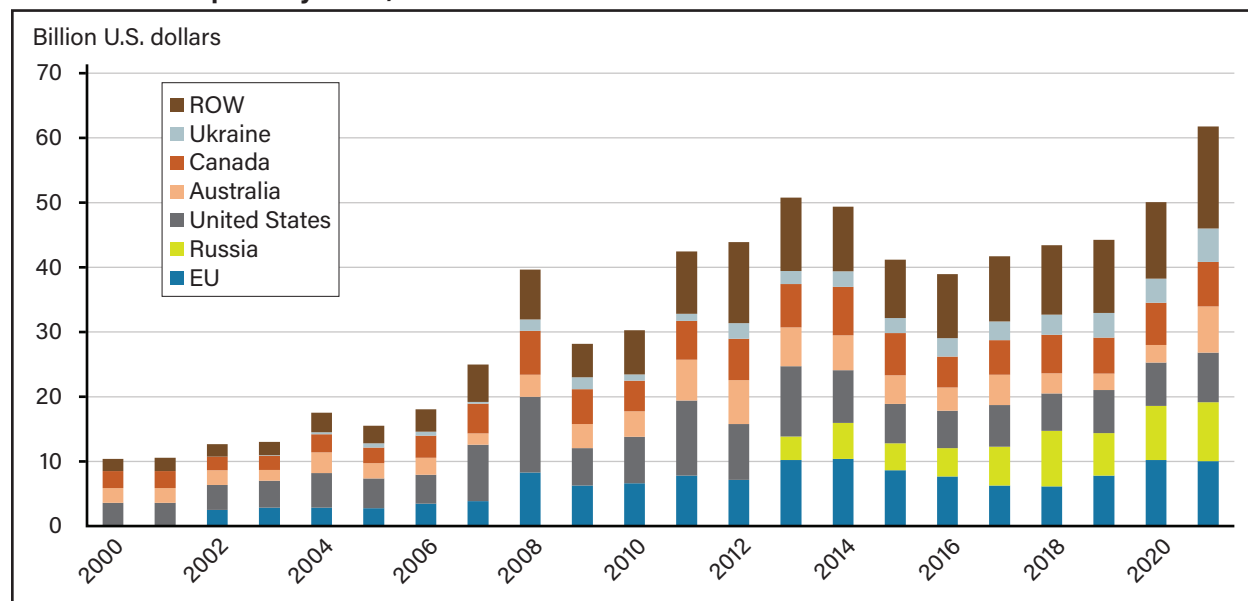
## Wheat and Intermediate Products

The value of global wheat<sup>8</sup> exports has fluctuated over the last 20 years, partly because of economic events and trade policies—e.g., export taxes and restrictions—that affected wheat prices (figure 15). From 2004 to 2006, the U.S. wheat price started to increase steadily following a long-term decline in the inflation-adjusted price. Wheat prices began to rise further in 2007 based on tightening supplies in major exporting countries. Specifically, drought reduced Australia's wheat crop for the second year in a row (Janzen et al., 2014). High prices throughout MY 2007/2008 spurred additional planting for the MY 2008/2009 crop. When the larger crop began to be harvested in mid-2008, wheat prices began to decline. Total export value then recovered in

<sup>8</sup> Consistent with the aggregation of the USDA, Foreign Agricultural Service, PSD database, we include the following HS codes in the wheat category: 1001, 1101, 190219, 190230, 190240, and 190430. These codes include wheat, wheat flour, and wheat prepared products (pasta, bread).

2011 in part because Russia enacted a ban on wheat exports to mitigate drought-related production deficits (Janzen et al., 2014). In 2018, China imposed a 25-percent tariff on U.S. wheat, and U.S. wheat export value declined by 10.5 percent relative to 2017. Morgan et al. (2022) found that China’s retaliatory tariffs on U.S. wheat imports resulted in annualized losses of \$308 million from mid-2018 through 2019.

Figure 15  
**Global wheat exports by value, CYs 2000–2021**



CYs = calendar years; ROW = rest of world; EU = European Union.

Note: The European Union comprises 27 countries; The United Kingdom is not included in these calculations; There are missing data from Russia and Turkey prior to 2013; Consistent with the aggregation of the USDA, Foreign Agricultural Service, Production, Supply and Distribution database, we include the following Harmonized System (HS) codes in the wheat category: 1001, 1101, 190219, 190230, 190240, and 190430. These codes include wheat, wheat flour, and wheat prepared products (pasta, bread).

Source: USDA, Economic Research Service using Trade Data Monitor data.

The six largest wheat exporters by value are Australia, Canada, the EU, Russia, Ukraine, and the United States. In 2021, wheat exports from these countries accounted for more than 70 percent of all exported wheat (figure 15).

The United States’ current standing within this market has evolved, with its share of global wheat exports having decreased over time. In 2000, 40 percent of global wheat exports by value originated from the United States, and by 2021, this share declined to 12.4 percent. In 2014, the EU surpassed the United States as the top wheat exporter, with 21 percent of the global market share (TDM, 2021). The reduced export share was—in part—the result of downward trends in the area of wheat planted and production in the United States since the 1980s (USDA, ERS, 2021b). This declining production is attributed to a variety of factors, including increased foreign competition that has decreased wheat farmers’ returns, a policy that allows for more flexible crop choices, and improved production of corn and soybeans due to greater genetic and technological advancements relative to wheat (USDA, ERS, 2021b).

Competition from the EU, Russia, and Ukraine has contributed to the decline in U.S. wheat exports, even as wheat demand has steadily increased in developing countries where populations are increasing. Some regions with the highest growth in wheat consumption and imports have included South and Southeast Asia (Indonesia—one of the world’s largest wheat importers—Thailand, Vietnam, and Bangladesh); Sub-Saharan Africa (Nigeria, Kenya, and Tanzania); and North Africa (Egypt and Algeria). Several of these countries



represent new and growing export destinations, while others—such as Egypt and Nigeria—have continued increasing their already well-established demand for imports over the last decade. Many of these markets have relied primarily on Russia and Ukraine for lower-cost wheat of varying quality levels (Liefert and Nulph, 2018). These top exporters have high production capacity and have seen their export volumes rise significantly (Liefert, 2010). Liefert and Nulph (2018) found the average volume of wheat exports from Russia and the EU almost doubled from the period 2005–2009 to 2014–2016. Exports from Ukraine rose by more than 150 percent during that same period.

The most dramatic change in export shares occurred with Egypt, the largest importer of wheat in the world. In 2000, the United States was the major source of wheat for Egypt, and by 2020, U.S. exports to Egypt fell to less than 1 percent of Egypt’s total wheat imports. In 2021, Egypt primarily imported wheat from Russia (48 percent) and Ukraine (28 percent) (TDM, 2022).

To better understand the export flows from the United States over the last 20 years, the authors looked at the destinations of U.S. wheat exports over four periods (table 7). Between 2000 and 2005, the United States’ largest wheat exports, by value, were Japan (11.7 percent), Mexico (8.8 percent), Egypt (8.9 percent), and Nigeria (6.9 percent). Wheat exports to Mexico, the Philippines, and Japan continued to increase, becoming the top three markets for U.S. wheat in terms of export value from 2018–2021. The average share of wheat exports to Nigeria increased from 2006 to 2011 but have trended downward since.

Table 7  
Average export shares of U.S. wheat by country, CYs 2000–2021

Country/region	Time period with average export share by percent			
	2000–2005	2006–2011	2012–2017	2018–2021
Mexico	8.8	8.8	12.1	14.5
Philippines	5.9	5.8	8.1	11.4
Japan	11.7	12.4	11.6	10.4
South Korea	4.7	4.3	5.1	5.7
Nigeria	6.9	9.9	7.9	5.4
China	2.3	0.7	4.8	5.3
Taiwan	3.9	3.5	4.3	4.5
Canada	2.6	3.0	3.6	3.9
Indonesia	1.1	2.3	2.9	3.1
European Union	5.4	3.2	3.0	2.9
Egypt	8.9	5.7	1.9	1.2
Venezuela	2.4	2.8	2.0	1.1
Brazil	0.8	1.1	4.8	1.3
ROW	34.6	36.5	28.0	29.4
U.S. average wheat export value (billion U.S dollars)	\$4.2	\$8.2	\$7.7	\$6.7

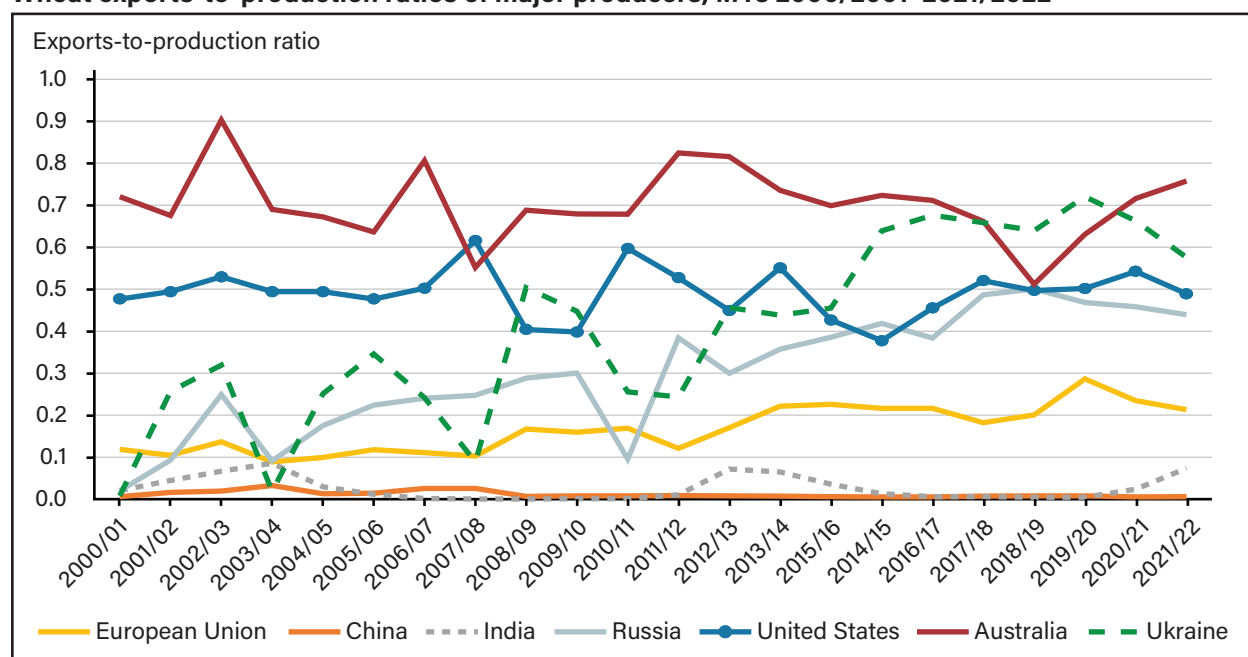
CYs = calendar years; ROW = rest of the world.

Source: USDA, Economic Research Service using Trade Data Monitor data.

China has also become a destination for U.S. wheat exports in recent years, even as China has remained a strong wheat producer. The demand for high-quality wheat and wheat with different gluten content positions China as an important export market—just between 2019 and 2020, China’s total wheat imports doubled. The opportunity for U.S. wheat in China could further increase with the World Trade Organization (WTO) ruling that China’s administration of wheat, rice, and corn TRQs were inconsistent with its WTO obligations of transparency and fairness (Gale, 2021) and with the adoption of the 2020 Phase One U.S-China trade agreement.

Exploring the propensity to export among the largest wheat producers, the authors found the EU, Russia, and Ukraine had wheat export propensity ratios trending upward in the last 10 years. Ukraine had the highest growth, with an exports-to-production ratio increasing from 0.24 in MY 2010/2011 to 0.72 in MY 2019/2020 (figure 16). Prior to MY 2011/2012, Ukraine’s export propensity ratio was more unpredictable, fluctuating between 0 and 0.5. This was partly due to the volatile political climate in the country (Janzen et al., 2014; Liefert et al., 2010).

Figure 16  
**Wheat exports-to-production ratios of major producers, MYs 2000/2001–2021/2022**



MYs = marketing years.

Note: All MYs are local marketing years and differ by country and by commodity. The local MY for each commodity can be found in USDA, Foreign Agricultural Service’s Production, Supply and Distribution database, data availability section.

Source: USDA, Economic Research Service using data from the USDA, Foreign Agricultural Service, Production, Supply and Distribution database.

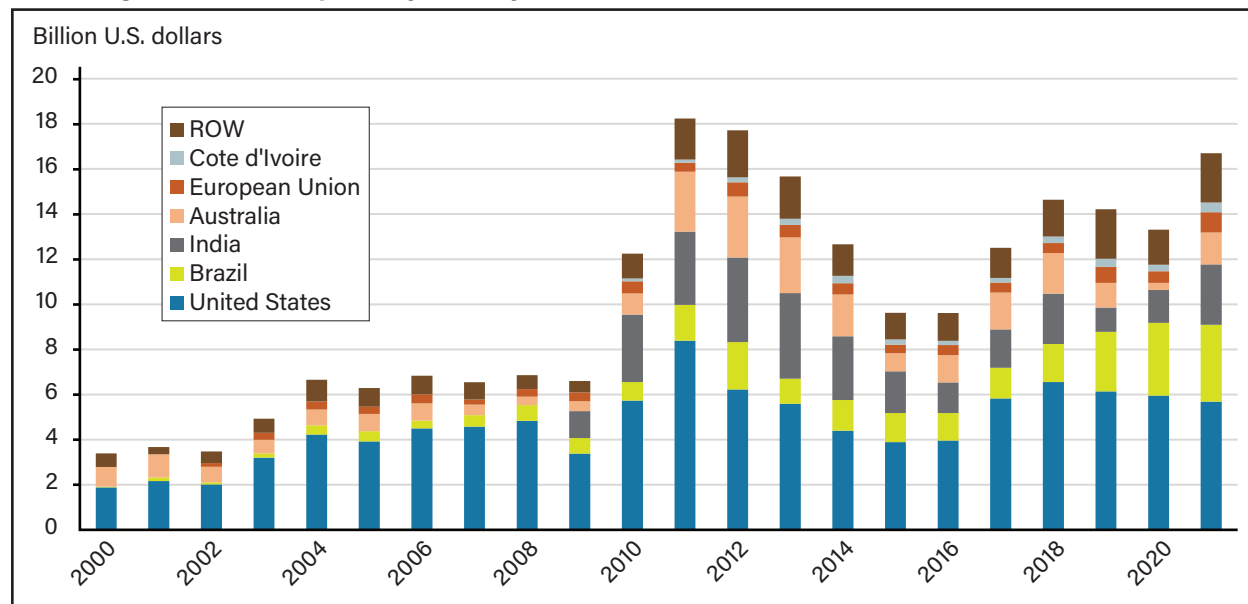
Australia had the highest export propensity in 2021 with a ratio of 0.76. This figure has fluctuated between 0.5 and 0.9 over the last two decades; in 2007, Australia’s export propensity declined because of a severe drought that damaged entire wheat plantings in several regions.

Exports-to-production ratios for the United States were fairly stable from MY 2000/2001 to MY 2006/2007, increasing from 2006/2007 to 2007/2008 and then sharply declining in 2008/2009 to 0.40. From 2010 to 2015, the United States’ propensity to export trended downward, reaching a low of 0.37 in 2015 in part due to U.S. wheat exports declining to 21.2 million metric tons. More recently, the U.S. propensity to export wheat slightly declined from 0.54 in 2020 to 0.49 in 2021.

## Cotton

Cotton<sup>9</sup> has remained an important export commodity used in finished products such as textiles and clothing. Global cotton production and consumption generally trended upward with increasing populations and economic growth. However, production and exports showed sharp declines partly due to large stockpiles and decreasing import demand from China (USDA, ERS, 2021a). Figure 17 shows that the values of global cotton exports fluctuated greatly between 2010 and 2020. The recent decline in global exports in 2020 is partly due to decreased mill demand for cotton during the COVID-19 pandemic, which temporarily shuttered textile spinning facilities around the globe (Meyer, 2021). Cotton export values globally improved in 2021.

Figure 17  
**Value of global cotton exports by country, CYs 2000–2021**



CYs = calendar years; ROW = rest of the world.

Note: Cotton in the context of this report only includes raw cotton, specifically, the Harmonized System (HS) code 5201 (cotton, not carded or combed).

Source: USDA, Economic Research Service using Trade Data Monitor data.

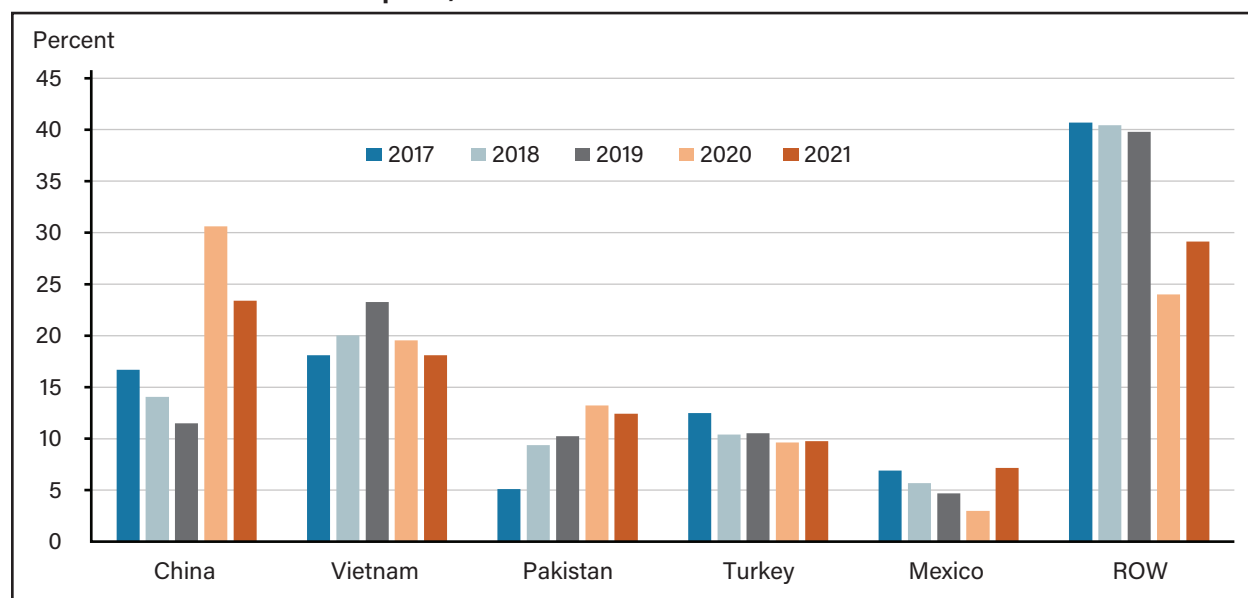
Cotton remains one of the United States' major agricultural exports in terms of value. As of 2021, the United States has remained the leader in global cotton exports, accounting for 30 percent of the market share, with exports valued at almost \$6 billion (figure 17). However, over the last 20 years, the U.S. market share declined as other exporters joined the global cotton market. In 2009, Brazil and India captured 10 and 18 percent of cotton exports in terms of value, respectively. Since then, Brazil has captured an increasing share of the market. In 2021, Brazil accounted for 20 percent of global cotton exports, while the United States and India captured 34 and 16 percent, respectively.<sup>10</sup> Brazil is the strongest U.S. competitor as both countries export large quantities of high-quality, machine-picked cotton (Muhammad et al., 2019). Cotton production in Brazil increased from 2.5 million acres per year in MY 2013/2014 to nearly 4 million acres in MY 2019/2020. This sharp increase has been partly caused by improved domestic prices relative to corn and soybeans (Muhammad et al., 2019).

<sup>9</sup> Consistent with the aggregation of the USDA, Foreign Agricultural Service, PSD database, we included the following HS codes in the cotton category: 5201 (cotton, not carded or combed).

<sup>10</sup> These market shares are calculated using export values and not export quantities. Using export values, we can incorporate the effect of prices in yearly trends.

In 2021, the United States primarily exported cotton to China (23 percent), Vietnam (18 percent), Pakistan (12 percent), and Turkey (10 percent). These countries were the top four markets for U.S. cotton exports—in terms of value—from 2017 to 2021 (figure 18). Cotton export value to China more than doubled between 2019 and 2020, with many of the exports destined for China’s State Reserve (SR). The decline in exports to China from 2018 to 2019 was partly due to retaliatory tariffs. In August 2018, China imposed an 894,000-ton quota at 1 percent and a 25-percent retaliatory tariff on U.S. cotton on top of an existing 40 percent out-of-quota tariff (Muhammad et al., 2019; Robledo, 2020). Over the last decade, fluctuations in cotton exports were partly affected by China’s import demand and replenishment of the country’s state reserve stocks.

Figure 18  
**Destinations of U.S. cotton exports, CYs 2017–2021**



CYs = calendar years; ROW = rest of the world.

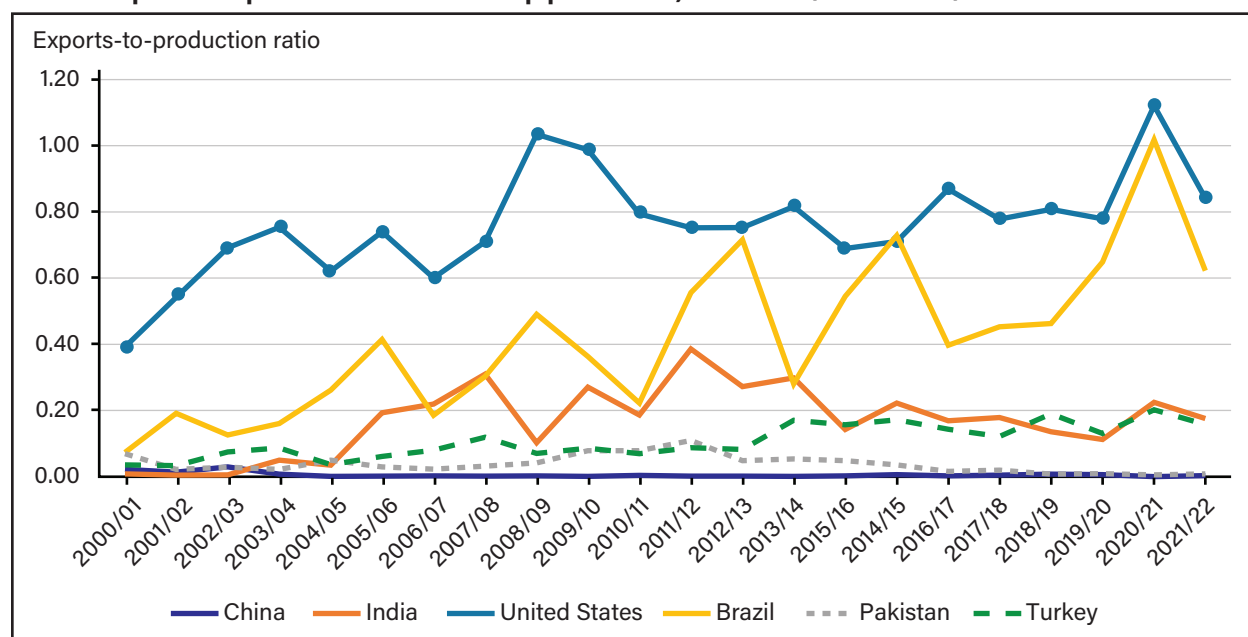
Source: USDA, Economic Research Service using data from Trade Data Monitor.

Figure 19 depicts the export propensity ratio of the largest cotton producers. The United States and Brazil held the highest export propensity ratios from MY 2020/2021. Cotton exports in both countries were lower in MY 2021/2022 relative to MY 2020/2021, which can explain the decline in export propensity.

In some years, these ratios were above 1 because countries held cotton stocks that were later exported, exceeding production for the year. The United States had two marketing years—MYs 2008/2009 and 2020/2021—with an export propensity ratio higher than 1. Despite being in the top six cotton-producing countries, China and Pakistan have had low export propensity. These countries primarily use cotton production to support their domestic textile industries.

Figure 19

**Cotton exports-to-production ratios of top producers, MYs 2000/2001–2021/2022**



MYs = marketing years.

Note: All MYs are local marketing years and differ by country and by commodity. The local MY for each commodity can be found in USDA, Foreign Agricultural Service's Production, Supply and Distribution database, data availability section.

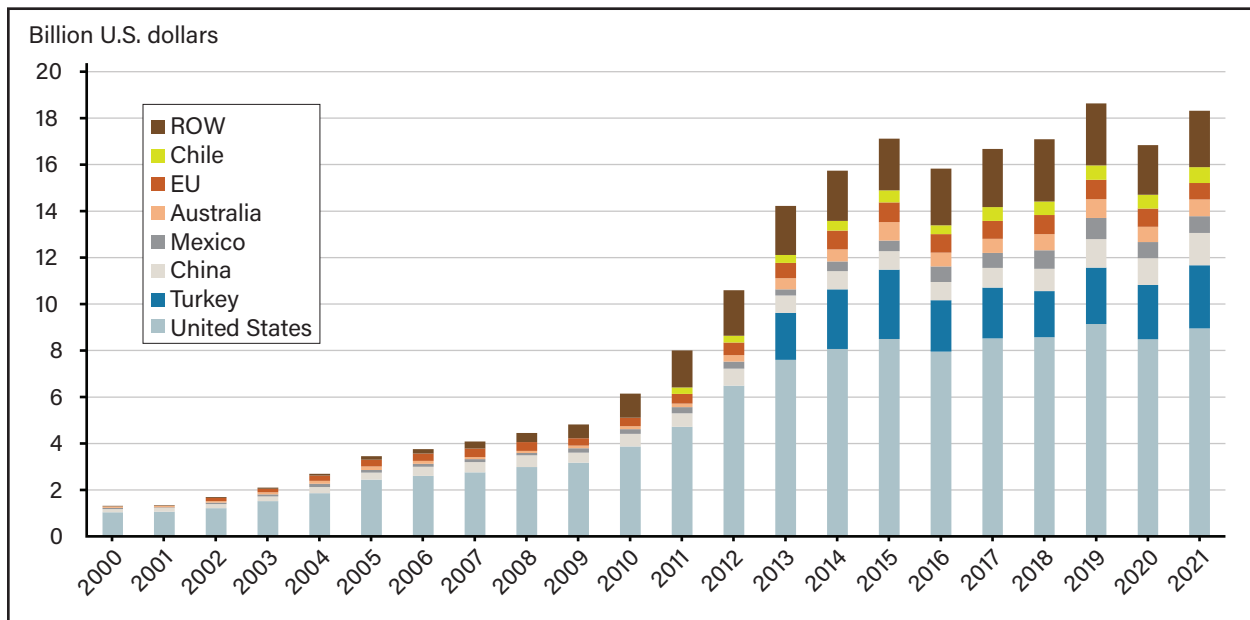
Source: USDA, Economic Research Service using data from the USDA, Foreign Agricultural Service, Production, Supply and Distribution database.

### Tree Nuts: Almonds, Pistachios, and Walnuts

Since 2000, global trade in tree nuts<sup>11</sup> has more than quadrupled in volume and increased by more than 11 times in value—primarily led by almonds but also including pistachios, walnuts, hazelnuts, pecans, and other nuts (excluding cashews, coconuts, and other tropical crops). The growth of major Asian economies, shifting consumer preferences, opening of trade relationships, and producers' corresponding investments in orchard expansion have helped fuel this growth. The United States has remained the largest producer and exporter of tree nuts, with an advantage in several types of nuts. In 2021, U.S. tree nut exports totaled \$8.95 billion, followed by Turkey and China with exports valued at \$2.7 billion and \$1.3 billion, respectively (figure 20).

<sup>11</sup> HS codes for tree nuts include almonds, fresh or dried, in shell (080211); almonds, fresh or dried, shelled (080212); pistachios, fresh or dried, in shell (080251); pistachios, fresh or dried, shelled (080252); walnuts, fresh or dried, in shell (080231); walnuts, fresh or dried, shelled (080232); nuts (other than peanuts [ground-nuts]), and other seeds, including mixtures, prepared or preserved, not elsewhere specified or indicated (nesoi) (200819); nuts, nesoi, fresh or dried, whether or not shelled (080290); hazelnuts or filberts, fresh or dried, in shell (080221); hazelnuts or filberts, fresh or dried, shelled (080222); macadamia nuts, fresh or dried, in shell (080261); macadamia nuts, fresh or dried, shelled (080262); chestnuts, fresh or dried, in shell (080241); chestnuts, fresh or dried, shelled (080242).

Figure 20  
**Value of global tree nut exports, CYs 2000–2021**



CYs = calendar years; ROW = rest of the world; EU = European Union.

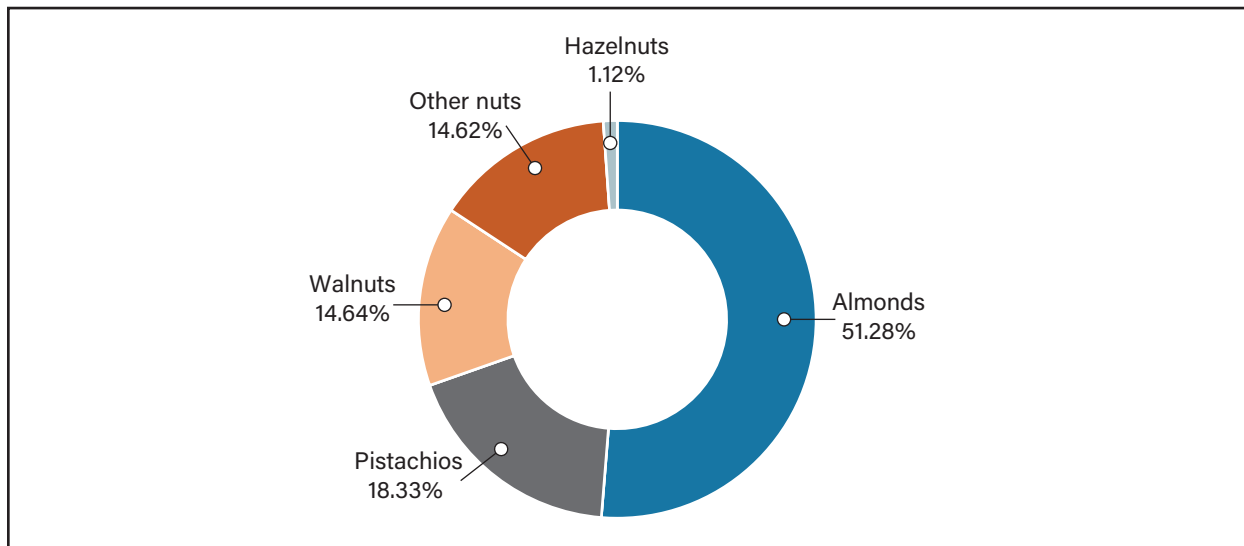
Note: The Harmonized System (HS) codes for tree nuts include almonds, fresh or dried, in shell (080211); almonds, fresh or dried, shelled (080212); pistachios, fresh or dried, in shell (080251); pistachios, fresh or dried, shelled (080252); walnuts, fresh or dried, in shell (080231); walnuts, fresh or dried, shelled (080232); nuts (other than peanuts [ground-nuts]), and other seeds, including mixtures, prepared or preserved, not elsewhere specified or indicated (nesoi) (200819); nuts, nesoi, fresh or dried, whether or not shelled (080290); hazelnuts or filberts, fresh or dried, in shell (080221); hazelnuts or filberts, fresh or dried, shelled (080222); macadamia nuts, fresh or dried, in shell (080261); macadamia nuts, fresh or dried, shelled (080262); chestnuts, fresh or dried, in shell (080241); chestnuts, fresh or dried, shelled (080242).

Source: USDA, Economic Research Service using Trade Data Monitor data.

The United States has exported almonds and pistachios primarily. Figure 21 shows a breakdown of the 5-year average of U.S. exports by type of nut, totaling nearly \$43.6 billion over the past 5 years.

Figure 21

**Five-year average percentage of U.S. tree nut exports by type, CYs 2017–2021**



CYs = calendar years.

Note: The Harmonized System (HS) codes for this figure include almonds (080211, 080212), pistachios (080251, 080252), walnuts (080232, 080231), and hazelnuts (080221, 080222). "Other nuts" include the HS codes for macadamia nuts (080261, 080262), chestnuts (080241, 080242), and other nuts and mixtures not elsewhere specified or indicated (200819, 080290).

Source: USDA, Economic Research Service using Trade Data Monitor data.

More than any other tree nut, almonds have propelled the growth in U.S. tree nut exports since 2000. New nutritional information revealed the health benefits of nuts—including almonds—and plant proteins, in contrast to earlier concerns over saturated fats (Swegal, 2017). From an average of just 0.25 pounds per person in the 1970s, domestic almond consumption reached 2 pounds per person by 2012.

This surge in almond demand caused significant price increases, from \$1.28 per pound in 2000 to over \$4 per pound by 2015. Producers responded by expanding orchards and planting millions of new almond trees on at least 20,000 new acres annually between 2007 and 2016 (Swegal, 2017). California almond acreage grew from 640,000 in 2007 to 940,000 in 2016. By 2016, however, other factors halted the almond production expansion. Periodic droughts throughout California threatened new and existing orchards, as well as the continued availability of affordable irrigation water for a notoriously thirsty crop (Elkin 2021).

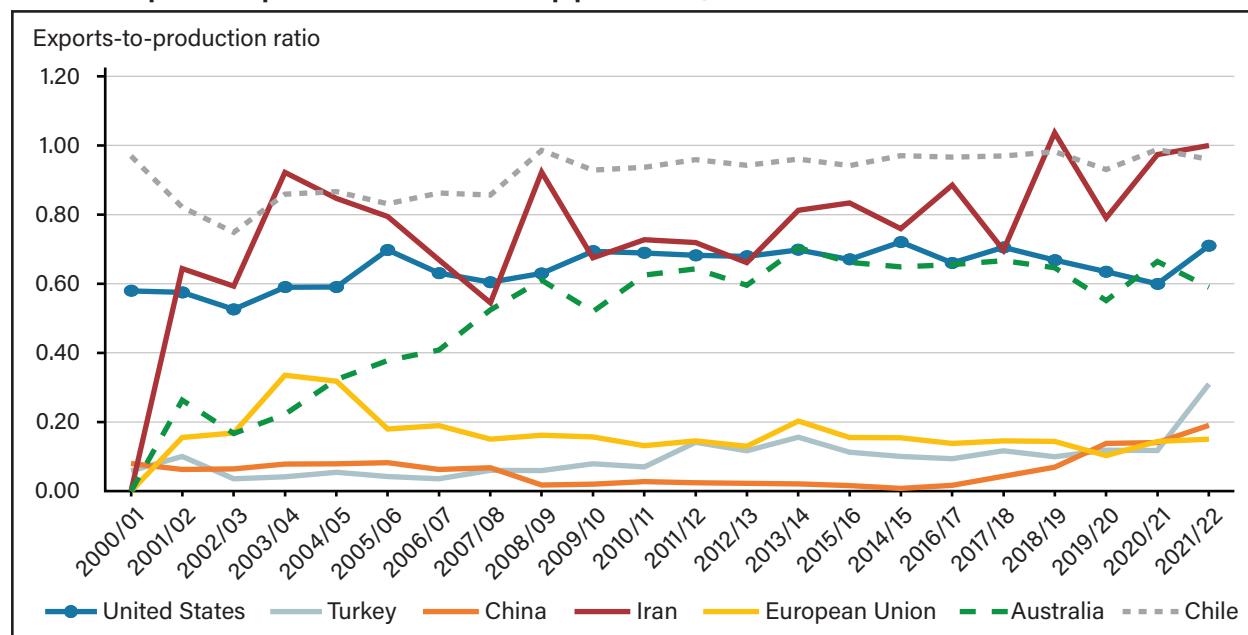
Since MY 2015/2016, the United States has surpassed other leading producers in both pistachio yields and exports. The U.S. share of global pistachio exports averaged 76 percent between 2017 and 2021—in terms of value—with China and the EU being the largest export markets (TDM, 2022). In 2020, the United States supplied 73 percent of the \$962 million in pistachio imports to the EU but just 40 percent of China’s \$659 million in imports, where U.S. pistachios were assessed an additional 15-percent Section 232 tariff and a 30-percent Section 301 tariff (Halstead, 2021).<sup>12</sup> Despite the trade dispute with China in 2018, direct U.S. pistachio exports to China rose approximately 5 percent between 2019 and 2020, while Iran’s production suffered due to a severe frost.

<sup>12</sup> As of 2022, importers can apply for exclusion from the Section 301 tariffs applied to shipments from the United States, but the Section 232 tariff still applies (Halstead, 2022).

In the context of export propensity, rising yields in the United States outpaced growth in consumption during the 2000s, with exports increasing from 60 percent in MY 2020/2021 to 70 percent in MY 2021/2022. Iran—a major pistachio producer—has maintained an even more export-oriented sector, exporting close to 100 percent of production in MY 2021/2022. Chile has emerged as a major exporter of walnuts; meanwhile, China and the EU have maintained low export propensity ratios due to high domestic consumption (figure 22).

Figure 22

**Tree nut exports-to-production ratios for top producers, MYs 2000/2001–2021/2022**



MYs = marketing years.

Note: All MYs are local marketing years and differ by country and by commodity. The local marketing year for each commodity can be found in USDA, Foreign Agricultural Service's Production, Supply and Distribution (PSD) database, data availability section. "Tree Nuts" is a grouping of the PSD product categories of almonds, pistachios, and walnuts.

Source: USDA, Economic Research Service using USDA, Foreign Agricultural Service, Production, Supply and Distribution data.

Despite other countries having a larger propensity to export, the United States has remained the top exporter of tree nuts because of the volume of production as well as increased demand in key export markets. However, tree nut production can be highly sensitive to weather disruptions (Jin et al., 2020) and aflatoxin contamination—both of which have led to disturbances in U.S. exports.

## Conclusion

This report identifies how the U.S. position in global markets for five commodity groups (corn, soybeans and derivative products, wheat and wheat products, cotton, and tree nuts) evolved over a 20-year period with changes in major export competitors, world events, and the establishment of new trade agreements. This report analyzes the top five U.S. export crops by commodity using a trade-cum-production index and export shares.

The United States continues to be the top exporter of corn, tree nuts, and cotton, while other competitors have penetrated the global soybean and wheat markets. Through trade agreements, the United States increased its competitiveness in South and Central America. For example, imports of U.S. corn have made up



the largest share in several countries with a U.S. trade agreement in place, including—but not limited to—Mexico, Peru, Colombia, and Panama.

Since 2000, soybean production in Brazil and Argentina has expanded even more rapidly to meet growing global demand, and U.S. dependence on China as a key soybean export market made the success of U.S. soybean exports somewhat contingent on China's trade policies. In 2018, retaliatory tariffs primarily affected U.S. soybean producers, and the decline in soybean exports accounted for 71 percent of U.S. export losses.

The United States remains a strong participant in the wheat export market; however, its dominance on the global stage in the early 2000s disappeared. The United States continued to both lose market share in major import markets and capture new markets, particularly in regions with growing wheat consumption and limited production capacity. The growing strength of Ukrainian and Russian wheat exports also weakened the U.S. position as the top wheat exporter.

Although the United States is competitive in crop exports—holding a top exporter position in the majority of commodities discussed in this report—some challenges to U.S. competitiveness exist; for example, the lack of FTAs and other trade agreements from mid-2012 to 2020 while other competitors engaged in FTAs to acquire preferential access to markets. Some of these challenges are domestic as well—such as the danger of erratic weather patterns to the production of tree nuts—a major export crop for the United States.

This report raises several important areas for future research to better understand U.S. agricultural export competitiveness. First, although this report highlighted increased FTA activity among U.S. competitors, future research could examine how these other agreements may affect long-run access of U.S. producers to those foreign markets. Additionally, future research could simulate how U.S. agricultural exports may change if new FTAs were to be established. This is especially important because each FTA is unique in terms of the preferential market access provided, which can ultimately affect the volume and value of realized trade.

Second, future research may be able to better identify the short- and long-run effects of various macroeconomic and trade policy shocks on U.S. export competitiveness. For example, U.S. exports to China declined for many agricultural commodities due to retaliatory tariffs imposed in 2018; however, little is known about how the duration of this trade dispute may affect U.S. exports moving forward. Similarly, market disruptions due to weather, disease, or geopolitical conflict may alter the trajectory of export competitiveness even as the initial disruption is resolved. Future research may focus on the dynamics of changes in competitiveness.

Third, this report highlights the importance of continued research into the measurement and analysis of trade competitiveness. This report uses two measures—including the exports-to-production ratio and export shares—to measure competitiveness. Future research may want to integrate different measures of export and production values with preferential access through trade agreements to better facilitate cross-national comparisons of competitiveness. Additionally, new measures might be developed that consider domestic sales, consumption, and cost of production.

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