

CHAPTER 15. INTERNATIONAL TRADE AND CALIFORNIA AGRICULTURE

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ABSTRACT

A large share of California's agricultural supply chain is devoted to international trade. On average, more than 44 percent of California's agricultural output is sold into over 60 foreign markets, making California agriculture more orientated towards export markets, compared to other major agricultural producing states in the United States. This means that California agriculture has a big stake in more liberalized agricultural trade, unlike some other regions in U.S. agriculture. The dynamics of the world market have encouraged California agriculture to be highly competitive and innovative. It has achieved these characteristics by exporting fruits, vegetables, tree nuts, and dairy products.

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California agriculture has had an increased dependence on international trade. International exports as a share of California agricultural output rose from 25.2 percent in 2000 to 43 percent in 2015. As of 2017, leading export destinations for California agricultural commodities included the European Union (\$3.415 billion), Canada (\$3.287 billion), China and Hong Kong (\$2.27 billion), Japan (\$1.452 billion), Mexico (\$1.057 billion), South Korea (\$1.011 billion), and Taiwan (\$305 million).

Photo Credit: Heidi Schweizer, UC Davis, 2017

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INTRODUCTION

This chapter summarizes the importance of international trade for California's agricultural sector. It outlines the trade dimensions, trade environment, challenges, and prospects for the continued role of international trade as a driver of California agriculture. We briefly discuss what it means for California agriculture to be "competitive" in an increasingly globalized marketplace. We review the importance of the state's key agricultural trading partners, including the role of China as both a market and a competitor. Foreign markets are growing in importance for California agriculture, and increased trade liberalization will be beneficial to most California producers since they competitively supply high-valued specialty products, despite facing some important and, in some cases, growing barriers to trade in important foreign markets.¹ The main section of this chapter describes California's agricultural trade up until 2017, before the beginning of the U.S.-China trade war.² Because China's retaliatory import tariffs were somewhat targeted at agricultural trade, there is a section towards the end of the chapter that addresses the implications of the trade war for California's agriculture.

Historically, the major crops in California (i.e., fruits, vegetables, and tree nuts) have not benefitted from federal farm subsidy programs and other forms of protectionism provided by U.S. Congress to the main program commodities (such as grains, oilseeds, cotton, sugar, and milk). Therefore, we argue that California agriculture would benefit from reduced subsidies to midwestern U.S. agriculture and concomitant increased access to markets abroad. Thus, to the extent that the political fallout from the protectionist 2014 and 2018 U.S. Farm Bill results in a less ambitious World Trade Organization (WTO) agreement, this is costly for the California agricultural sector. The 2017 U.S. withdrawal from the Trans-Pacific

Partnership (TPP)—with 11 trading nations in the Pacific Region—has also hurt California agriculture, especially regarding more access to the Japanese market. It goes without saying that the U.S.-China trade war was detrimental to California agriculture. The North American Free Trade Agreement (NAFTA)—now called the Canada-U.S.-Mexico Agreement (CUSMA)—was renewed in 2020, which is a good thing for California agriculture because a withdrawal from that agreement would have been costly like the withdrawal from TPP was.

Globalization describes the phenomenon of greater integration of international markets, including more cross-border movement of goods, services, and factors of production (such as capital, technology, and labor). Classical economic theory predicts benefits to economies as a whole from the integration of markets. The benefits arise because factors of production like land, labor, and capital will be allocated more efficiently across international borders, and consumers will have access to a wider variety of products at a lower price. Put another way, trade allows a region to shift its pattern of production so that it can produce more with the same endowment of resources—just like technological change, which allows a country to do more with less. Historical examples bear out economists' predictions; production for international markets rather than the domestic market alone has led to rising average incomes and higher profitability for firms.

Some fear that California's agricultural future is bleak because of globalization. They even go so far as to claim that without protection, California agriculture will go out of business, because it cannot compete with developing countries. This view emphasizes that agriculture is becoming less important in the state's economy, and the lower wage rates and weak domestic regulations in developing countries means California growers' costs will be too high to compete successfully internationally.

However, neither low wage rates nor weak domestic regulations in developing countries mean an end to California agriculture. The fact that California agriculture continues to thrive despite trade barriers in foreign markets underscores the fact that California agriculture

1 Beckman et al. report that sanitary and phytosanitary trade barriers and other non-tariff barriers to trade in agricultural products are growing, with increasing international disagreement over the scientific basis for rejecting imports.

2 2018 trade statistics are available at:
www.cdfa.ca.gov/statistics/pdfs/AgExports2018-2019.pdf.
However, 2018 exports were affected by the trade war.

remains efficient and competitive.³ Productivity growth in California agriculture has been relatively high, holding costs down. California farmers reduce the unit costs of production by substituting capital and technology for land and labor. A recent analysis suggests that California agriculture productivity grew at about 1.7 percent per year from 1980–2004,⁴ faster than most of U.S. manufacturing.

Several other trends also work in favor of California agriculture. There is a continuing shift in global food demand towards high-value, differentiated products like those produced in California. For instance, the U.S. Department of Agriculture (USDA) annually projects U.S. agricultural exports; and the latest projections (2020) support the view that world demand for California agricultural products will continue to expand. The USDA projects that U.S. dairy and horticultural exports will grow by 42 and 27 percent, respectively, from 2018 to 2029. This is a significant growth rate compared to a number of other agricultural products.

Economies of scale and technological “spillovers” in California agriculture, which are not as common in other regions of the world that produce specialty crops, help to keep California’s production costs low. The state has a dependable climate, cutting-edge technology, advanced human capital, productive labor, and world-class marketing networks, institutions, and infrastructure. As a result, agricultural producers using these inputs are likely to compete successfully in an increasingly globalized marketplace. For example, the U.S. (led by California) is the largest exporter of horticultural products in the world,⁵ despite their generally labor-intensive nature. Tree nut exports to Asia have been especially strong. For instance, California almond exports were valued at \$4.5 billion in 2017, compared to only \$0.65 billion in 2000—an exceptional growth in production and export sales. In California, bearing almond orchards now cover more than 1 million acres, up from 510,000 acres in 2000.

Despite these trends, not all crop and livestock producers in California will benefit from increasing globalization. The cost of production for specific agricultural products may indeed be higher in California than in foreign countries. However, for more than one reason, this information alone gives little guidance as to the competitiveness of California’s agricultural sector. First, comparing the cost of garlic production in California to the cost of garlic production in China, for example, obscures the point that today’s garlic growers need not grow garlic tomorrow. A structural transformation within the sector, towards products that capitalize on the state’s strengths, will allow California agriculture to most effectively meet the challenges and opportunities of globalization.

Second, marketing costs, including transportation, are often a high share of total delivered costs. This makes foreign suppliers much less competitive during California’s production season for many fresh commodities. Indeed, even for many crops with a high import share, most of the imports enter off-season; the advantage of other countries is not cost, but latitude and climate. California firms can and do exploit the state’s climatic advantages by shifting fruit and vegetable production towards fresher rather than processed products. The state has also moved out of field crops towards more and more tree nuts. More generally, increased trade exposes producers to more competition; the most efficient and productive growers and firms will do the best.

3 See McCalla and Johnston for an excellent discussion of the booms and busts that California agriculture has experienced.

4 See www.ers.usda.gov/data-products/agricultural-productivity-in-the-us/.

5 Defined by three broad categories: i) vegetables, ii) fruits and nuts, and iii) processed vegetables, fruits, and nuts.

CALIFORNIA'S AGRICULTURAL TRADE

California's agricultural trade is characterized by: (1) a large and growing share of exports relative to production, (2) a diversity in exports that matches changing global food demand, (3) significant sales to rich-country markets and high-income consumers, despite trade barriers in these markets, and (4) new competition for access to these markets from Mexico, China, and other temperate-zone emerging food exporters.

Compared to agricultural commodity producers in other states, and with some notable exceptions, California agriculture competes largely on its own merits in a complex and dynamic global environment; but managing foreign competition and accessing protectionist markets remain a challenge. California agricultural producers rely on foreign markets for a significant portion of their revenues. Table 15.1 reports that the value of California agricultural exports total about \$22 billion, or about 44 percent of the value of agricultural commodities produced in California (almost \$50 billion)—based on a five-year 2012–2016 average.⁶ The second largest agricultural state

Table 15.1. Summary Statistics: Top Five Agricultural States, 2012–2016 Average

	Agricultural Production	Agricultural Exports	Export Share
State	\$ Billions		Percent
CA	49.985	22.077	44.2
IA	29.513	10.682	36.2
NE	23.287	6.637	28.5
MN	19.105	7.256	38.0
TX	22.741	6.173	27.1

Sources: Compiled from USDA/ERS data, available at: <https://www.ers.usda.gov/data-products/farm-income-and-wealth-statistics/> and <https://www.ers.usda.gov/data-products/state-export-data/>

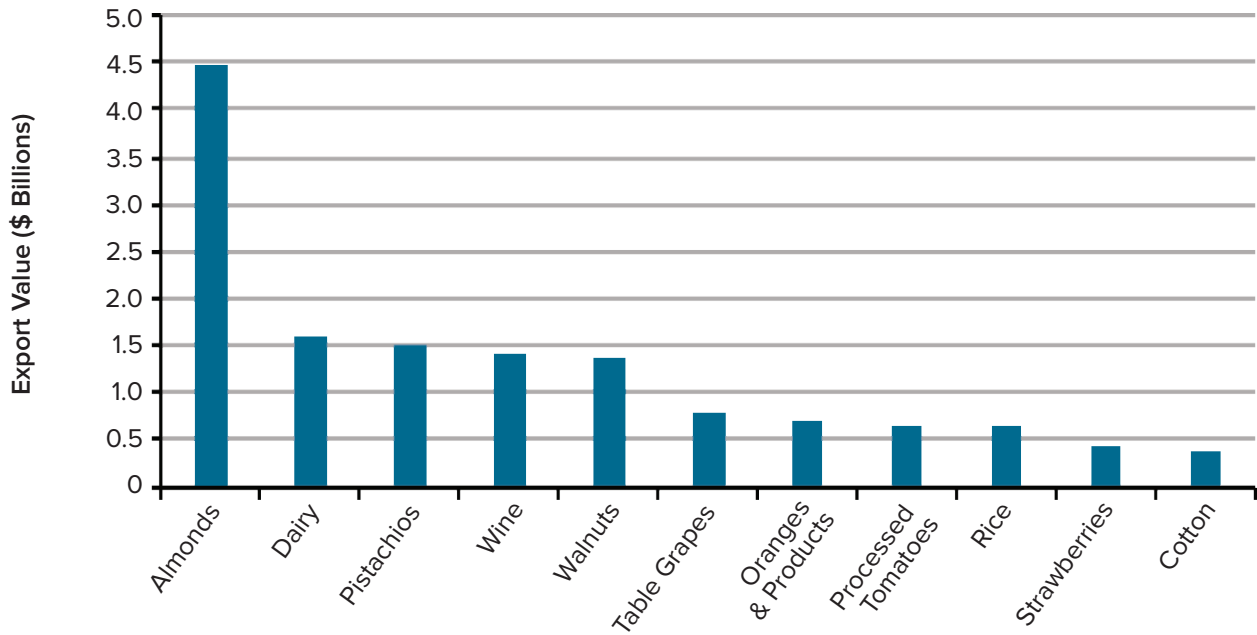
in the United States, Iowa, produces about \$29 billion in agricultural products per year and exports about 36 percent of that production to international markets. While California generates 13 percent of national farm cash receipts, it accounts for an estimated 16 percent of total U.S. agricultural export revenue.⁷ Keep in mind for some products, such as tree nuts, the share of state output that is exported ranges up to 70 percent.

California exports a wide variety of high-value, specialty food products. As shown in Figure 15.1, according to the California Department of Food and Agriculture (CDFA), the top six food product exports from California in 2017 (and for most recent years) were almonds, dairy products, walnuts, wine, pistachios, and table grapes. Tree nuts (almonds, walnuts, and pistachios) are the No. 1 agricultural product group exported by California, but the diversity of California's exports is also an important industry characteristic. The top 10 products account for less than 70 percent of California's agricultural exports by value. Even when exports are aggregated into commodity groups, the range of products exported by California is notable (Figure 15.2). According to available estimates of state-level trade statistics, fruit exports (including wine) comprise 17 percent of the state's agricultural exports, followed by tree nuts (33 percent), vegetables (13 percent), animal products (7 percent), wine (7 percent) and field crops (6 percent).

6 Data analyses in this chapter are constrained by the fact that detailed state-level trade data are very limited. For example, there are no reliable data on California's agricultural imports. Almost all trade data are collected at the national level rather than the state level. However, the California Department of Food and Agriculture (CDFA) and the U.S. Department of Agriculture (USDA) do estimate state-level export values. The USDA method uses state exports based on U.S. farm-cash-receipts data, under the assumption that California's share of U.S. exports for a particular commodity is equal to California's share of national production for that commodity. The CDFA uses a slightly different method and provides a more disaggregate breakdown of the commodities compared to the USDA data. The USDA estimates can be found at: <https://www.ers.usda.gov/data-products/state-export-data/>. The CDFA estimates (in conjunction with the UC Agricultural Issues Center) can be found at <https://www.cdfa.ca.gov/statistics/PDFs/AgExports2015-2016.pdf>. The resulting estimates of aggregate exports are quite similar from the two sources. For instance, for 2015, the CDFA estimated California's agricultural exports to be \$20.69 billion, and the USDA estimate was \$21.4 billion. Both sources estimate that the agricultural industry in California exports about 44 percent of its production, based on value. However, for some specific commodities, the export estimates are substantially different. The CDFA estimated dairy (and products) exports to be \$1.632 billion in 2015, whereas the USDA estimated California dairy product exports to be \$922.7 million in that same year. This discrepancy is not surprising because California is only one of several dairy states and it is difficult to apportion the percent of state production exported overseas. Alternatively, almost all of the U.S. almonds, pistachios, and walnuts are produced in California, so for these products, the estimated California exports are most likely very accurate. Hereafter, when we refer to CDFA export estimates, please note these estimates are published in conjunction with the University of California Agricultural Issues Center (<https://aic.ucdavis.edu/>).

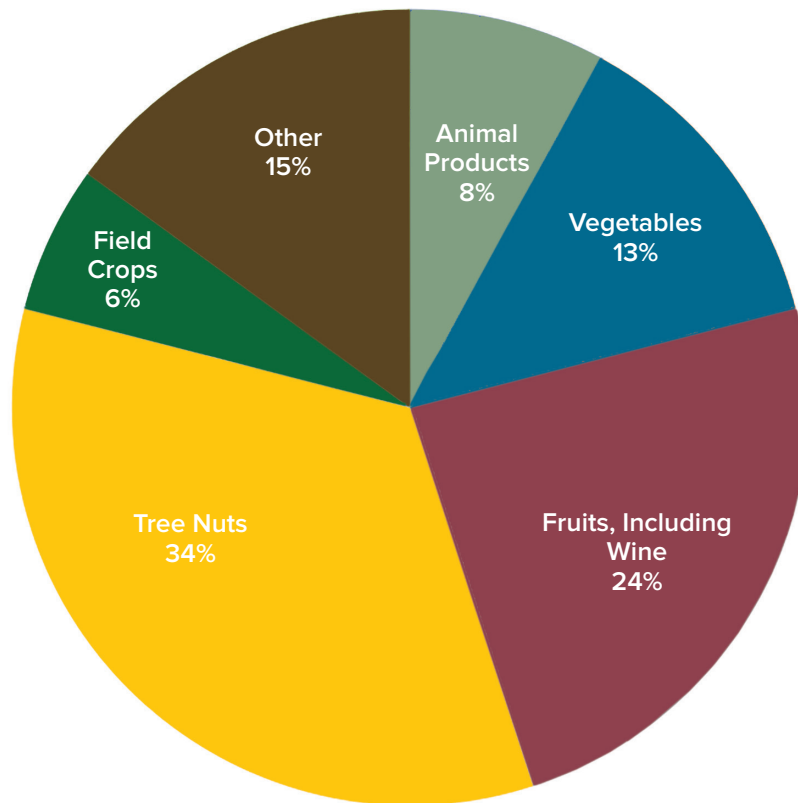
7 See www.ers.usda.gov/data-products/farm-income-and-wealth-statistics/.

Figure 15.1. California's Main Agricultural Exports, 2017

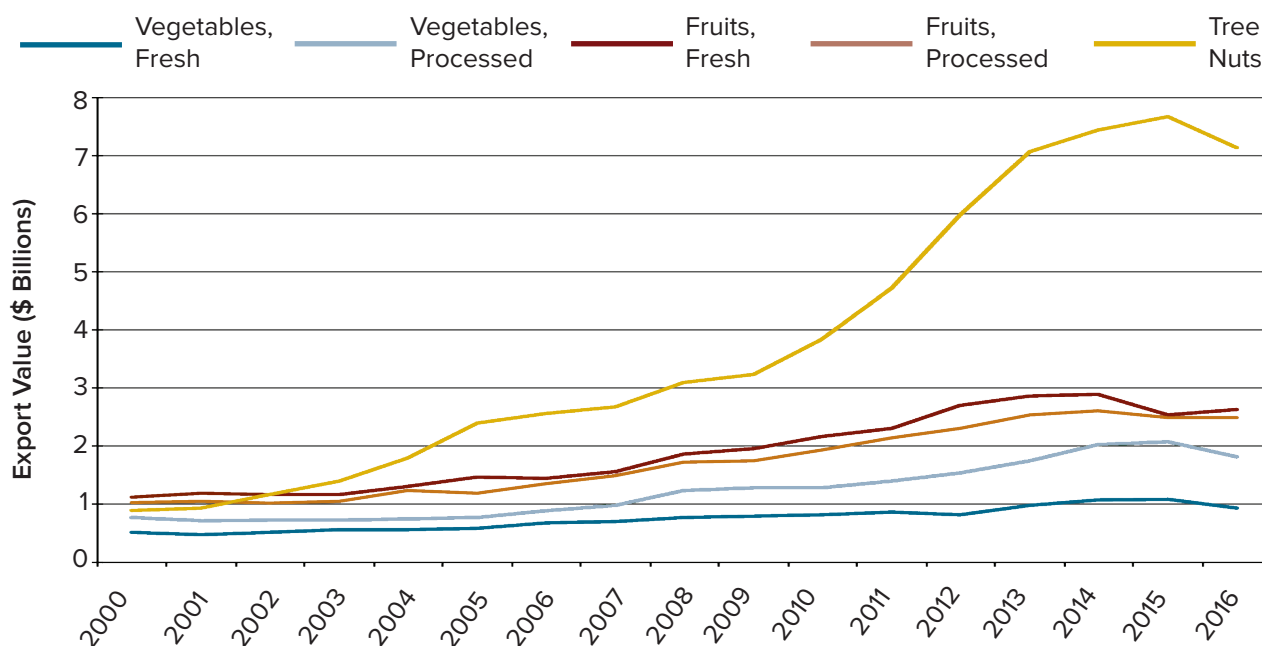


Sources: UC Agricultural Issues Center; CDFA, available at: <https://www.cdca.ca.gov/statistics/PDFs/AgExports2018-2019.pdf>

Figure 15.2. California Agricultural Export Shares, 2018



Source: Compiled from USDA/ERS data, available at: <https://www.ers.usda.gov/data-products/state-export-data/>

Figure 15.3. California's Main Agricultural Exports, 2016

Source: Compiled from USDA/ERS data, available at: <https://www.ers.usda.gov/data-products/state-export-data/>

There have been significant changes in the make-up of California's agricultural exports in the past 20 years. For instance, cotton was the second most important export commodity in 2002, and now it barely ranks in the top 10. Table grapes moved down from the top four to the top seven. At the same time, exports of dairy (and products), walnuts, and pistachios have moved up the rank of top export commodities. Over the past 15 years, the relative importance of tree nuts as a share of the state's agricultural exports has increased from 15 to 33 percent. In fact, tree nuts are also the nation's third-largest agricultural export, with soybeans and corn No. 1 and No. 2, respectively. The share of (fresh and processed) vegetables in California exports rose from 9 to 13 percent. At the same time, the share of exports of fruits and products (excluding wine) fell from 25 to 17 percent. There was a dramatic change in the role of field crops, falling from 17 percent of exports in 2002 to only 6 percent in 2017.

Figure 15.3 further illustrates, these trends in the make-up of the state's agricultural exports. In the early 2000s, the value of tree nut exports began to break away from the value of fruit and vegetable exports, and tree nut export sales rose much more rapidly, from \$2.4 billion in 2005 to \$7.1 billion by 2016. Figure 15.3 shows that export growth in fresh fruits has outperformed export growth in fresh

vegetables. The differential growth rate between processed fruits and processed vegetables is less, but the percentage growth in processed fruit exports has exceeded the growth in processed vegetable exports.

This assortment of agricultural exports from California differentiates the state from other important agricultural states in the U.S., which tend to specialize in only a few commodities. The agricultural sector in Iowa and Illinois is concentrated on just three commodities: corn, soybeans, and hogs, which account for 75 to 85 percent or more of each of those states' farm cash receipts. Nebraska's production of corn and cattle generates over 75 percent of that state's farm receipts. Texas depends on the cattle sector, which produces over 40 percent of its farm cash receipts, with cotton generating another 10 percent.⁸

A notable development for California agriculture has been the dramatically increased dependence on international trade. As shown in Table 15.2, international exports as a share of California agricultural output rose from 25.2 percent in 2000 to 43 percent in 2015. On the one hand, this is positive because it reveals that California

8 The figures are compiled from USDA/ERS data, available at: www.ers.usda.gov/data-products/farm-income-and-wealth-statistics/.

Table 15.2. California's Growing Dependence on International Trade, 2000–2017

	Value of CA Ag Production	Value of CA Exports	Export Share
	\$ Billions		Percent
2000	27.19	6.85	25.2
2005	34.56	9.67	28.0
2010	40.68	15.37	37.8
2015	52.17	22.84	44.0
2017	52.55	22.66	43.0

Sources: Agricultural production from USDA/ERS Farm finance indicators, state ranking. Available at: <https://data.ers.usda.gov/reports.aspx?ID=17839>; Value of exports from: <https://www.ers.usda.gov/data-products/state-export-data/>

agriculture is dynamic and responsive to changing market conditions. The shift away from field crops into tree nuts is no doubt partially driven by export opportunities. On the other hand, the increased trade dependence exposes California agriculture to the vagaries of the world market, which is more unpredictable than the domestic market. Exchange rates, trade agreements, trade wars, third market competition, and protectionism in foreign markets all come into play in the international market. Perhaps this is no more evident than in the case of the downturn in the global dairy market that began in 2013.

The USDA estimated the value of California dairy exports fell from \$1.27 billion in 2013 to \$825 million in 2016, a 35

percent drop.⁹ This was partly due to the EU removing its dairy production quotas in 2015, a relatively strong U.S. dollar relative to competitor currencies (Australia, New Zealand, and the EU), a drop in China's import demand, and a Russian import embargo.

As of 2017, leading export destinations for California agricultural commodities included the European Union (\$3.415 billion), Canada (\$3.287 billion), China and Hong Kong (\$2.270 billion), Japan (\$1.452 billion), Mexico (\$1.057 billion), South Korea (\$1.011 billion), and Taiwan (\$305 million). This is not surprising because the top five markets for U.S. agricultural exports are Canada, Mexico, the EU, China, and Japan. Major agricultural products sent to these key markets are summarized in Table 15.3. This table again shows the diversity of California's exports, but also suggests that products are targeted to different markets; each market is dominated by a different set of products, with little overlap between them.

In 2017, almond exports from California were primarily destined for the EU (35 percent), India (15 percent), China/Hong Kong (11 percent), Canada (6 percent), and Japan (5 percent). Most of the walnuts in 2017 were sold into the EU, Turkey, China and Hong Kong, Japan, South Korea, Vietnam, and Canada. The EU serves as the major market for California wine, followed by Canada, China/Hong

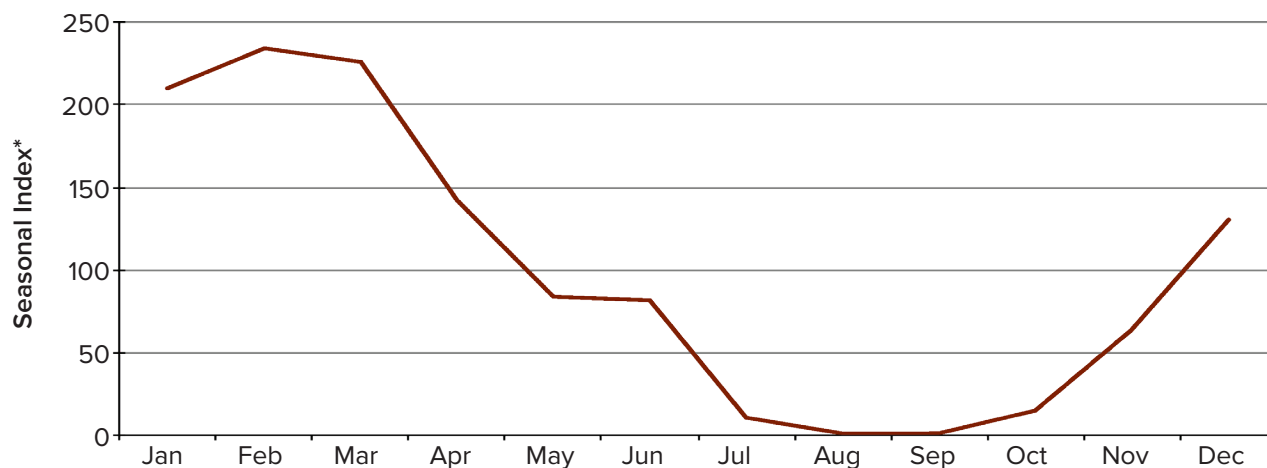
9 See <https://www.ers.usda.gov/data-products/state-export-data/>.

Table 15.3. California's Major Export Markets, \$ Millions, 2017

EU	Canada	China/ Hong Kong	Japan	Mexico	S. Korea
Almonds (1,568)	Wine (376)	Pistachios (663)	Almonds (226)	Dairy (447)	Oranges (229)
Wine (521)	Strawberries (284)	Almonds (501)	Rice (190)	Table Grapes (96)	Almonds (174)
Walnuts (491)	Lettuce (279)	Wine (185)	Walnuts (131)	Proc. Tomatoes (80)	Beef (95)
Pistachios (462)	Proc. Tomatoes (270)	Dairy (175)	Beef (127)	Almonds (75)	Walnuts (93)
Raisins (70)	Almonds (256)	Oranges (124)	Hay (117)	Nursery (41)	Rice (85)
Total* (3,415)	Total* (3,287)	Total* (2,270)	Total* (1,452)	Total* (1,057)	Total* (996)

Source: UC Agricultural Issues Center; CDFA, available at: <https://www.cdca.ca.gov/statistics/PDFs/AgExports2018-2019.pdf>

Note: *Total dollar value is for all commodities exported to each region, not just those listed in the table.

Figure 15.4. Seasonality in U.S. Fresh Strawberry Imports, 2014–2016

Source: Compiled from *Trade Data Monitor* raw import statistics, HTS 0810.10

Note: *See text below for calculations of seasonal index.

Kong, and Japan. Canada and Mexico imported 41 percent of California's table grapes in 2017, with Canada buying 29 percent alone. The EU, China/Hong Kong, and Canada are the largest importers for California pistachios (accounting for about 80 percent of export sales). Processed tomato exports were shipped primarily to Canada (42 percent), Mexico (12 percent), and the EU (8 percent). A large share of the rice exports from California (30 percent) were sold to Japan, with S. Korea and Jordan purchasing 13 and 14 percent of rice exports, respectively, in 2017.

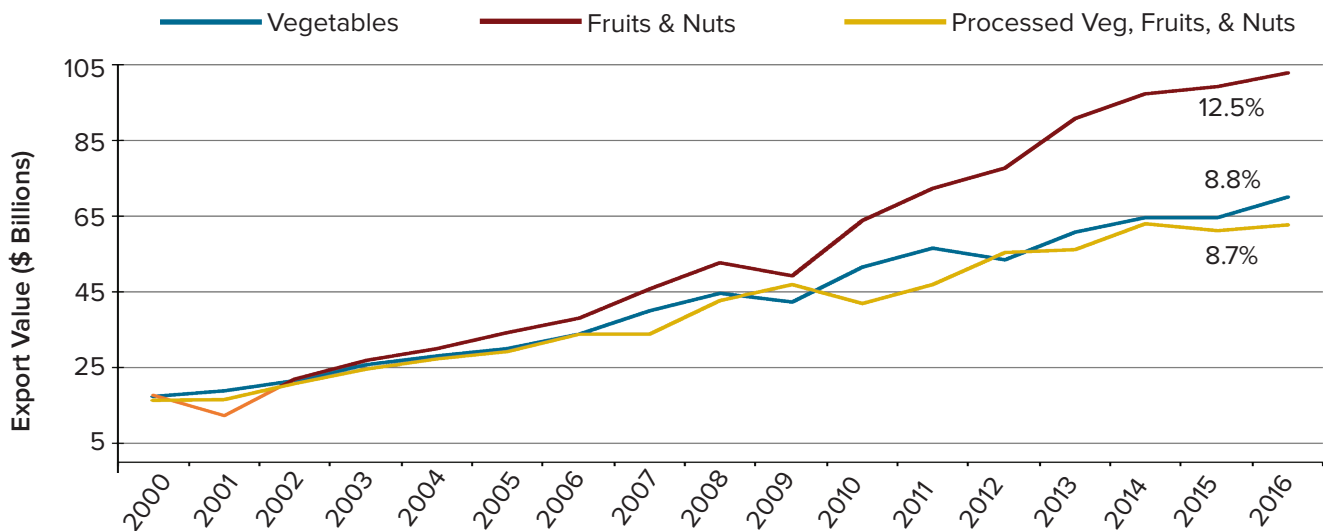
California's integration into world agricultural markets is not unidirectional. Residents of the state also consume significant amounts of agricultural imports. For commodities not grown in the U.S., such as cocoa, coffee, and bananas, California relies entirely on imports. While data on import value by state is not readily available, we can estimate the sense of the magnitude of import consumption by relying on the proportion of the U.S. population residing in California (12 percent in 2016). In 2016, the U.S. as a whole imported beef and veal worth \$4.8 billion, \$5.1 billion worth of cocoa and related products, \$6.0 billion worth of coffee and related products, \$2.3 billion worth of bananas and plantains, and \$1.8 billion worth of cane sugar. If 12 percent of these products were destined for California, then consumers in this state spent about \$2.4 billion on imports of these commodities alone.

As mentioned above, there is strong seasonality associated with U.S. exports and imports of agricultural products

produced in California. For instance, in the winter months, California's production of some fresh products, such as strawberries, declines due to the relatively cold weather. Figure 15.4 illustrates the seasonal pattern of U.S. strawberry imports for 2014–2016. We calculate the seasonal index by expressing the average volume of imports for each month as a percentage of the overall monthly average import volume (for all months combined) over the entire time period. For the time period covered in Figure 15.4, in January the three-year average import volume was 27.421 thousand metric tons. At the same time, the overall monthly average import volume for all months was 13.038 thousand metric tons. Therefore, the January index is $(27.421 / 13.038) * 100 = 210.3$. In other words, the January import volume was 210 percent above the typical monthly import volume over the time period (2014–2016). We see from Figure 15.4 that U.S. strawberry imports are typically high in December, January, February, and March, when the California harvest is virtually dormant. Imports then drop off to almost zero in the summer months when the California harvest of fresh strawberries is in full swing.

GLOBAL AGRICULTURAL TRADING ENVIRONMENT RELEVANT TO CALIFORNIA

From 2006–2016, the nominal value of total U.S. agricultural exports grew by about 90 percent, while California's agricultural exports increased by about 106 percent. The fortunes of California's commodities have

Figure 15.5. Average Growth in Global Trade in Horticultural Products, 2006–2016

Source: *Trade Data Monitor*. Vegetables HTS 07, Fruits and Nuts HTS 08, and Processed Vegetables, Fruits, and Nuts HTS 20

been mixed; exports of some commodities important to California grew more rapidly, while others rose less rapidly than the national average. Over this time period, the nominal value of California dairy exports increased by 135 percent and fresh vegetable exports increased by only 39 percent. On the other hand, tree nut exports expanded by about 180 percent in value.¹⁰

Figure 15.5 displays the annual growth in the dollar value in international trade in horticultural products. From 2000 to 2016, trade in vegetables grew from \$17.4 to over \$70 billion per year. At the same time, trade in fruits and nuts increased from \$17.7 to \$102.8 billion, and processed fruits, nuts, and vegetables grew from \$16.3 to \$62.7 billion. The trade growth rate in fruits and nuts was most impressive, increasing by 12.5 percent per year, on average. The other two categories shown in Figure 15.5 experienced trade growth close to 9 percent per year, which is very high compared to most non-agricultural products.

California agriculture is suited to supply agricultural products to countries whose markets are experiencing strong demand growth due to international trends in income, urbanization, heightened food safety, and healthy lifestyles. The summary statistics in Table 15.4 document that the U.S. is the world's largest export supplier of the combination of fruits, vegetables, and tree nuts, and

most of these crops originate in California and Florida. However, Florida does not export tree nuts. Although the state-level export data are imprecise, the USDA estimates that California exports about 38 percent of the nation's vegetables (fresh and processed) and accounts for 58 percent of the nation's fruit exports (processed and fresh). Florida accounts for 6 percent of the vegetable exports and 8.5 percent of the fruit exports.¹¹

As shown in Table 15.4, the U.S. is very dominant in the global fruit and nut market, with annual exports totaling \$14.46 billion, on average, from 2014–2016. Spain ranks second with exports of \$9.12 billion. Alternatively, China is dominant in the exports of vegetables, supplying \$9.27 billion in annual exports. In vegetables, the U.S. ranks fifth on the list, behind Mexico. When it comes to processed vegetables, fruits, and nuts, the U.S. ranks No. 2 as a world exporter behind China. If we aggregate all three categories in Table 15.4 (see rightmost column), the U.S. nudges out China as the largest exporter with annual sales of \$27.22 billion. Spain, the Netherlands, and Mexico rank behind China. These data indicate that California's strongest export competitors in the world horticultural sector are China, European suppliers, and Mexico. However, some of this competition is outside of the California harvest season.

10 See <https://www.ers.usda.gov/data-products/state-export-data/>.

11 See <https://www.ers.usda.gov/data-products/state-export-data/>.

Table 15.4. Major Exporters of Fruits, Vegetables, and Tree Nuts, 2014–2016 Average

	Vegetables	Fruits & Nuts	Processed Vegetables, Fruits & Nuts	Total
Exporter	(\$ Billions)			
USA	4.52	14.46	8.23	27.22
China	9.27	4.99	9.81	24.06
Spain	6.28	9.12	5.18	20.58
Netherlands	7.30	5.35	5.05	17.69
Mexico	5.94	4.75	2.40	13.09

Source: Compiled from UN Comtrade, Vegetables HTS 07, Fruits and Nuts HTS 08, and Processed Vegetables, Fruits, and Nuts HTS 20.

Available at: <https://comtrade.un.org/data/>

California agriculture faces a complex international trading environment, characterized by import tariffs and tariff-rate quotas (TRQs), non-tariff trade barriers (such as certain phytosanitary requirements), geographical indicators, fluctuating exchange rates, and low-cost competitors. Increasing foreign export competition and import barriers in foreign markets have raised the importance of further trade liberalization. For instance, the California Farm Bureau Federation supported the TPP¹² because it would have likely increased state agricultural exports and farm cash receipts.¹³ Liberalizing imports in Japan, Vietnam, Malaysia, and other TPP markets would increase gains from trade. Japan would have likely eliminated its high imports tariffs on oranges, cheese, grapes, avocados, strawberries, raspberries, blueberries, kiwifruit, and watermelon, and TPP would have harmonized wine import tariffs that now favor Australia and others over California. Within the Asian region, trading partners now have regional trade agreements that give non-U.S. exporters advantages in certain markets. Important for California agriculture, the TPP would have leveled this playing field.

The U.S. International Trade Commission (USITC, 2016) has documented certain areas where California agriculture would have benefited from TPP membership. These include

- Increased dairy exports to Canada and Japan.
- Increased market access to Japan and Vietnam for U.S. exports of fresh fruits, vegetables, and nuts.
- Increased wine exports to Japan resulting from reduced import tariffs.
- Reduction in the impact of sanitary and phytosanitary (SPS) measures on trade as TPP will require that SPS measures are science- and risk-based and not being used as a protectionist non-tariff import barrier.
- Reduction in high tariffs on processed foods exported to Japan, Malaysia, and Vietnam.

In the last 25 years, the most significant agricultural import growth in world markets has been in high-valued and processed food products like those exported from California. From 1995–2014, the share of fruits/nuts and vegetables in world agricultural trade declined slightly, while the share of high-value, processed agricultural products increased (Beckman et al., 2017). The fact that fruit and vegetable trade did not increase any faster than total agricultural trade is very surprising given the growing per-capita demand in developed and transition countries for fresh fruits and vegetables. The stagnant share of fruit and vegetable trade no doubt reflects the high level of protectionism around the world for these food categories. For instance, two-tiered tariffs known as tariff-rate quotas (TRQs) are commonly used to restrict imports of fruits and vegetables. Worldwide, there are more than 350 TRQs placed on fruits and vegetables, and more than

12 The Trans-Pacific Partnership (TPP) originally had 12 member countries before the U.S. dropped out. The trade agreement created a platform for economic integration across the Asia-Pacific region, and encompassed existing free trade agreements (FTAs), such as NAFTA. The U.S. does not have FTAs with all TPP nations, and this was a significant reason why the TPP was a good idea for the United States. The U.S. has no FTA with Brunei, Japan, Malaysia, New Zealand, and Vietnam (all TPP members). After the U.S. dropped out of TPP, the agreement's name was changed to the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP).

13 See <http://www.cfbf.com/top-issues/?tab=Trade+%26+Transportation>.

Table 15.5. U.S. International Trade in Fruits, Vegetables, and Tree Nuts

Commodity	2000	2005	2010	2015
Exports (\$ Billions)				
Vegetables	1.89	2.42	3.78	4.36
Fruits & Nuts	3.98	6.39	10.14	14.46
Processed Vegetables, Fruits & Nuts	2.22	2.41	3.78	5.43
Imports				
Vegetables	2.65	4.32	6.49	8.66
Fruits & Nuts	3.37	4.88	7.58	12.68
Processed Vegetables, Fruits & Nuts	2.68	3.90	5.48	7.22
Net Trade (Exports – Imports)				
Vegetables	–0.76	–1.90	–2.70	–4.30
Fruits & Nuts	0.61	1.51	2.56	1.78
Processed Vegetables, Fruits & Nuts	–0.46	–1.49	1.70	–1.79

Source: *Trade Data Monitor*; Vegetables HTS 07, Fruits and Nuts HTS 08, and Processed Vegetables, Fruits, and Nuts HTS 20

25 percent of all agricultural TRQs are concentrated in the fruit and vegetable trade (Skully, 2001), which critically affects California agriculture.

As an exporter of high-value food commodities, California must contend with the fact that import tariffs in important markets, such as the EU, are generally higher on processed agricultural products than on the primary commodities. This tariff wedge between a processed commodity (e.g., processed fruit) and its corresponding primary commodity (e.g., fresh fruit) is referred to as tariff escalation, and this poses a significant obstacle to California exports. Tariff escalation produces a trade bias against processed agricultural and value-added products. There is general evidence of tariff escalation in OECD countries (such as Australia, Canada, the EU, and New Zealand), especially for fruits, vegetables, and nuts, which are major California exports. For many countries, bound tariffs¹⁴ tend to be higher for processed agricultural products than for unprocessed products, and many importers also practice discriminatory trade behavior, favoring domestic products over imported products. For example, in 2017, the United States launched a trade enforcement action against Canada at the WTO, challenging regulations that discriminate

against the sale of U.S. wine in grocery stores. In 2018, Australia initiated a similar WTO case against Canada over trade discrimination in the wine market.

On the import side, the vast majority of U.S. agricultural imports are classified as high-value products, as opposed to bulk commodities. The top horticultural imports by value are legumes, fresh and processed vegetables, processed fruits, nuts, grapes, apples, and citrus. Table 15.5 shows that the U.S. international trade deficit in vegetables grew (in nominal dollars) from \$760 million in 2000 to \$4.3 billion in 2015. The trade deficit in processed vegetables, fruits, and nuts also grew (from \$460 million to \$1.79 billion), but if we adjust for inflation, the increase is minimal. Turning to fruits and nuts in Table 15.5, the U.S. trade surplus increased from \$610 million to \$1.78 billion. One way to interpret the trade statistics in Table 15.5 is to conclude that California's horticultural exports (especially fruits and nuts) have helped to lower the U.S. trade deficit in fruits and vegetables. Although the U.S. share of total world agricultural exports has fallen (Beckman et al., 2017), from 23 percent of global value in 1995 to 12.5 percent in 2013, the agricultural industry in California has lessened the drop.

¹⁴ A bound tariff is the maximum import duty allowed by the WTO for imports from any member state.

NAFTA

The North American Free Trade Agreement (NAFTA) has impacted California agriculture in a positive way by reducing agricultural trade barriers on the continent. It has improved competition and facilitated foreign investment by California agribusiness in farm production and food processing in Mexico. The trade agreement was signed by the United States, Canada, and Mexico on January 1, 1994, and this trade pact has benefitted producers and consumers in all three member countries. As a result of NAFTA, the agricultural sectors in North America have become more integrated, leading to more trade in a wide range of agricultural products, substantial levels of cross-border investment, and regional changes in production that have lowered costs (Zahniser et al., 2015).

U.S. farm exports to Canada and Mexico rose from \$8.9 billion in 1993, before NAFTA implementation, to \$38 billion in 2016. In 2016, the U.S. exported \$17.6 billion in agricultural products to Mexico and \$20.4 billion to Canada. Canada is the No. 2 market for California agricultural exports and Mexico ranks fifth. Canada and Mexico account for about 20 percent of California's agricultural exports. On the import side, Mexico and Canada are both large suppliers to the U.S.; in 2016, the U.S. imported \$22.5 and \$21.4 billion in agricultural products from these two countries, respectively.¹⁵

At the outset of NAFTA, there was significant opposition to the agreement from U.S. agriculture. Opposition came from producers of wheat, sugar, peanuts, citrus, and winter fruits and vegetables (Orden, 1996). Some agricultural interests in California opposed NAFTA because of fear of competition from low-wage Mexican agriculture in the production of labor-intensive crops. Proponents argued that NAFTA would enhance the competitiveness of California's agriculture.

Factor price equalization lay at the root of the debate over the effects of liberalized trade on the competitiveness of California agriculture precisely because a large percentage of California's agricultural production is labor-intensive, using a relatively high proportion of labor relative to other inputs such as land and capital. This includes the production of fruits and vegetables, nuts, and various

horticultural crops, where labor costs are a relatively high percentage of total production costs.

Despite protectionism on both sides of the border, NAFTA led to freer trade and more cross-border investment between the U.S. and Mexico.¹⁶ For instance, in 1996 the U.S. opened its market to Mexican avocados for the first time in 82 years. Prior to this ruling, phytosanitary rules banned unprocessed Mexican avocados imports and provided considerable protection to California growers. The U.S. decision to import avocados extended beyond that single market and helped to persuade Mexico to reduce import trade barriers on certain fruits.

While the California dairy industry has experienced strong exports sales to Mexico under NAFTA, some of the fruit and vegetable industry (e.g., asparagus) have faced increased competition from rising imports. This suggests that increasing trade flows will entail both risks and benefits for California agricultural producers.

Starting in 2020, the new NAFTA will be known as the USMCA and the changes will only have incremental impacts on California agriculture. This is a good thing because Canada and Mexico are two of the largest trading partners with California agriculture and the freeing up of trade through NAFTA will be preserved with USMCA.

OTHER FOREIGN MARKETS

Despite the fact that Japanese agriculture receives high levels of government support, Japan is also one of the world's largest net importers of agricultural products. The United States supplies roughly 15 percent of Japan's agricultural imports, and in 2016, Japan's agricultural imports from the U.S. were valued at \$11 billion.¹⁷ About 15 percent of these U.S. exports to Japan originated in California. Japan is California's fourth largest export market for agricultural products, with rice, almonds, and alfalfa hay ranking as the top commodities (Table 15.3). The U.S. withdrawal from the Trans-Pacific Partnership (TPP) will mean that U.S. agricultural exporters to Japan will be at a competitive disadvantage vis-à-vis Japan's TPP trading partners who will face lower import duties under the TPP.

16 See <https://www.cfr.org/background/naftas-economic-impact>.

17 See <http://bit.ly/37Gjnsa>.

15 USDA/ERS, *Outlook for U.S. Agricultural Trade*, AES-102, Nov. 30, 2017.

Japan continues to restrict imports of horticultural products, livestock products, and processed foods, all of which are important exports for California. Under the appearance of phytosanitary concerns, Japan restricts imports of U.S. fresh fruit, vegetables, and other horticultural crops, keeping Japanese domestic prices of horticultural products artificially high. Government subsidies encourage farmers to divert land out of rice production and into vegetables. Japan also has country-of-origin labeling requirements for agricultural products, which principally affects fruits, vegetables, and animal products and acts as a non-tariff barrier to trade. Japan maintains high tariffs on beef, citrus, and processed foods. In addition, imported, high-quality California rice is strictly controlled and rarely reaches the consumer food table in Japan. The over-quota rice tariff in Japan exceeds 400 percent.

In the case of fresh oranges and lemons, the U.S. (primarily California and Arizona) is the largest supplier to Japan, accounting for over 80 percent of Japan's imports. Other exporters of oranges and lemons of lesser importance in Japan are Australia, Chile, and South Africa. The Japanese government continues to impose a high import tariff on fresh oranges. The tariff rate is 32 percent for imports during the December–May period, (during the marketing season for domestically produced citrus) and 16 percent during June–November.¹⁸ Japan's import tariffs on table grapes are also relatively high—17 percent from March to October. Import tariffs on wine can range up to 57.7 percent. California is a large supplier of processed fruit to Japan (such as raisins, prunes, and frozen strawberries) and California competes directly with China and other Asian exporters in the Japanese market.

An ongoing trade dispute between the U.S. and the EU concerns the use of geographical indicators (GIs), especially for wine and dairy products. For instance, the EU has over 2,800 wine GI registrations (R. Johnson, 2017). While some GIs are allowed under WTO rules, the EU wants to extend the list of protected products and prohibit foreign producers of food and beverage products from labeling products with European regional names on hundreds of cheeses, meats, and spirits (e.g., French Champagne and Chablis wine, Italian Parma ham, or

French Roquefort cheese). The list of products that will receive this protection is an ongoing subject of negotiations at the WTO.

For California, there is a trade-off associated with GI protection. On the one hand, California would have to stop exporting products using certain names if the EU is successful (e.g., Basmati rice or Feta cheese as these names refer to regions of other countries). This means that U.S. Feta cheese (for example) could not be exported to the EU because any Feta cheese sold in the EU must originate from regions with GI certification. On the other hand, California agriculture could use GI protection to develop niche markets for its food and beverage products, potentially capturing a price premium. In fact, the Napa Valley wine growers support the EU attempt to expand the use of GIs in the U.S. market (Johnson, 2017). The TPP will address the regulation of GIs in the Pacific region. Regional free trade agreements that include GI protections but exclude the U.S. can and will affect U.S. trade with that region.

California's agricultural industry is carefully watching developments in China's agricultural trade. China's land area sown to fruits, nuts, and vegetables has grown rapidly in the past decade and trade is expected to take on a greater importance for China in coming years. China's horticultural exports account for a large share of its agricultural exports. Given China's rich agricultural resources, abundant labor supply, and large population, it has great potential to play a much more prominent role in agricultural trade in the coming years, as both an exporter and an importer.

China uses both tariff and non-tariff barriers to restrict agricultural imports. China has in place import tariffs on certain agricultural commodities currently exported by California, such as citrus, table grapes, wine, beef, and dairy products. China has import tariffs on citrus and table grapes of approximately 10 percent and maintains a restrictive tariff rate quota (TRQ) on cotton.

Domestic developments in China, not directly related to trade policy but related to rising incomes, present opportunities for California agricultural exports. For example, the growing importance of Western-style supermarkets in Chinese cities may present a new opportunity for California producers to supply pre-packaged or processed products and products that require refrigeration.

18 USDA/FAS GAIN Report, JA7150, Dec. 2017.

Another example of the effect of increasing incomes on potential demand for California products is the increasing popularity of wine among China's urban middle class.

China has become a serious export competitor with the U.S. in third markets for horticultural products. This is partly a result of the relative size of the two countries; the harvested area of fruits and vegetables in China is about 22 million hectares, or seven times the U.S. area for these products. As China's agricultural sector moves away from its historical focus on land-intensive grains and concentrates more on labor-intensive cash crops, markets in other parts of Asia will be subject to increased competition from China. The U.S. response to China's production and exports of these products will affect how competition from China impacts California producers.

A skirmish over the garlic market was an example of the policy response to the emergence of China as a competitor. California accounts for over 80 percent of U.S. garlic production but experienced competition from China in the mid-1990s. U.S. imports of Chinese garlic increased from about 3 million pounds a year in 1992 to 64 million pounds by 1994. This raised concerns among California producers. California garlic growers lobbied and won import relief from Chinese imports in 1994, when the U.S. government issued an antidumping order and imposed a 376 percent tariff on garlic imports from China.

Garlic production in California is highly concentrated, with less than 10 producers accounting for about 80 percent of the annual harvest. These growers joined together to seek protection from foreign competition, and they were quite successful at first. China eventually regained its market share after the antidumping case. In 1994, when the case was initiated, the value of U.S. imports of garlic from China decreased from \$11.9 million to \$4.1 million, a drop of 65.5 percent. However, while China's exports to the United States fell to \$250,000 in 1995, Mexico's exports nearly doubled to \$20 million, and Argentina's exports increased by an additional 19 percent to \$3.9 million. Today, China is once again the No. 1 foreign supplier of garlic to the U.S., and imports from China totaled \$145 million in 2016. Other large suppliers to the U.S. include Spain, Mexico, and Argentina.

After joining the World Trade Organization (WTO) in 2001, China increased its trade dependence on agriculture.

As of 2019, it was the fourth largest exporter and second largest importer of agricultural products in the world, according to WTO trade statistics.¹⁹ China's import growth has been driven by a shift in its domestic production mix, and changing consumer diets with rising incomes and urbanization. China's substantial increase in fruit and vegetable production is a major factor behind its agricultural export growth. With imports growing faster than exports during the post-WTO accession years, China reversed its long-time status as a net agricultural exporter to that of a net importing country since 2004. Very strong growth in exports of horticultural products (e.g., garlic, apples, pears, and citrus), semi-processed food products (e.g., animal products and pet food), and aquaculture (e.g., fish fillets) have dominated the changing structure of China's agricultural exports.

China is an emerging competitor for U.S. farmers in some specialty crops and China has a positive trade balance with the U.S. on horticultural crops, although the total dollar value is a relatively small share of total agricultural trade. China's growing demand for almonds, pistachios, and walnuts is a positive development for U.S. agriculture. And per-capita consumption of these specialty crops is still very low in China, as Chinese per-capita consumption of almonds is only 5 percent of U.S. levels.

Impediments to foreign market access are an issue for Chinese agribusiness firms. For instance, China's agricultural exports of horticultural products have been adversely affected by antidumping (AD) investigations against them launched by firms in both developing and developed countries. Globally, there have been about 23 AD cases against China's agriculture since that market opened up in the early 1980s, and many of the AD actions in agriculture targeted horticultural products—resulting in very high tariff rates against Chinese firms. Most antidumping cases are nothing more than hidden protectionism. Under U.S. AD law, China is treated as a “non-market economy” and as a result, its exporters have been assessed tariffs higher than typical AD rates applied

19 See https://www.wto.org/english/res_e/statis_e/mts2020_e/mts2020_e.pdf.

Table 15.6. California Market Access Program Allocations

Trade Organization	FY 2018 Award (\$ Millions)
Blue Diamond Growers/Almond Board of California	5.007
California Agricultural Export Council	1.012
California Cherry Marketing and Research Board	0.566
California Cling Peach Growers Advisory Board	0.470
California Fresh Fruit Association	0.405
California Prune Board	2.910
California Strawberry Commission	0.148
California Table Grape Commission	3.285
California Walnut Commission	3.910
Raisin Administrative Committee	2.814
Wine Institute	5.526
Cotton Council International	14.589
Sunkist Growers, Inc	1.720
USA Rice Federation/ U.S. Rice Producers Association	2.488
U.S. Dairy Export Council	4.626
Total	49.47

Source: USDA/FAS, available at: <https://www.fas.usda.gov/programs/market-access-program-map/map-funding-allocations-fy-2018>

Notes: Payments to cotton, rice, and dairy producers are not limited to California. Sunkist products are grown in Arizona and California.

to so-called market economies.²⁰ U.S. AD cases against China's exports have targeted imports of fresh garlic, preserved mushrooms, apple juice concentrate, shrimp, and crawfish tail meat. With the exceptions of honey and shrimp, these cases have had mixed success at keeping out Chinese exports for more than a few years. But in each and every case, the U.S. consumer has paid higher prices as a result of the dumping orders.

The trade war between the U.S. and China that started in 2018 impacted the U.S. and California in a significant way. Average foreign tariffs on agricultural and food products increased from 8.3 percent to 28.6 percent, targeting 1,118 products and affecting more than \$28.9 billion US (37.1 percent) of agricultural and food exports of the United States (Carter and Steinbach, 2020a; Balistreti et al., 2020) found that California incurred the largest 'net' welfare loss among all states due to the trade war. Below, we discuss the impacts of the trade war in more detail.

20 U.S. Government Accountability Office (GAO) "U.S.-China Trade: Eliminating Nonmarket Economy Methodology Would Lower Antidumping Duties for Some Chinese Companies" (10-JAN-06, GAO-06-231).

FEDERAL GOVERNMENT SUPPORT FOR CALIFORNIA AGRICULTURE

As previously noted, California agriculture receives relatively few subsidies from the federal government compared to other states. Agricultural producers in California received \$425 million in federal assistance in 2016; of this, about \$290 million came as crop insurance subsidies. Disaster programs provided \$66.6 million and commodity programs paid \$62.7 million directly to California farmers. The remainder of government payments to farmers came in the form of conservation programs.²¹

California agriculture receives less than 1 percent of federal commodity payments even though the state produces about 13 percent of national farm output (as of 2016). Federal subsidies to California have also been on the decline as the total was around \$800 million in 2001. Farms in California receiving these government payments are growing cotton, rice, and wheat. California has dropped in the national subsidy ranking as cotton production in California has waned.

California also benefits from several smaller government programs designed to either explicitly subsidize exports or promote demand for California specialty products in foreign markets. Government programs that help farmers include marketing and promotion programs, crop insurance and disaster assistance, and trade assistance. In addition to the trade-orientated programs, the USDA purchases fruits, vegetables, and tree nuts for domestic distribution under various subsidized meal programs such as the school lunch program and child nutrition programs. Johnson (2014) reported government purchases of fruits and vegetables totaled \$660 million in 2013.

Among the promotion programs, the most important to California producers is the Market Access Program (MAP),

and the Foreign Market Development Program (FMD), both of which subsidize market development activities overseen by trade organizations. In addition, the Technical Assistance for Specialty Crops Program (TASC) funds projects that address technical barriers to the export of specialty crops, such as sanitary and phytosanitary trade barriers.

MAP spends over \$49 million per year promoting California crops such as almonds, citrus, kiwifruit, peaches, pears, pistachios, prunes, strawberries, table grapes, tomatoes, tree fruits, and walnuts (see Table 15.6).²² The California dairy industry benefits from the FMD program, which spends funds to expand foreign imports of U.S. dairy products.

Economic theory predicts that programs like the MAP or FMD are not cost-effective uses of public budgets; it is difficult to find economic evidence in favor of the MAP. If the private benefits of marketing efforts exceed their cost, firms should find it profitable to undertake these efforts without government assistance. Government assistance uses taxpayers' money to underwrite marketing efforts with high costs relative to benefits. Well-known arguments are made for government support for investments that have "externalities"; that is, benefits that accrue to many groups whether they pay the cost of the investment or not. However, the marketing of name-brand agricultural products is not likely to be such an investment.

²² See <https://www.fas.usda.gov/programs/market-access-program-map>.

²¹ See <https://farm.ewg.org/region.php?tips=06000&progcode=total&yr=2016>. Twenty-six states received higher total federal government payments to agriculture than California in 2016. Since these states are smaller than California in both area and population, even this ranking understates the extent to which California receives relatively little federal government subsidy to agriculture.

U.S.–CHINA TRADE WAR²³

In 2018, the U.S. started a trade war with China and other trading partners by introducing import “safeguard” tariffs and quotas on washing machines and solar panels. This was followed up by tariffs on steel and aluminum, apparently imposed for national security reasons, and then followed by additional tariffs on hundreds of Chinese products. One of President Trump’s stated goals was to use import trade barriers as leverage to force China to change its policies regarding intellectual property rights and government subsidies. In response, China imposed retaliatory import tariffs, specifically targeting U.S. agricultural exports. These retaliatory tariffs reduced U.S. agricultural exports to China by close to \$14.4 billion per year, eliminating China as the No. 1 export market for U.S. agriculture. Some of the agricultural products targeted by China’s retaliatory tariffs are important California exports, including almonds, walnuts, pistachios, wine, oranges, and table grapes.

In addition to China, other countries also imposed retaliatory tariffs on U.S. agricultural and food exports in response to the U.S. tariffs on their exports. In 2018, tariffs were imposed by Canada on prepared meats, fruits,

and vegetables, coffee, and whiskey; by Mexico on pork, prepared fruits and vegetables, cheese, and vegetables; by the EU on prepared vegetables and legumes, grains, fruit juice, peanut butter, and whiskey; and by Turkey on tree nuts, rice, some prepared foods, whiskey, and tobacco.

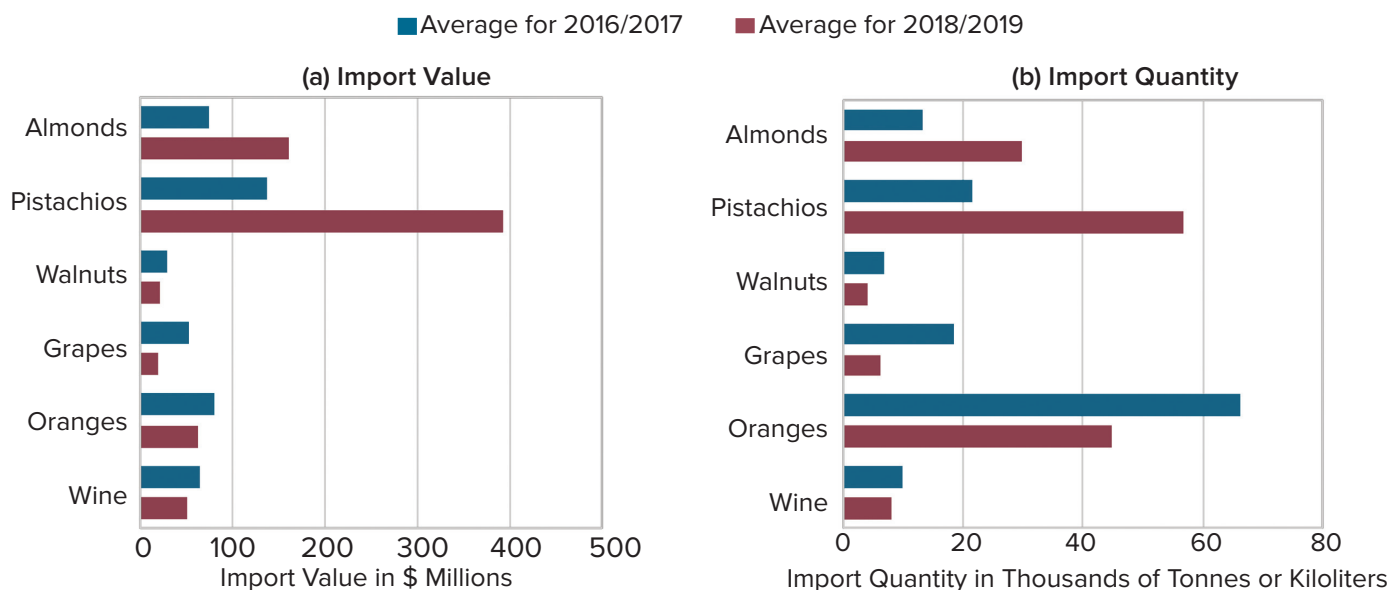
The impact of retaliatory tariffs was particularly significant for agricultural and food trade with China. U.S. exports of these products to China decreased by 63 percent between 2017 and 2018. The trade effects are concentrated in Washington, Louisiana, Texas, California, and Oregon, which together accounted for nearly 80 percent of the overall U.S. exports to China (Carter and Steinbach, 2020b). All states but Oregon saw double-digit percent declines in the value of agricultural exports to China. Several of the retaliatory tariffs were lifted as a result of ongoing negotiations. In May 2019, Canada and Mexico lifted their retaliatory tariffs to clear the way for the ratification of the USMCA, as the United States also lifted its tariffs on steel and aluminum from Mexico and Canada. Moreover, the United States and China reached a trade deal in early January 2020, with China agreeing to resume purchasing U.S. agricultural exports. However the COVID-19 virus further disrupted trade in 2020 and delayed the implementation of this agreement between the U.S. and China.

23 This section draws heavily from Carter, 2018 and Carter and Steinbach, 2020b.

Table 15.7. China Import Tariffs in Response to U.S. Tariffs: Selected California Export Products

HS Code	Commodity	Former Tariffs	2018 Tariffs	2019 Tariffs
			Percent	
80211	Almonds, In Shell	10	25	60
80212	Almonds, Shelled	10	25	60
80231	Walnuts, In Shell	25	40	75
80232	Walnuts, Shelled	20	35	70
80251	Pistachios, In Shell	5	20	55
80252	Pistachios, Shelled	5	20	55
80510	Oranges, Fresh	11	26	61
80610	Grapes, Fresh	13	28	63
220410	Sparkling Wine	14	29	54
220421	Wine	14	29	54

Source: USDA FAS GAIN Report Number: CH2019-0194, 1/05/20

Figure 15.6. Average Chinese Imports from the U.S. Before and After the Tariff Increases

Sources: Carter and Steinbach, 2020b, Chinese customs statistics (*Trade Data Monitor*, 2020)

Note: In Figure 15.6b, wine exports are measured in kiloliters.

I analyzed the initial round of China's retaliatory tariffs in 2018 (Carter, 2018) and concluded that for wine, walnuts, and table grapes, there would be little export price impact but a loss of market share for California exporters in the Chinese market. For almonds and pistachios, it looked as though the volume of U.S. exports would not be unduly impacted, and this turned out largely to be the case. With the retaliatory tariffs in place, Chinese consumers ended up paying higher prices for almonds and pistachios; nevertheless, imports of these tree nuts from the U.S. remained steady because of the U.S. position as the dominant global supplier. In the case of almonds and pistachios, the U.S. has 86 percent and 71 percent of world exports, respectively. The U.S. share of walnut exports is lower (54 percent), and China is actually a net exporter of walnuts. As a result, U.S. walnut exports to China declined somewhat due to the trade war.

Following the initiation of the trade war between China and the United States, the federal administration decided to spend \$28 billion US in 2018 and 2019 on 'trade war compensation' programs for farmers to repay them for the adverse effects of the trade war (mainly with China) (Carter and Steinbach, 2020b). Most of this money was given to farmers in the form of direct payments for eligible commodities. The 2018 and 2019 'trade aid' programs provided special subsidies for three commodity groups—

grains and oilseeds, specialty crops (mainly fruits and nuts), and animal products (hogs and dairy). These subsidy payments were made on a per-unit or per-acre base. Some research has found that the federal administration overpaid farmers for certain commodities because the government did not account for lost exports that may have been diverted to other third countries (Glauber, 2019).

Table 15.7 shows the escalation of China's retaliatory tariffs in 2018 and 2019. California farmers are the primary U.S. supplier of the seven targeted products listed in Table 15.7. Before the trade war, China's import tariffs on the commodities listed in Table 15.7 ranged from 5 percent on pistachios to 25 percent on walnuts. China's initial World Trade Organization tariffs on walnuts were relatively high (20 to 25 percent) to protect its large domestic industry. The annual production of walnuts in China is close to 1 million metric tons, compared to less than 600,000 metric tons in the United States. China is self-sufficient in walnuts but remains reliant on world markets for pistachio and almond supplies. For instance, China is the world's largest pistachio importer. It is the third-largest importer of almonds and the third-largest importer of fresh oranges.

In the first wave of retaliation, China raised its tariffs to the 20–40 percent range. Then, in the second wave, some of China's retaliatory tariffs more than doubled from 2018 to

Table 15.8. Average U.S. Market Share in China for 2016/17 and 2018/19 and Potential Trade Losses

	Column A Average U.S. Market Share for 2016/2017	Column B Average U.S. Market Share for 2018/2019	Column C 2019 Imports from the U.S.	Column D 2019 Imports from the U.S. Assuming Average 2016/2017 Market Share	Column (C - D) / C
Commodity	Percent		\$ Millions		Percent Change
Almonds	97.4	44.0	197.1	511.9	-159.7
Pistachios	90.8	67.8	483.4	734.5	-52.0
Walnuts	87.8	66.2	14.3	24.1	-68.9
Grapes	8.7	3.1	6.0	56.2	-829.8
Oranges	25.9	14.7	38.2	103.3	-170.8
Sparkling Wine	0.4	0.3	0.1	0.4	-472.1
Wine	2.7	2.2	32.9	59.1	-79.4

Sources: Carter and Steinbach, 2020b; Chinese customs statistics (Trade Data Monitor, 2020)

2019. By 2020, U.S. walnut exports faced the highest tariff (75 percent), while the tariff on pistachios was 55 percent, up from 5 percent before the trade war (see Table 15.7).

The market impact of the Chinese retaliatory tariffs is evaluated by using international trade data from 2016 and 2017 as a benchmark. Data from 2016/2017 is the “before” the retaliatory tariffs period and 2018/2019 is the “after” period. Figure 15.6a illustrates the before and after value of imports into China from the United States and Figure 15.6b reports import quantities.

The annual value of Chinese imports of the seven targeted U.S. products (in Table 15.7) increased from \$439 to \$706 million from 2016/2017 to 2018/2019, according to Chinese customs statistics. We see from Figure 15.6 that the annual average value of Chinese almond imports from the United States increased from \$75 to \$160 million and pistachios from \$137 to \$394 million in 2018/2019 over 2016/2017. In contrast, the annual value of China’s imports from the United States declined by 20 percent and 29 percent for wine and walnuts, respectively. Therefore, it appears there was some trade destruction for the targeted products, but this was countered by the substantial growth in China’s pistachio imports from the United States.²⁶

Although the U.S. remains a major supplier of these seven products to China, it lost significant market shares to foreign competitors partially due to the trade war. Table 15.8 summarizes changes in U.S. market shares in China and shows the maximum potential trade losses due to the tariffs as the percent difference between columns C and D. As shown in columns A and B in Table 15.8, all products experienced a significant drop in market share, with the U.S. market share for almonds dropping by more than 53 percent, from 97.4 percent to 44 percent. Therefore, lost trading opportunities amplified the effects of the trade destruction.

Assuming average 2016/17 market shares for 2019, Chinese imports from the U.S. could have been double their 2019 level (\$1,489 million instead of \$772 million). Although there is sufficient supply in the market, in a “but for” world, the U.S. may have chosen not to meet all of the increased import demand in China.

There was some degree of trade diversion, and export sales losses for walnuts, almonds, and table grapes largely account for this diversion. The data indicate that Australia (almonds, grapes, oranges, walnuts), Peru (grapes), Chile (walnuts, grapes), Egypt (oranges), and Iran (pistachios) gained from the Chinese tariffs against the United States. For instance, California was the most important exporter of walnuts to China but with the retaliatory tariffs in place, China has shifted to Chile and Australia for imported walnuts—that is what we call trade diversion.

24 Trade destruction means U.S. exporters lose sales to China.

CONCLUSION

California's agricultural trading environment holds both new challenges and new opportunities. Established markets in developed countries continue to erect non-tariff barriers against imports of California's specialty crops. The rapidly changing Chinese market holds uncertain benefits, but also the promise of new competition. Further trade liberalization in agriculture is a promising avenue for the expansion of California's agricultural trade. As such, California producers should guard against the temptation to support the expansion of domestic U.S. policies and non-tariff barriers that make far-reaching trade liberalization less likely. Farms in other parts of the U.S. can afford to be protectionist because they are not so dependent on foreign markets; California growers have no such luxury.

Coordinated liberalization does expose California growers to new competition from Mexico and China, especially. Market integration may also lead to new food safety concerns, as with BSE (i.e., mad cow disease). But higher incomes and urbanization abroad should also translate into increased demand for high-value fresh produce and wine. Product differentiation is an important competitive strategy for California, which has a reputation as a high-quality producer and increasingly, as a producer of value-added agricultural and food products. As the trend toward adding value continues to unfold, agricultural goods will less and less be homogenous. There are new opportunities for business in emerging markets as well as competitive challenges.

Not all California agricultural producers win from increased trade liberalization. Ending government support for agriculture and lowering tariff barriers will inevitably benefit some more than others. Coordinated liberalization that affords California increased access to these markets, even if at the expense of increased competition from China and Mexico, could be an important opportunity. This is all the more true because most of California's agricultural producers have few subsidies to give up. Even the loss of the export-promotion programs would not be very costly; these programs provide little benefit to the industries they support.

Finally, the 2018 trade war started by the U.S. administration has been costly for California agriculture in the short-run and could have serious consequences for the long-run as key California agricultural export products lost market share in the growing China market. There could be long-lasting consequences for California associated with China looking elsewhere for export suppliers, diversifying international supply chains.

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