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Unpacking the Growth in Per Capita Availability of Fresh Market Tomatoes

Sarah Baskins, Jennifer Bond, and Travis Minor

Abstract

As the U.S. fresh market tomato sector has evolved to provide an increasing volume and variety of globally sourced offerings, U.S. per capita availability of fresh market tomatoes has steadily risen. Through the early 1980s, Americans consumed an average of about 12 pounds of fresh market tomatoes per person per year. Per capita availability began to steadily increase in the mid-1980s, showed gains in every subsequent decade, and reached an average of 20.7 pounds in 2010-17. Growing imports, changing consumer demographics and tastes, and emerging production technology are among the major factors shaping the demand for and supply of fresh market tomatoes. By evolving in response to changing consumer demands and market opportunities, the fresh market tomato sector has enjoyed a long period of expanding supplies and per capita availability. Current trends favor continued expansion and provide momentum for sustained growth in the fresh market tomato sector.

Keywords: fresh tomatoes, trade, per capita availability, technology

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Contents

Introduction	1
Domestic Field Production: Concentrated, Seasonal, and Trending Down	3
Greenhouse Tomato Production Expands Throughout North America	5
Imports Support Sustained Growth in Per Capita Availability	7
Suspension Agreement Governs Fresh Tomato Imports From Mexico	8
Exports Trend Down, Mirroring Domestic Field Production	10
Growth in the Organic Tomato Market Segment	11
Looking Forward	13
References	14

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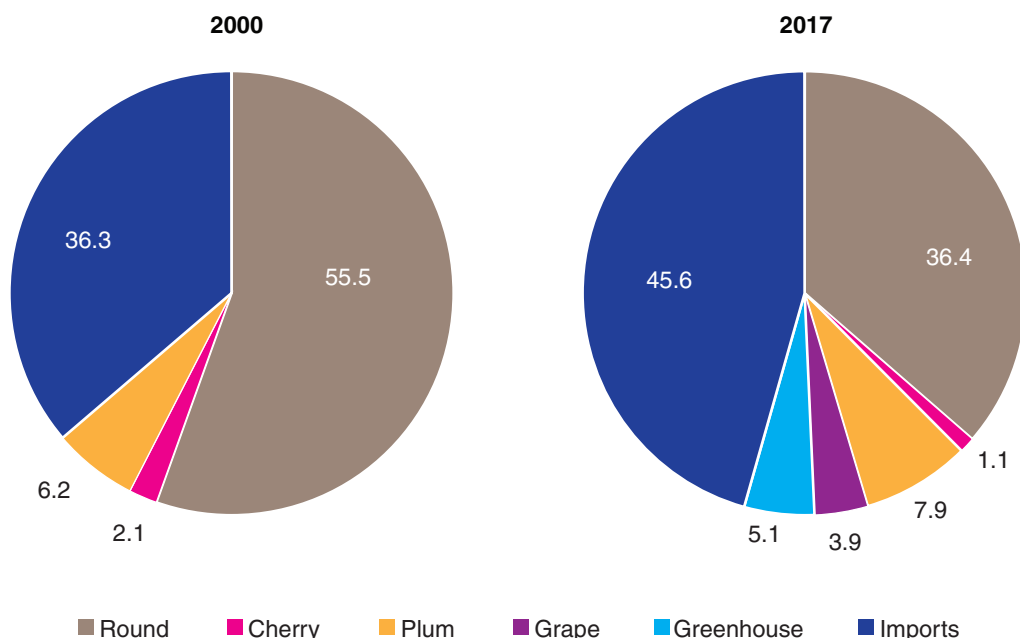
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Unpacking the Growth in Per Capita Availability of Fresh Market Tomatoes

Introduction

The fresh market tomato sector has evolved to provide more specialized and globally sourced offerings for U.S. consumers (fig. 1).¹ Expanding access to diverse and consistently available supplies of fresh market tomatoes has contributed to the long-term trend of rising per capita fresh market tomato availability. Tomatoes are the second most consumed fresh market vegetable per capita (behind potatoes), a testament to the crop’s prominence in U.S. diets.

Figure 1
U.S. shipments of fresh tomatoes, 2000 and 2017 (percent)



Notes: Shipments correspond to approximately 50 percent of domestic availability in 2000; 30 percent in 2017. In 2000, only round, cherry, plum, and imported categories are reported by USDA, Agricultural Marketing Service (AMS). Organic tomatoes account for less than 0.5 percent of shipments in 2000 and 2017. Source: USDA, Economic Research Service using data from USDA, AMS, Annual Fresh Fruit and Vegetable Shipments: Specialty Crops Shipments reports.

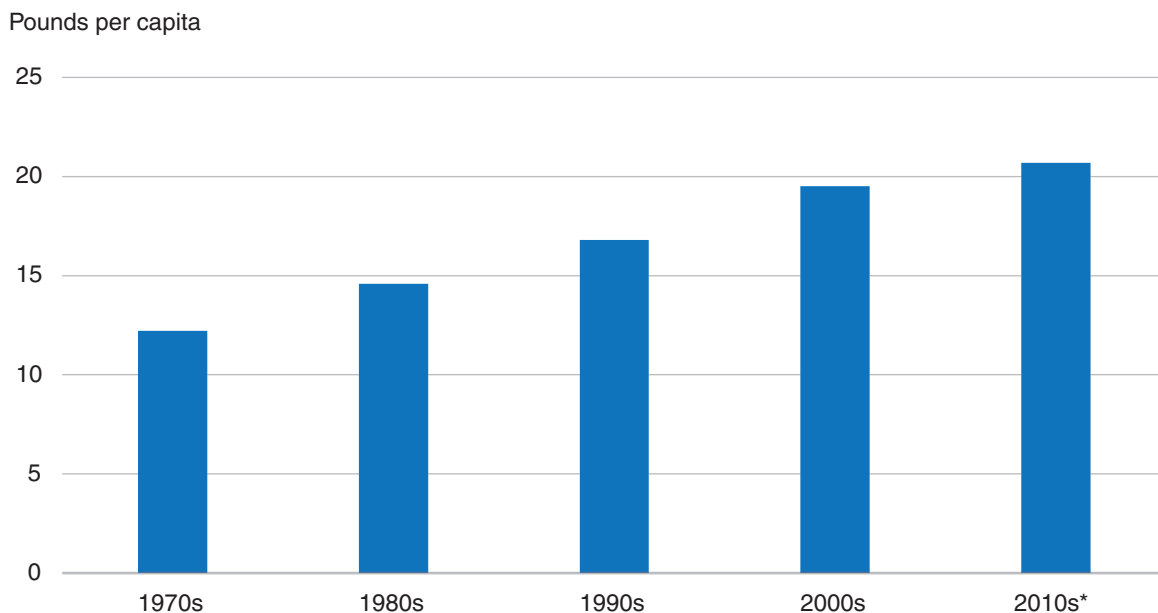
Through the early 1980s, per capita consumption of fresh market tomatoes was slightly more than 12 pounds (USDA, ERS, 2018; Boriss and Brunke, 2011). By 2010-17, the average per capita availability had risen to 20.7 pounds (fig. 2).² Lopez (2017) attributes part of the growing consumption

¹ The U.S. tomato market consists of the fresh tomato market and the processing market. The fresh tomato market refers to the sector that ultimately supplies consumers with whole, unprocessed tomatoes. The processing sector is exclusive of fresh, whole tomatoes and inclusive of all manner of tomato products.

² In this context, consumption is a measure of per capita demand for a particular good. Availability refers to the supply that is available for human consumption on a per capita basis and is frequently used as a proxy measure for per capita consumption when supply, rather than demand, data are available.

of fresh market tomatoes to increasing cultural diversity in the United States. Nzaku and Houston (2009) report that Hispanic and Asian immigration to the United States has led to higher vegetable consumption, and Lucier et al. (2000) note that members of the Hispanic population consume more fresh tomatoes than any other ethnic group. Several studies have also found increased consumer interest in pursuing healthy lifestyles and eating nutritious foods, including fresh produce (Sturm and An, 2014; Thilmany et al., 2010; Deghan et al., 2011). Fresh market tomatoes are a good source of vitamin C, folate, and potassium, and they also contain lycopene, which has been associated with reduced risk of some diseases, including cancer, making tomatoes a healthful addition to many diets (Beecher, 1998; Agarwal and Rao, 2000).

Figure 2
Fresh tomato per capita availability, 1970s-2010s



* Data available 2010-17.
 Source: USDA, Economic Research Service, Vegetable and Pulses Yearbook Tables, 1970-2017.

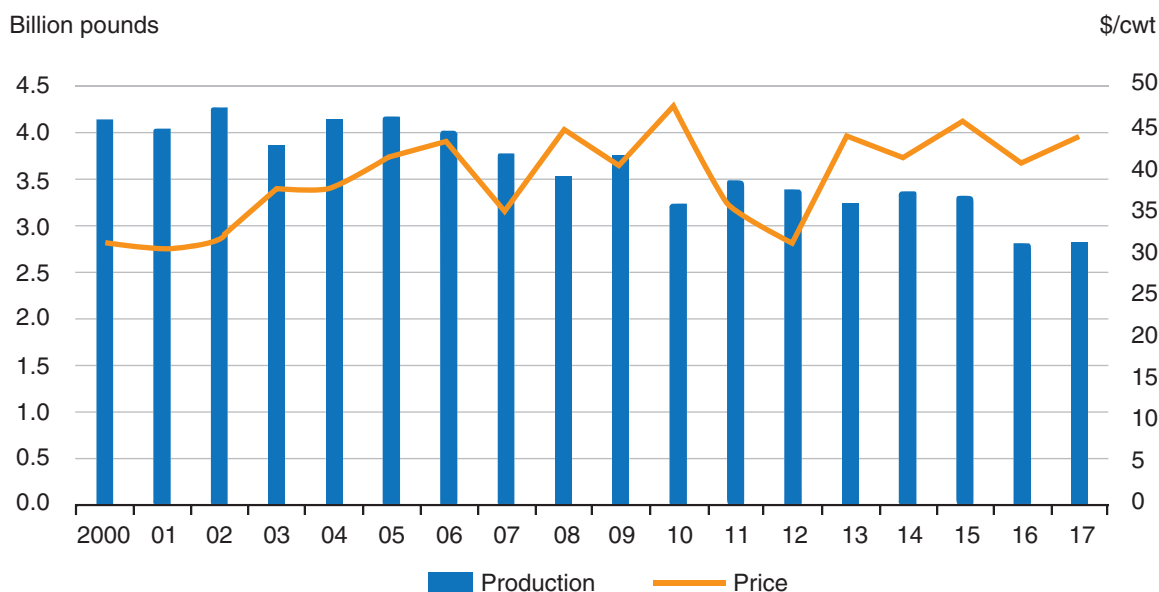
Initially spurred by a period of technological innovation that supported expanded U.S. fresh tomato production, supply has steadily increased, facilitating growing per capita availability. In the 1980s, U.S. commercial field production of fresh market tomatoes began to accelerate, helping the United States to become the third-largest global producer of the crop, behind only China and India (FAO-UN, FAOSTAT, 2018). U.S. growers harvested an average of about 3.0 billion pounds of fresh tomatoes per year through the 1980s, an average of 3.6 billion pounds per year in the 1990s, and an average of 4.0 billion pounds in each year of the first decade of the 2000s.

Starting in 2010s, however, U.S. growers produced fewer fresh market tomatoes, averaging about 3.3 billion pounds of field-grown tomatoes per year in 2010-16. The decline in U.S. fresh market tomato production coincided with a sustained expansion of imports, largely from Mexico. Throughout the marketing year, and especially during the winter months, imported tomatoes currently augment U.S. production and provide consumers with year-round access to supplies of diverse varieties of fresh tomatoes.

Domestic Field Production: Concentrated, Seasonal, and Trending Down

Domestic production peaked at nearly 4.3 billion pounds in 2002 (fig. 3). After a production rally between 2004 and 2005, production tailed off in 2006 as imports and a surge in Florida's spring harvest volume began to put downward pressure on prices (Lucier and Jerardo, 2006). Since 2012, when prices took a sizable dip, grower prices have rebounded to pre-2006 levels and have remained relatively stable (fig. 3).

Figure 3
U.S. fresh market tomato production and prices, 2000-17



cwt = hundredweight.

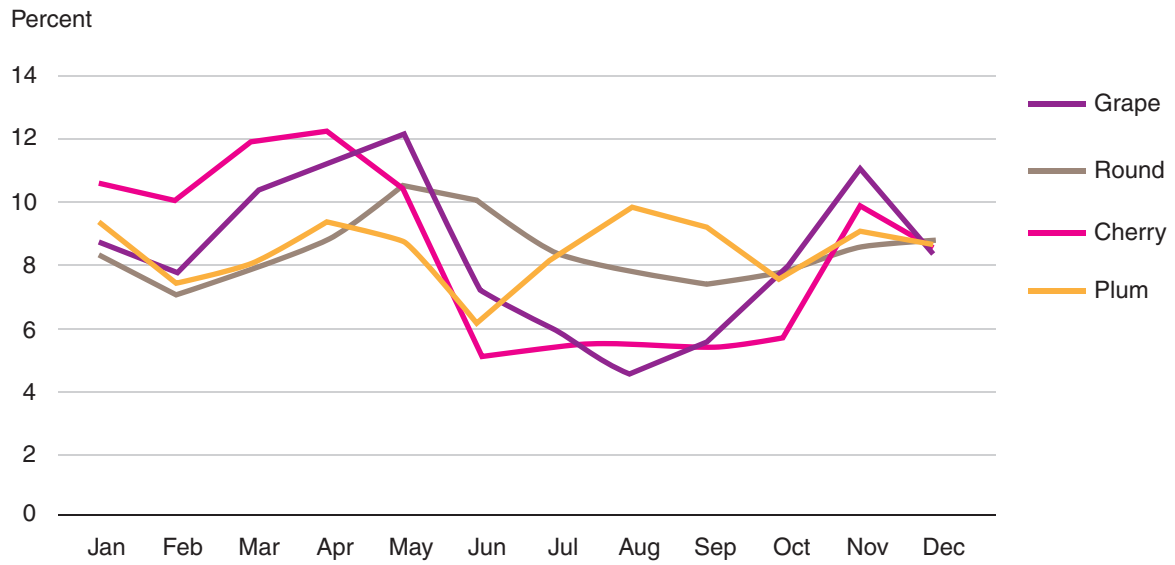
Source: USDA, Economic Research Service, Vegetable and Pulses Yearbook Tables, 1970-2017.

While tomatoes are grown across the United States, production is largely concentrated in California and Florida. Since 2000, these two States have alternated holding the top production spot, with California ranked first in overall domestic fresh market tomato production in 7 of the last 15 years and Florida taking top honors in 8 years. Together, these two States account for an average of about 80 percent of U.S. field-grown fresh tomato harvested area and commercial production. Nearly every other State produces tomatoes, though production concentration is greatest in the upper north-east, eastern seaboard, and southeast.

U.S. tomato production is highly seasonal, with fresh market tomato shipments lower in January and February when temperatures across the United States are cooler. Production peaks in the spring, typically around late May, when growing conditions across the southern portion of the United States, and particularly in California, are favorable. In mid- to late-summer, production declines before reaching seasonal lows from July through October. A second spike occurs in late fall when Florida production reaches the market. The seasonal production trends generally hold for all varieties of tomatoes, including round, cherry, grape, and plum, which accounted for approximately 77, 3, 9, and 12 percent, respectively, of all shipments from 2012 to 2016. Of the varieties, round tomatoes have the most stable supply year-round, followed by plum, or Roma, tomatoes (fig. 4).

Figure 4

Seasonality of shipments of fresh market tomatoes by variety: 2012-16

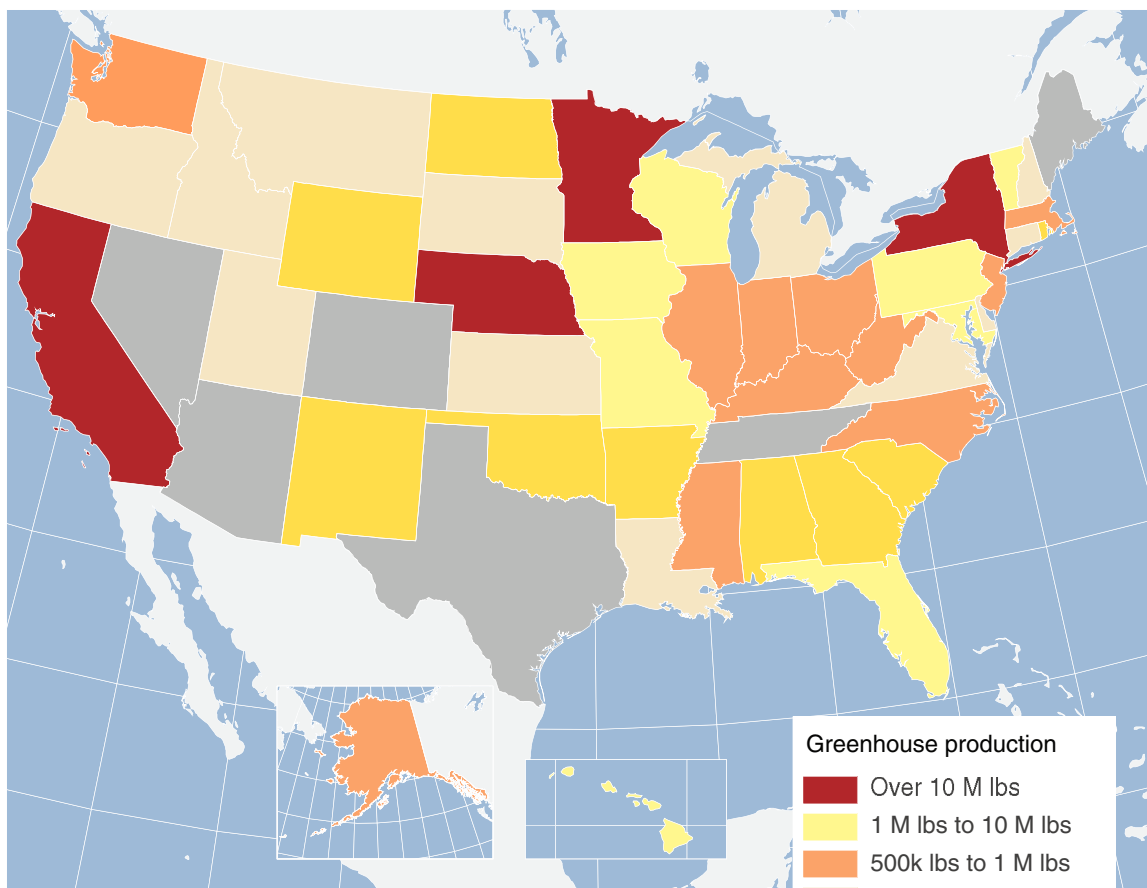


Source: USDA, Economic Research Service using data from USDA, Agricultural Marketing Service, Annual Fresh Fruit and Vegetable Shipments: Specialty Crops Shipments reports.

Greenhouse Tomato Production Expands Throughout North America

While Florida and California accounted for 76 percent of U.S. production of field-grown tomatoes in 2016, greenhouse production and use of other protected-culture technologies help extend the growing season and make production feasible in a wider variety of geographic locations (Calvin et al., 2013). Some greenhouse production is clustered in traditional field-grown-tomato-producing States like California, according to the USDA, National Agricultural Statistics Service (NASS) *2014 Census of Horticulture Specialties*. However, high concentrations of greenhouses are also located in Nebraska, Minnesota, New York, and other States that are not traditional market leaders (fig. 5). Among the benefits that greenhouse tomato producers can realize are greater market access both in the off-season and in northern retail produce markets, better product consistency, and improved yields. These benefits make greenhouse tomato production an increasingly attractive alternative to field production despite higher production costs.

Figure 5
U.S. greenhouse tomato production, 2014



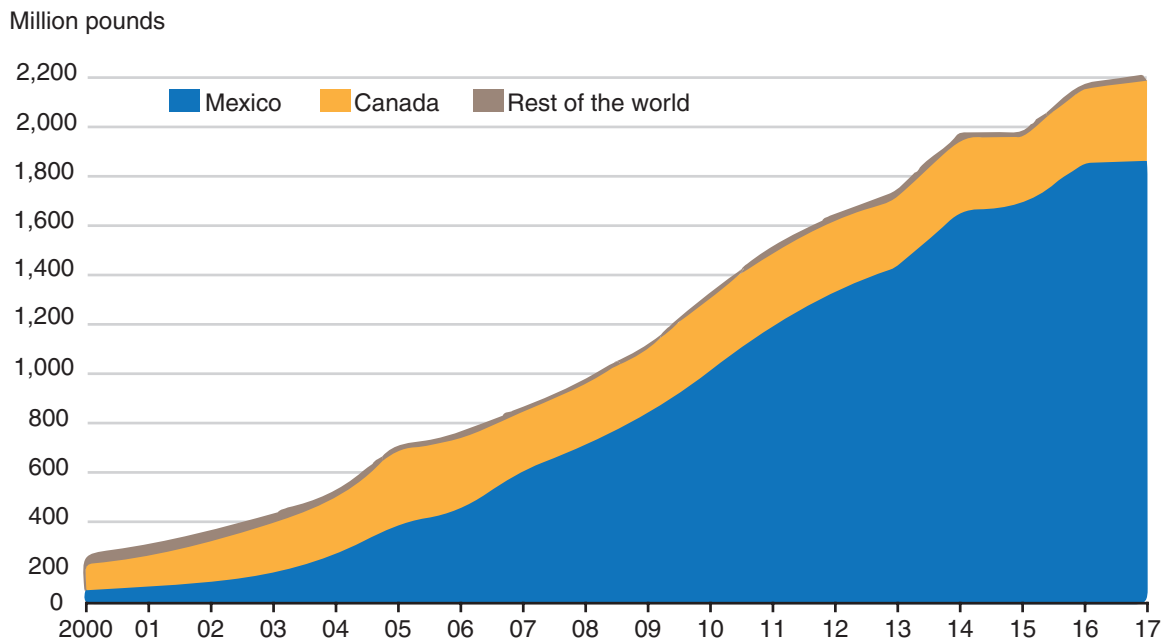
M = million. k = thousand.

Source: USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service, *Census of Agriculture, 2014 Census of Horticultural Specialties*.

Detailed production data on protected-culture technologies, which include hothouses, hoop houses, and shade houses in addition to greenhouses, are not readily available. However, data related to shipments of greenhouse-grown tomatoes (largely cherry and grape varieties) provide a proxy indicator for the volume of protected-culture production. In 2000, USDA, Agricultural Marketing Service (AMS) reported that no shipments were greenhouse-grown. From 2005 to 2012, AMS reports that greenhouse-grown shipments grew steadily to 475 million pounds annually. By 2017, greenhouse-grown tomatoes constituted more than 5 percent of shipments (fig. 1). However, that share is likely understated. With the withdrawal of a major shipper from the AMS voluntary reporting process after 2013, reported greenhouse shipments fell to around 200 million pounds, where the figure has remained in recent years.

In 2004, U.S., Mexican, and Canadian growers each contributed about 300 million pounds of greenhouse tomatoes annually to the U.S. fresh tomato market.³ Since then, Mexico's share of the greenhouse tomato market has grown sharply, averaging 35 percent annual growth, outpacing shipments of field-grown fresh tomatoes from Mexico to the United States. In 2017, imports from Mexico accounted for almost 84 percent (1.8 billion pounds) of the greenhouse volume coming into the U.S. market. Imports of Canadian greenhouse-grown tomatoes, approximated by fresh market tomato shipments to the United States, have remained at about 300 million pounds (USDA, FAS, 2016 and Statistics Canada, 2017) (fig. 6).

Figure 6
Greenhouse-grown fresh market tomato imports, 2000-17



Source: U.S. Department of Commerce, Census Bureau. Figures include all greenhouse-grown fresh tomatoes imported into the United States.

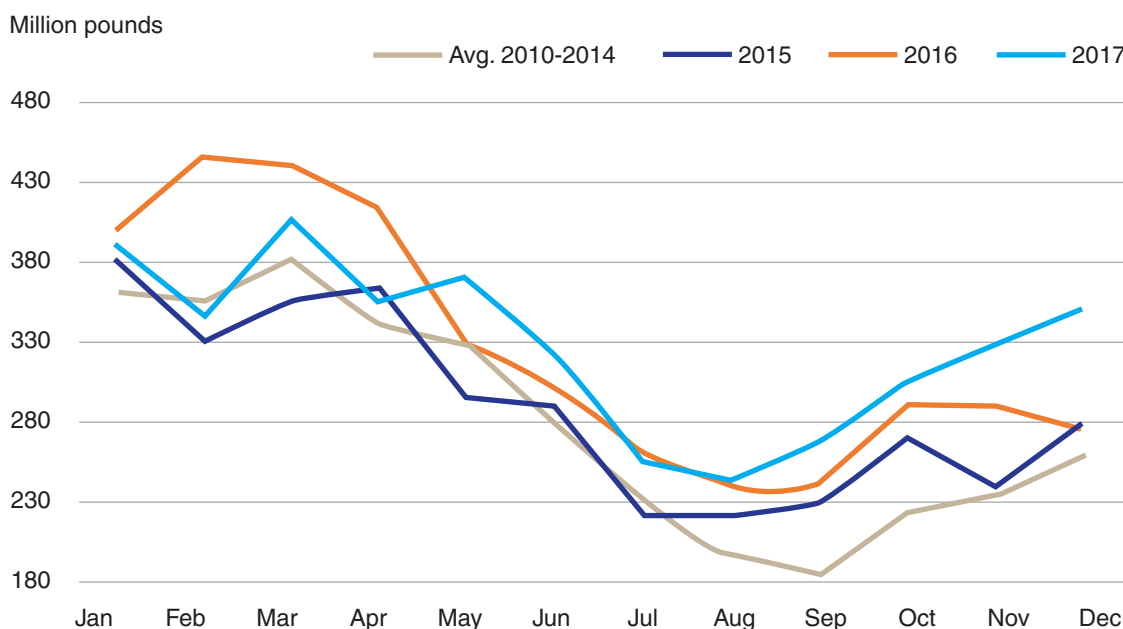
³ Import data differentiate between greenhouse-grown tomatoes (HTS codes: 0702002010, 0702004010, and 0702006010) and field-grown tomatoes, allowing users to focus on this market. This differentiation, however, is not made for tomatoes exported from the United States.

Imports Support Sustained Growth in Per Capita Availability

Imports, most-often sourced from Mexico, increasingly supplement U.S. production. In 2000, imports provided 30 percent of fresh market tomatoes for domestic use; by 2016 that proportion had increased to 57 percent (USDA, ERS, 2018). Unfavorable weather conditions in Florida boosted imports by nearly 30 percent between 2009 and 2010. In 2010, for the first time, imports constituted a majority of total U.S. fresh tomato supplies. After dipping slightly below 50 percent in 2011, imports have since risen to once again represent the largest source of U.S. fresh tomato supplies. Fresh tomatoes from Mexico (field and greenhouse) accounted for over 90 percent of total fresh tomato imports in 2016 (USDA, ERS, 2018).

Imports of fresh market tomatoes are also highly seasonal (fig. 7). Mexican imports are at their highest levels in January through March, when temperatures in Mexico are warmer than in the United States, and then steadily recede through the spring and summer as the United States moves into full production. Imports from Mexico begin to climb again in October.

Figure 7
Seasonality of fresh market tomato imports, 2010-17



Source: U.S. Department of Commerce, Census Bureau.

Rising imports have supplemented supply and fostered higher per capita availability. Since 2000, per capita availability has risen 11 percent, indicating that, on average, fresh tomato supplies are growing at a faster pace than the U.S. population. An exception to this trend occurred in 2008 when a *Salmonella* outbreak erroneously attributed to tomatoes drove prices down and resulted in reduced production, leading to lower supply and per capita availability (CDC, 2008). In 2009, price, domestic production, and per capita availability began to recover before eventually rising to pre-outbreak levels by 2010.

Suspension Agreement Governs Fresh Tomato Imports From Mexico

U.S. imports of fresh tomatoes from Mexico are subject to a suspension agreement negotiated in 1996 between the U.S. Department of Commerce and producers/exporters in Mexico to settle an antidumping lawsuit brought by the United States (U.S. Department of Commerce, 2013). The agreement, which suspends the lawsuit as long as the suspension agreement is honored, sets a minimum price (referred to as a reference price) for fresh market tomatoes entering into U.S. commerce from Mexico. Tomatoes intended for processing or tomatoes that will not enter into traditional market channels, such as those intended for charity or relief organizations, are not subject to the agreement (USDA, AMS, 2013).

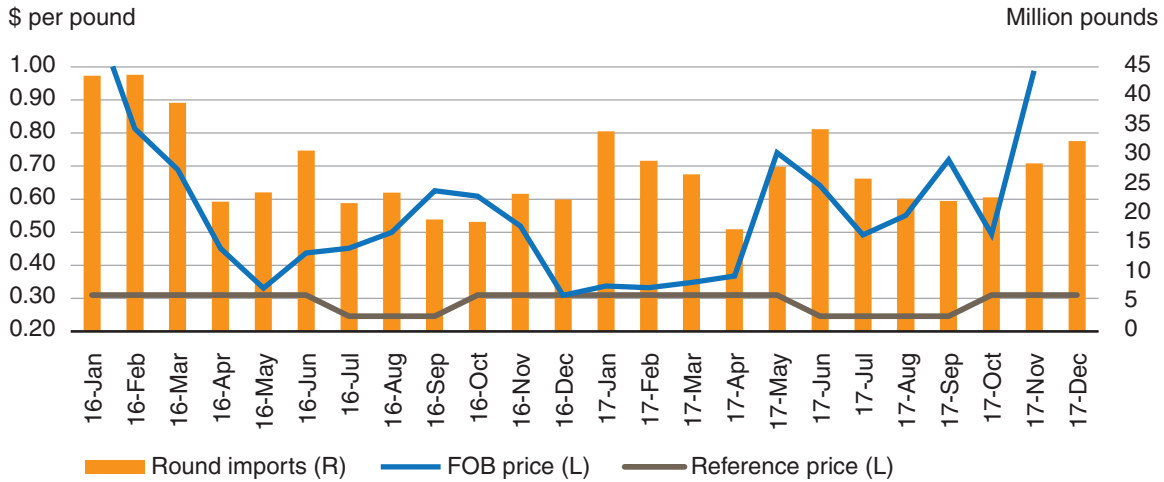
Subject to review every 5 years, the agreement was updated in 2002, 2008, and 2013. In August 2018, the fourth sunset review was completed and the results published in the Federal Register. As of November 2018, the suspension agreement, in the form negotiated in 2013, remains in effect. The agreement divides the fresh tomato market into two periods: July 1 to October 22, when shipments (both domestic and international) are generally lower and primarily from California and Northern Mexico, and October 22 to June 30, when shipments are higher and primarily from Florida and Central Mexico. Reference prices are higher in the October to June period.

The suspension agreement has evolved to address more niche areas of the fresh tomato market. For example, the 2013 agreement went beyond setting a reference price for tomatoes in general and specified categories and prices that reflected the increasing specialization and diversity found in the contemporary market. Fresh market tomatoes grown in a controlled environment (such as those grown in greenhouses, hot houses, and hoop houses) had an approximately 10-cent higher reference (i.e., minimum) price than field-grown tomatoes in each market period. Additionally, specialty tomatoes (cherry, grape, and heirloom) were differentiated from the round fresh tomato market, and their reference price was about 3 cents above the controlled-environment price. Finally, tomatoes in plastic clamshell packaging had the highest reference price—90 percent higher than the prices for traditional open-field tomatoes.

If the U.S. free-on-board (FOB) price of these tomatoes falls below the reference price, producers in Mexico are not permitted to ship their product into U.S. markets. All shipments of tomatoes from Mexico must be labeled as being in compliance with the suspension agreement, and shipments that remain in Mexico must be labeled as not for sale in U.S. commerce. A violation of the agreement can result in a civil penalty of up to the full value of the shipped product. To ensure compliance, import data on volume and price are monitored by the U.S. Department of Commerce and a joint industry-Mexican Government working group.

Comparing the FOB shipping price with the reference price for round tomatoes from 2016 to 2017 reveals that the reference price only infrequently converges with the FOB shipping price (fig. 8). The reference price was closer to the FOB price in May and December 2016 and April 2017, during periods when import volumes are generally greater and the reference price is higher and more restrictive.

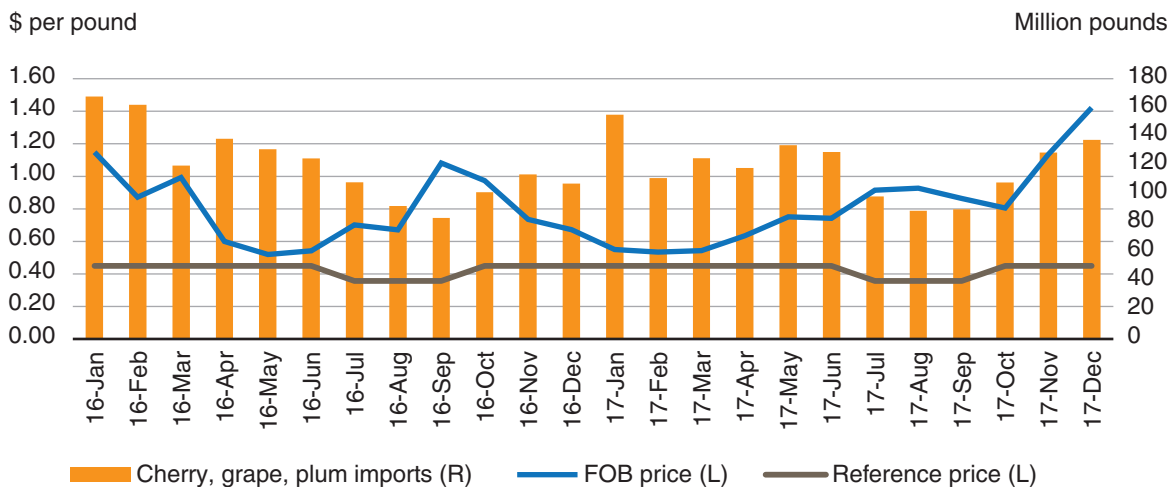
Figure 8
Price and imports of round tomatoes, 2016-17



Notes: FOB = free on board. FOB average price per container converted to price per pound by using an average container size of 22.40 pounds. Prices and imports exclude greenhouse or “vine-ripe” round tomatoes. L = left axis. R = right axis. Source: USDA, Economic Research Service using data from USDA, Agricultural Marketing Service and U.S. Department of Commerce, Census Bureau.

When the FOB shipping price, the reference price, and import volumes of cherry, grape, and plum tomatoes are compared with those of round tomatoes from 2016 to 2017, it is apparent that prices and import volumes are consistently higher for specialty tomatoes. Although the reference price for cherry, grape, and plum tomatoes did not appear to converge with the FOB price in the observed time period, it was closest to converging during the October-June period when FOB prices were somewhat lower and imports tended to be higher (fig. 9).

Figure 9
Price and imports of specialty tomatoes, 2016-17

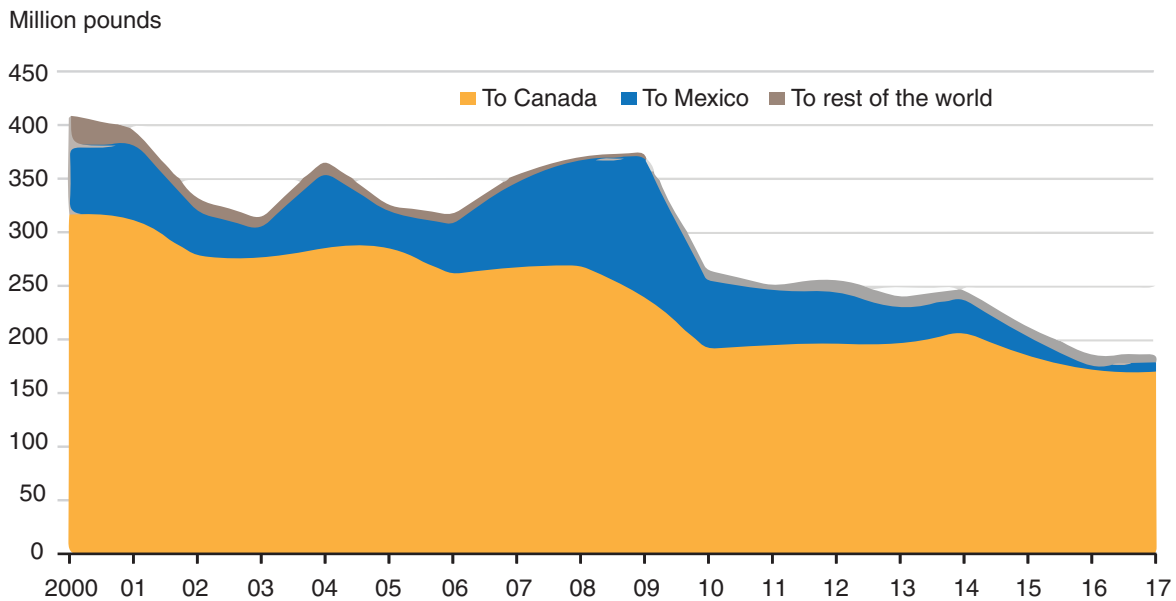


Notes: FOB = free on board. FOB average price per container converted to price per pound by using an average container size of 11.30 pounds. Prices exclude clamshell packaged tomatoes. L = left axis. R = right axis. Source: USDA, Economic Research Service using data from USDA, Agricultural Marketing Service and U.S. Department of Commerce, Census Bureau.

Exports Trend Down, Mirroring Domestic Field Production

Over the past 17 years, U.S. exports of fresh market tomatoes have fallen 54 percent, down from a peak of 410 million pounds in 2000 to just 188 million pounds in 2017. Reduced U.S. exports parallel reduced U.S. production. Canada remains the primary destination for U.S. exports of fresh tomatoes. While the value of U.S. exports to Canada has remained relatively steady at about \$115 million annually for the last 5 years, the volume of fresh market tomato exports to Canada has gradually declined, from 198 million pounds in 2013 to 172 million pounds in 2017. Mexico is the second-ranked destination for U.S. exports, with average annual sales of \$17 million in 2012-17. In 2017, U.S. exports of fresh tomatoes to Mexico were less than 10 million pounds (fig. 10).

Figure 10
U.S. fresh market tomato exports, 2000-17



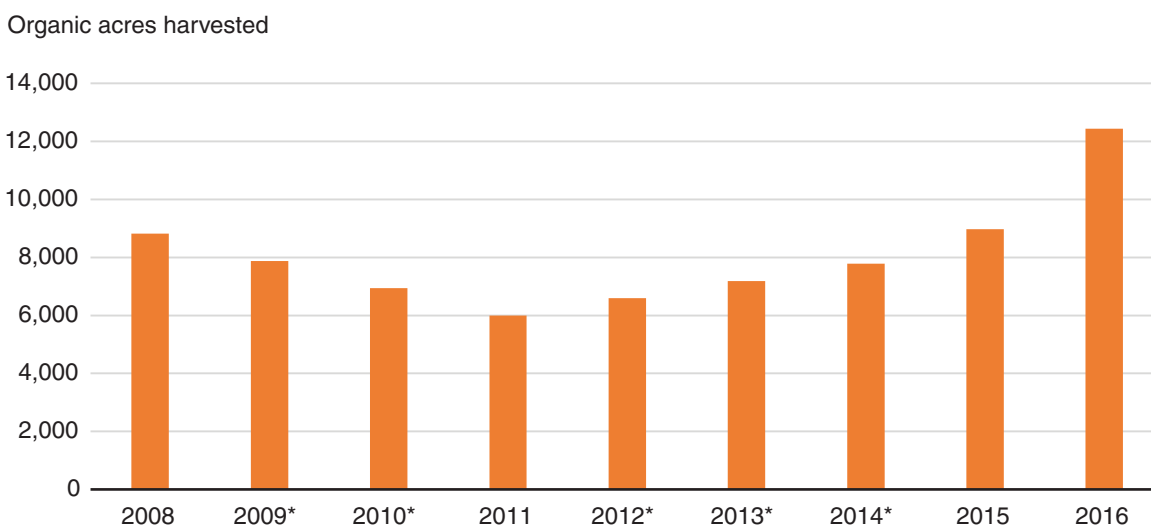
Source: USDA, Economic Research Service, Vegetable and Pulses Yearbook, and using data from U.S. Department of Commerce, Census Bureau.

Growth in the Organic Tomato Market Segment

Fresh tomatoes have remained a staple in American kitchens even as consumer tastes and preferences have evolved. Producers have responded to consumer demand for more organic produce by cultivating a growing volume of organic tomatoes. Organic fresh market tomato acreage reached a high of 12,400 acres in 2016, following several years of steady growth that began in 2012. Prior to 2012, the organic tomato industry experienced a period of contraction lasting from 2008 to 2011. During that time, organic tomato acreage fell approximately 32 percent to 6,000 acres in 2011. Increased consumer price sensitivity coupled with the higher relative price of organic produce contributed to the decline in both demand and production. After 2011, the organic tomato price began to rebound and encouraged production to grow by 50 percent from 2011 to 2015. From 2015 to 2016, acres harvested of organic tomatoes grew by another 39 percent to reach record levels (fig. 11).

Figure 11

Organic acres harvested for tomatoes grown in the open, 2008-16



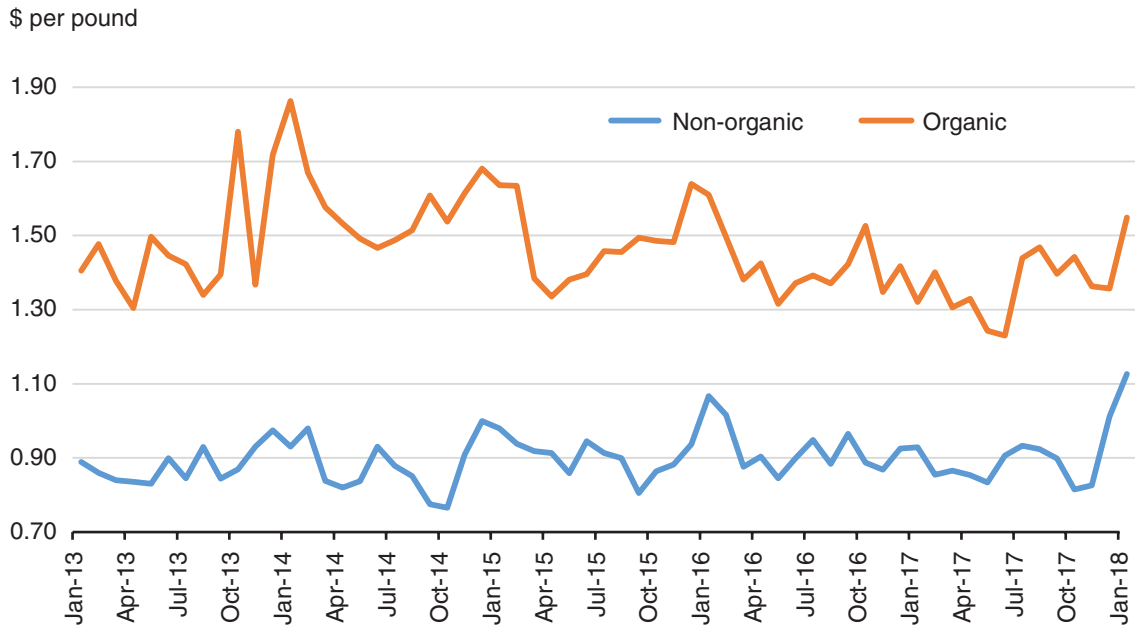
* Data imputed for non-reporting years.

Source: USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service.

In 2015, about 1,190 U.S. farms sold 45 million pounds of organic, fresh market tomatoes valued at close to \$68 million. Organic production accounted for 1.3 percent of total domestic fresh market tomato production in 2015 (USDA, NASS, Quick Stats database, 2018). Just as in overall fresh market tomato production, California was the largest organic producer, accounting for almost 60 percent of organic fresh market tomato volume. Florida, Pennsylvania, New Jersey, and New York constituted the remaining top five producing States. Indicative of a sustained and growing food trend, organic fresh market tomato shipments rapidly expanded between 2008 and 2018.

Between January 2013 and January 2018, advertised retail prices for round (excludes Roma and cherry varieties) organic tomatoes were, on average, \$1.43 per pound—over 60 percent higher than their conventional counterparts at \$0.89 per pound. Since April 2015, organic and conventional fresh tomato prices have largely paralleled each other, with organic round tomatoes commanding a stable price premium (fig. 12).

Figure 12
Retail price of organic and non-organic round tomatoes, 2013-18*



*Data available for partial year only.
 Source: USDA, Economic Research Service using data from USDA, Agricultural Marketing Service.

Looking Forward

Viewed from grocery store produce aisles, where consistent supplies of varied fresh tomatoes are readily available year round, the fresh tomato market could be seen as stable or relatively unchanging. Behind the scenes, however, technology, trade, seasonal price patterns, and variety expansion are all playing important roles in shaping the market for growers and consumers (fig. 1). Greenhouse, hoop house, and other controlled- and adapted-environment technologies have allowed domestic production to expand to regions and seasons where production was not previously feasible (economically or otherwise). Imports of both field- and greenhouse-grown tomatoes are increasingly supplementing domestic production and reducing U.S. growers' share of total supply. Fresh tomato markets are also becoming more highly differentiated, with multiple varieties—including cherry, grape, plum, and organic options—being marketed alongside traditional field-grown round tomatoes. By evolving in response to changing consumer demands and market opportunities, the fresh tomato sector has experienced a long period of expanding supplies and per capita availability. Current trends favor continued expansion and provide momentum for sustained growth.

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