

CARDON RESEARCH PAPERS IN AGRICULTURAL AND RESOURCE ECONOMICS

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Impact of COVID-19 Pandemic on Fresh Tomato Shipments and Prices

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The implementation of stay-at-home orders in March 2020 to prevent the spread of COVID-19 and the rapid, dramatic downscaling of foodservice operations across the country represents an unprecedented shock to U.S. food supply chains. Consumer spending on grocery retail saw a dramatic surge as households stocked up on supplies and demand for food retail has remained elevated since. Meanwhile, demand for food away from home collapsed as restaurants and bars were ordered to cease all dine-in service. While this market shock is interesting per se, it can also offer more detailed insight into the supply, demand, and market structure for individual commodities. This study examines the impacts of the COVID-19 pandemic on the U.S. market for fresh tomatoes. Market data quantifying the volume, price, and origin of tomatoes sold via foodservice supply chains do not exist at the industry level, nor do data on the volume sold at retail. The COVID-19 pandemic offers an opportunity to examine responses in volume and price by origin to the demand shocks caused by the pandemic, and information can be gleaned indirectly regarding the market for foodservice tomatoes and the role of tomatoes of different origins within the foodservice industry.

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Fresh Produce Association of the Americas

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Executive Summary

What is the issue?

The implementation of stay-at-home orders in March 2020 to prevent the spread of COVID-19 and the rapid, dramatic downscaling of foodservice operations across the country represents an unprecedented shock to U.S. food supply chains. Consumer spending on grocery retail saw a dramatic surge as households stocked up on supplies and demand for food retail has remained elevated since. Meanwhile, demand for food away from home collapsed as restaurants and bars were ordered to cease all dine-in service. While this market shock is interesting per se, it can also offer more detailed insight into the supply, demand, and market structure for individual commodities. ***This study examines the impacts of the COVID-19 pandemic on the U.S. market for fresh tomatoes.*** Market data quantifying the volume, price, and origin of tomatoes sold via foodservice supply chains do not exist at the industry level, nor do data on the volume sold at retail. The COVID-19 pandemic offers an opportunity to examine responses in volume and price by origin to the demand shocks caused by the pandemic, and information can be gleaned indirectly regarding the market for foodservice tomatoes and the role of tomatoes of different origins within the foodservice industry.

What did the study find?

Shipment volumes

- Round tomato shipping volumes saw significant declines following the start of COVID-19 related business closures. Mature greens saw the steepest drop, and the volume of Florida mature green tomato shipments persisted below its 5-year average for the remainder of the 2019/2020 season. The volume of Mexico vine ripe tomato shipments declined after shelter-in-place orders were enacted but later rebounded.
- Roma tomato shipment volumes track with their five-year averages, though a modest decline in shipments in the weeks following COVID-related business closures can be seen, particularly in shipments from Mexico.

Shipping point prices

- Shipping point prices for round tomatoes (mature greens from Florida and vine ripers from Mexico) as well as Roma tomatoes, were at or above five-year average prices for nearly all of the 2019/20 season.

Retail prices

- Generally, round and Roma tomato retail prices track with their 5-year averages. This contrasts with prices for other grocery commodities following the shock, such as meat and dairy, which saw large price increases after the onset of the pandemic.

How was the study done?

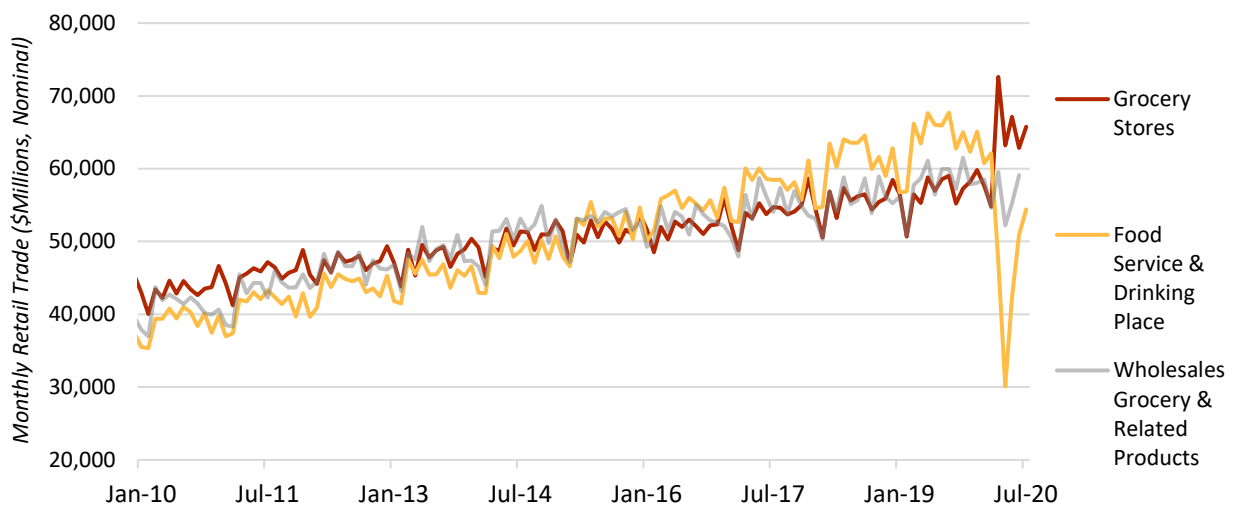
This study compares 2019/2020 growing season prices and volumes for round and Roma tomatoes originating from Florida and Mexico with previous 5-year averages to evaluate the effects of the COVID-19 shock on the U.S. market for tomatoes. Weekly shipping point prices, shipping point volumes, and retail prices were grouped by growing season, ranging from week 40 of a calendar year (first week of October) to week 39 of the subsequent calendar year (roughly last week in September). The onset of COVID-19 business closures is designated throughout the report as occurring during week 11, roughly the week of March 9th. Container sizes were assigned their corresponding weight using U.S. Department of Agriculture, Agricultural Marketing Service (USDA AMS) conversions and all prices were converted to a per-pound basis. All prices are nominal and were not adjusted for inflation considering the relatively short historical period examined in the analysis.

Introduction

COVID-19, the disease caused by the novel SARS-CoV-2 virus (WHO, 2020), has claimed a staggering number of human lives and caused dramatic disruptions to nearly every facet of daily life for individuals across the entire globe. First detected through an initial outbreak beginning in late 2019 in the province of Wuhan, China, the virus quickly spread through travel to areas of Asia, Europe, and North America, and by January 31, 2020, the World Health Organization issued a global health emergency (AJMC, 2020). Within the United States, the first case of COVID-19 was confirmed on January 21 in the state of Washington (AJMC, 2020). U.S. cases began to increase throughout February, evidence of community transmission emerged, and by the week of March 9th, individual states began issuing emergency declarations. In the following weeks, states implemented restrictions on large gatherings, as well as the closure of schools, restaurants, and other congregate settings (NGA, 2020).

The implementation of stay-at-home orders and the rapid, dramatic downscaling of foodservice operations across the country represents an unprecedented shock to U.S. food supply chains. Consumer spending on grocery retail saw a dramatic surge as households stocked up on supplies and demand for food retail has remained elevated since (Melo, 2020). Meanwhile, demand for food away from home collapsed as restaurants and bars were ordered to cease all dine-in service (OECD, 2020). Figure 1 illustrates the long-term trend towards near-parity between spending on food at home and grocery retail, followed by the sudden shift in consumer spending away from foodservice and towards food retail in response to the pandemic.

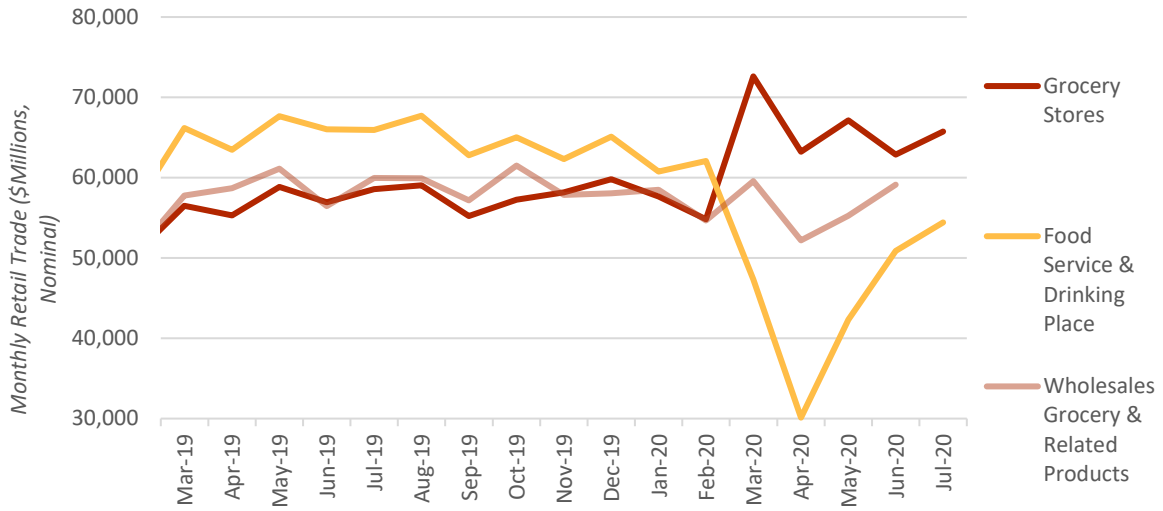
Figure 1. Monthly U.S. Retail Trade for Food Retail, Foodservice, & Wholesale (Millions, Nominal USD), 1992-2020



Source: U.S. Census Bureau (2020)

Between February 2020 and April 2020, retail spending at foodservice and drinking places fell by 51%. From February 2020 to March 2020, retail spending at grocery stores increased by 33% (Figure 2).

Figure 2. Monthly U.S. Retail Trade for Food Retail, Foodservice, & Wholesale (Millions, Nominal USD), March 2019 – July 2020



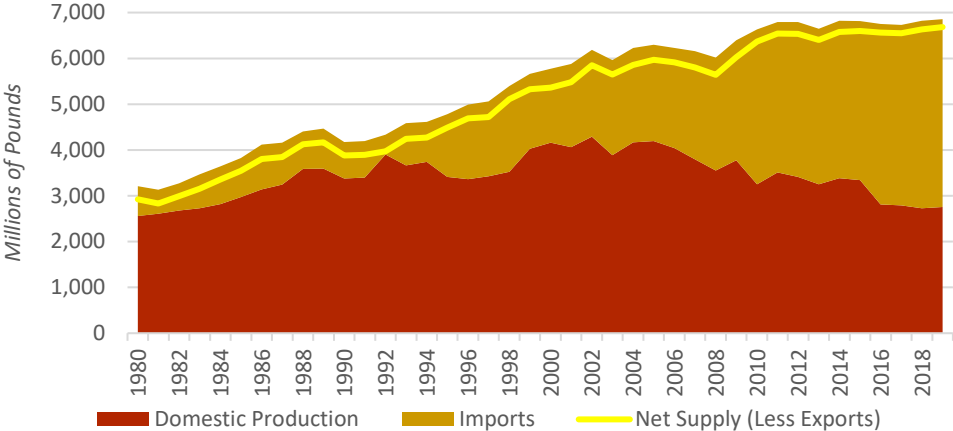
Source: U.S. Census Bureau (2020)

While this market shock is interesting per se, it can also offer more detailed insight into the supply, demand, and market structure for individual commodities. ***This study examines the impacts of the COVID-19 pandemic on the U.S. market for fresh tomatoes.*** Data quantifying the volume, price, and origin of tomatoes produced within and imported into the United States are readily available from the USDA Agricultural Marketing Service, as are data on the price and origin of tomatoes sold at retail (USDA AMS, 2020). Market data quantifying the volume, price, and origin of tomatoes sold via foodservice supply chains, however, do not exist at the industry-level, nor do data on the volume sold at retail. The COVID-19 pandemic offers a black-box experiment of sorts. Through examining responses in volume and price by origin to the demand shocks caused by the pandemic, information can be gleaned indirectly regarding the market for foodservice tomatoes and the role of tomatoes of different origins within the foodservice industry.

Background

U.S. fresh tomato supply has roughly doubled in the past 40 years, with most growth occurring through imports (Figure 3). U.S. exports of tomatoes represent only a small share of total supply. By weight, most tomatoes sold are round tomatoes or Roma (plum) tomatoes. It bears mentioning that tomato production in the U.S. for the processed market is separate from the fresh market. Roughly 95% of U.S. tomato production for processing occurs in California (Geisseler & Horwath, 2016).

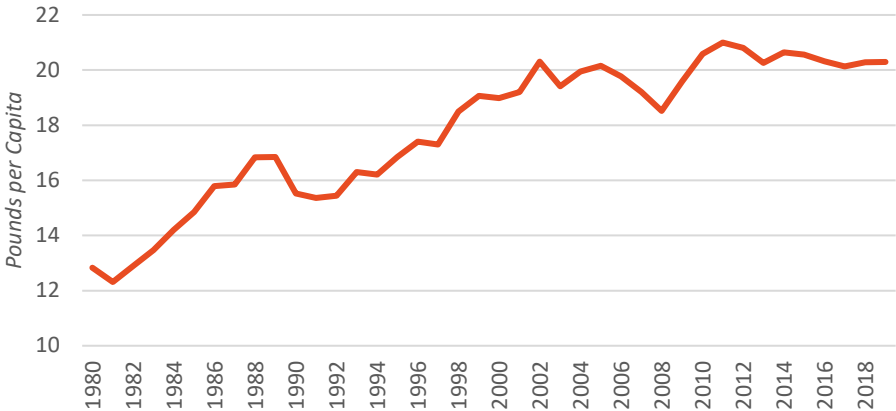
Figure 3. U.S. Fresh Tomato Supply, 1980-2019



Source: USDA ERS (2020)

As measured by per-capita availability, U.S. fresh tomato supply has grown over the past 40 years, leveling out around 20 pounds of availability per capita (Figure 4).

Figure 4. U.S. Fresh Tomato Supply in Pounds of Per Capita Availability, 1980-2019





Source: USDA ERS (2020)

U.S. fresh tomato supply is dominated by production in Florida and imports from Mexico. Combined, Florida and Mexico constitute 69.1% of U.S. shipments of round tomatoes and 90.9% of U.S. shipments of Roma (plum) tomatoes as of calendar year 2019 (USDA AMS, 2020c). Again, considerable tomato production occurs in California, however, that supply is destined primarily for food processing. Additionally, imports of greenhouse-produced tomatoes from Canada has seen rapid growth in recent years. As of 2019, U.S. shipments of round tomatoes were 23.8% of Florida origin, 45.4% of Mexico origin, 10.6% of Canada origin, and 20.3% of other origins (USDA AMS,

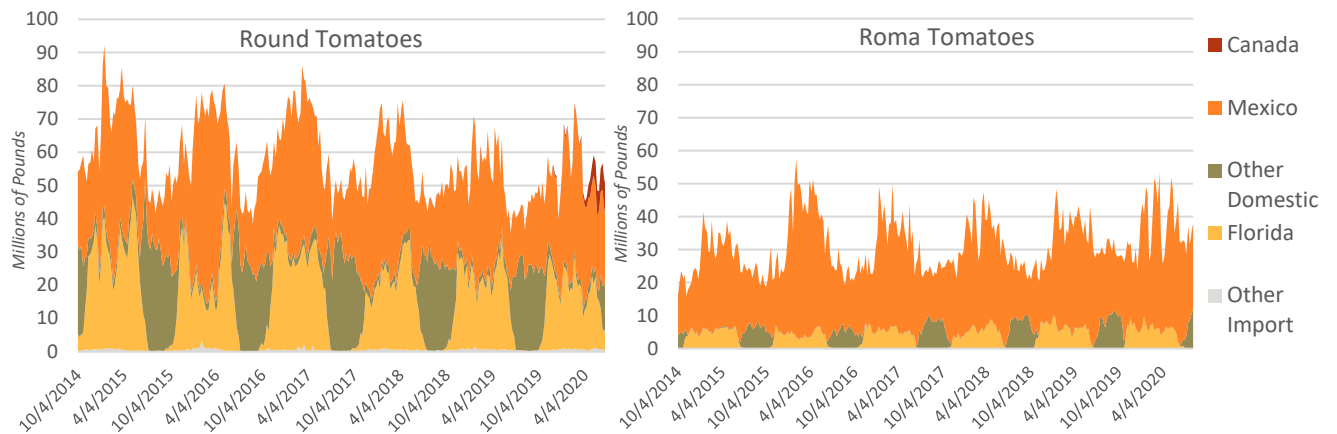
2020c). Shipments of Roma (plum) tomatoes were 11.1% of Florida origin, 79.8% of Mexico origin, and 9.1% of other origin (USDA AMS, 2020c). This analysis examines round tomatoes (both mature greens and vine ripens) and Roma (also known as plum) tomatoes (Table 1).

Table 1. Tomato Types & Varieties Covered in Analysis

Tomato Type	Image	Varieties
Round tomato		<ul style="list-style-type: none"> • Mature greens – tomatoes harvested prior to changing color, then either treated to induce ripening or that ripen during transport to market • Vine ripens – tomatoes harvested once they have started to ripen
Roma (plum) tomato		<ul style="list-style-type: none"> • Roma tomatoes traditionally used for canning or paste, gaining popularity in fresh market

Shipments of both round tomatoes and Roma tomatoes for the U.S. market are highly seasonal. Figure 5 illustrates the weekly volume of shipments between 2014 and 2020 by origin. Weekly shipments peak during spring months for both round and Roma tomatoes.

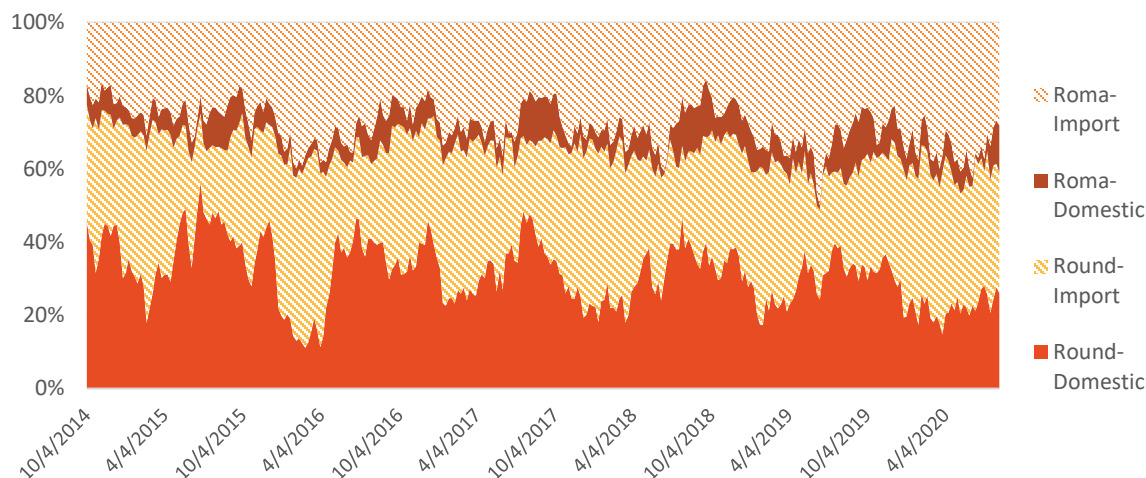
Figure 5. Weekly Round & Roma Tomato Shipping Volume by Origin, 10/2014 – 8/2020



Source: USDA AMS (2020)

Over recent years, the share of round tomatoes has seen a gradual decline as Roma tomatoes have become more popular in the U.S. Figure 6 presents the share of weekly U.S. tomato shipments for round and Roma tomatoes combined, both domestically produced and imported. A high share of Roma tomatoes is imported, whereas the share of round tomatoes imported is closer to the share domestically produced.

Figure 6. Share of Weekly U.S. Tomato Shipments, Domestic & Imported Roma & Round Tomatoes, 10/2014 – 8/2020



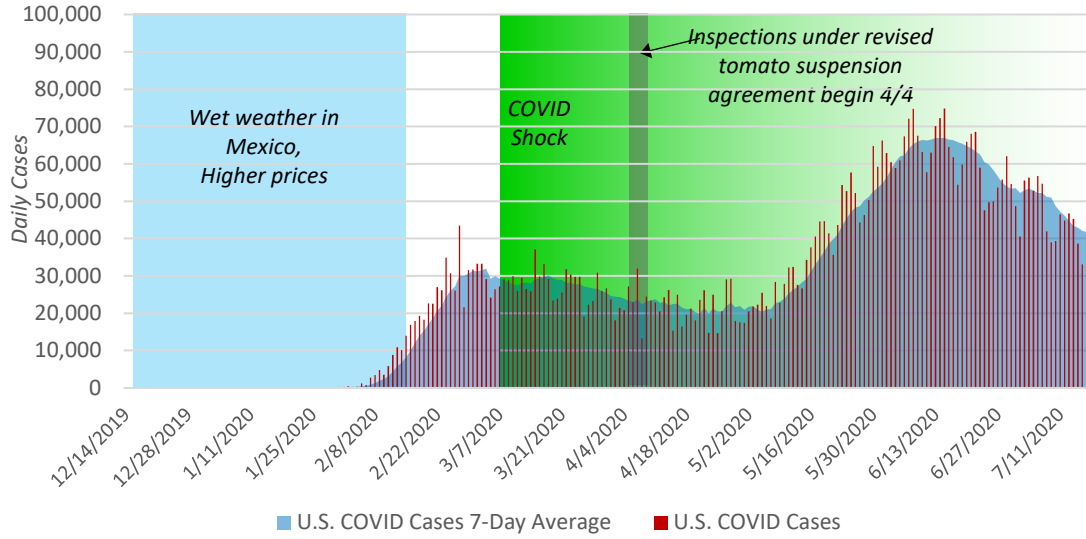
Source: USDA AMS (2020)

It's estimated that over 50% of U.S. fresh tomato availability (supply less exports) is destined for foodservice, while the remainder goes to grocery retail (Cook, 2015). The foodservice industry relies particularly on mature greens which are preferred for slicing (Cook, 2015). Since the 2014/2015 growing season, 99% of round tomato shipments (by weight) from Florida have been of mature greens (USDA AMS, 2020). As mentioned earlier, however, data quantifying the volume, price, type, and origin of tomatoes purchased by the foodservice industry are not available at the industry-level. Using existing data on shipment volumes, prices, tomato varieties, and origin, this analysis uses the shock to the foodservice and grocery retail industries caused by COVID-19 business closures to better understand the segmentation of the U.S. tomato market.

In the early weeks of March 2020, states and local governments around the United States began to implement emergency responses to control the outbreak of COVID-19. This included ceasing dine-in restaurant services, as well as the closure of schools, and other outlets for foodservice. Meanwhile, in anticipation of stay-at-home orders, many households stockpiled groceries and other supplies. These two factors resulted in a rapid shift in household spending away from food-away-from-home and towards grocery retail. In addition to these effects of COVID-19 on the food supply chain, the 2019/2020 growing season has presented other market shocks. Wet, cold weather in Mexican growing regions between December and February reduced yields, impacting shipments. For example, for the week of December 21, 2019, the shipping volume of Mexican round tomatoes was 39% lower compared with the prior 5-year average. The 'mostly low' price for round tomatoes of Mexican origin was over \$1.36 per pound at the start of 2020, while it was only \$0.86 per pound for the same week in 2019. Additionally, in early April, a provision of the revised tomato suspension agreement went into effect requiring that 99% of tomatoes originating from Mexico be inspected for quality and condition upon import. While new inspectors were hired to accommodate the increased inspection volume, concerns still persisted regarding potential delays of shipments (Karst, 2020).

Figure 7 presents a timeline of the events considered in this analysis – first and foremost, the 2020 COVID-19 outbreak – as well as the potential confounding factors mentioned above.

Figure 7. Timeline of Events for Analysis



Sources: CDC (2020); Burfield (2020); USDA AMS (2020b)

Data & Methods

Weekly data on shipping point price and volume of round and Roma tomatoes originating from Florida and Mexico were retrieved from USDA Agricultural Marketing Service Market News Custom Report portal (USDA AMS, 2020). For purposes of comparison across years, weekly observations on price and volume of shipments from 2014 through August 2020 were coded by date such that the first week of October is coded as week 40. Data were grouped by growing season, ranging from week 40 of a calendar year (first week of October) to week 39 of the subsequent calendar year (roughly last week in September). The onset of COVID-19 business closures is designated throughout the report as occurring during week 11, roughly the week of March 9th.

Data on organic tomatoes were excluded from the analysis as organic shipments represented a very small share of total volume. Container sizes were assigned their corresponding weight using USDA AMS conversions (USDA AMS, 2018) and all prices were converted to a per-pound basis. Preliminary data analysis included examining shipping prices and volume by the most common container sizes for round and Roma tomatoes. In general, for round tomatoes, Mexico usually ships larger tomatoes (4x4, 4x5, 5x5, and 5x6 packages) while Florida tends to ship smaller tomatoes (5x6, 6x6, and 6x7 packages). In consideration of differences in the most commonly shipped package sizes, all price data were converted to a per-pound basis for purposes of comparison and analysis includes all container sizes aggregated.

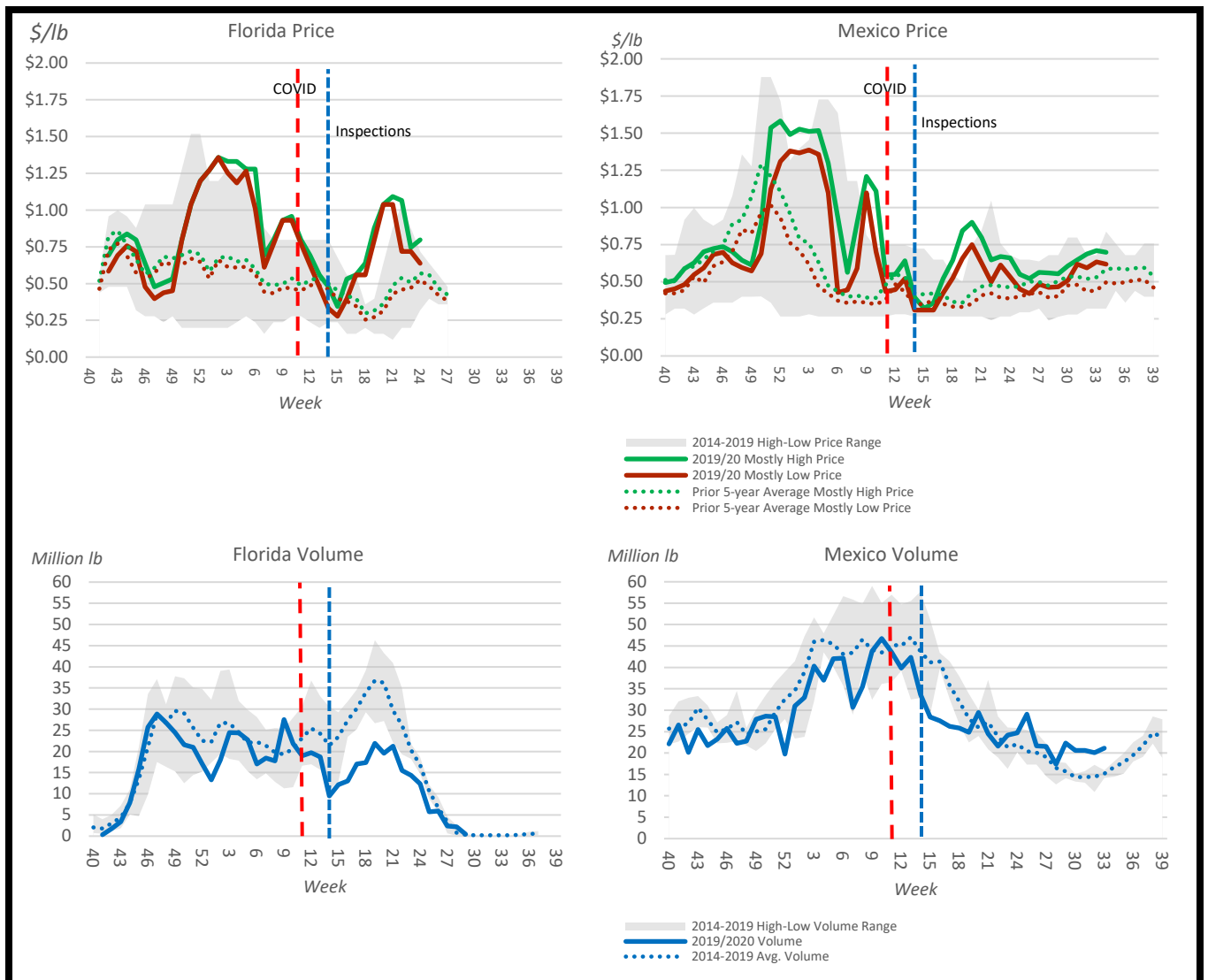
Five-year average weekly trends from the 2014/2015 season beginning in October to the 2018/2019 seasons were constructed for price and volume time series for round and Roma tomatoes from Florida and Mexico, separately. All prices are nominal and were not adjusted for inflation considering the relatively short historical period examined in the analysis. Due to the small proportion of vine ripe round tomatoes produced in Florida, the analysis of Florida-produced round tomatoes is limited to mature greens. Prices are presented for vine-ripes originating in Mexico, however, volume for Mexico is presented for all round tomato varieties combined.

Findings

Round Tomatoes – Shipping Point Price & Volume

Compared with the previous five-year average trend, prices for round tomatoes from both Florida and Mexico saw a sharp jump around week 50 of the 2019/2020 season (roughly mid-December) (Figure 8). This price increase occurred in response to reduced supplies due to unfavorable weather in Mexico between December and February impacting yields. Prices remained elevated above the five-year average for both Florida and Mexico round tomatoes from late December through mid-March. Around week 11, we observe the sudden impact of COVID-related closures (red vertical dashed lines in Figure 8). Prices drop sharply for both Florida and Mexico round tomatoes to at or below the five-year average trend. Following that sharp decline, prices then recover starting around week 17 (mid-April) and remain at or above the five-year average for the remainder of the season.

Figure 8. Weekly High-Low Shipping Point Price Range & Averages (2014/15-2018/19 vs. 2019/20) & Weekly Shipping Point Volumes High-Low Range & Averages (2014/15-2018/19 vs. 2019/20) for Florida & Mexico Round Tomatoes

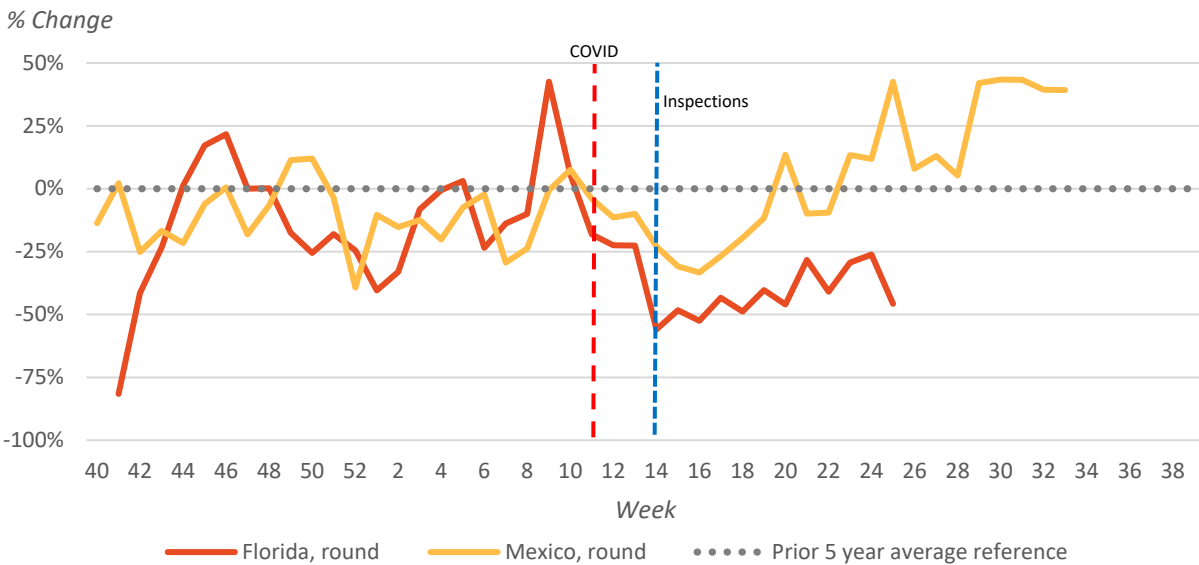


* Deviations in the high-low price range below the tomato suspension agreement reference price for tomatoes imported from Mexico may be observed in the graph due to conversions to a per-pound basis using estimated container weights

Volume of shipments exhibits similar trends compared to the 5-year averages for tomatoes from both Mexico and Florida for the first half of the season, with the exception of some weekly declines in late December and early January. After week 11, however, we see shipments fall below the 5-year average for round tomatoes of both origins. In weeks 15 and 16, volume of round tomatoes from Mexico continues to fall while some rebound is observed in mature greens from Florida. It is unclear if this deviation from the average is a result of COVID-related business closures or due to increased inspections of imports from Mexico beginning April 4th as part of the revised tomato suspension agreement (blue vertical dashed line in Figure 8).

Florida shipments fall to 39% of their five-year average by week 13 and remain well-below average until the end of the season. Mexico shipments also fall, though not as quickly, reaching around 67% of their five-year average by week 16. Following that low point, they begin to rebound and remain at or above the five-year average from week 20 onward (Figure 9).

Figure 9. Percent Difference in 2020 Weekly Round Tomatoes Shipping Volume Compared with Prior 5 Year Average, Florida vs. Mexico (week adjusted)

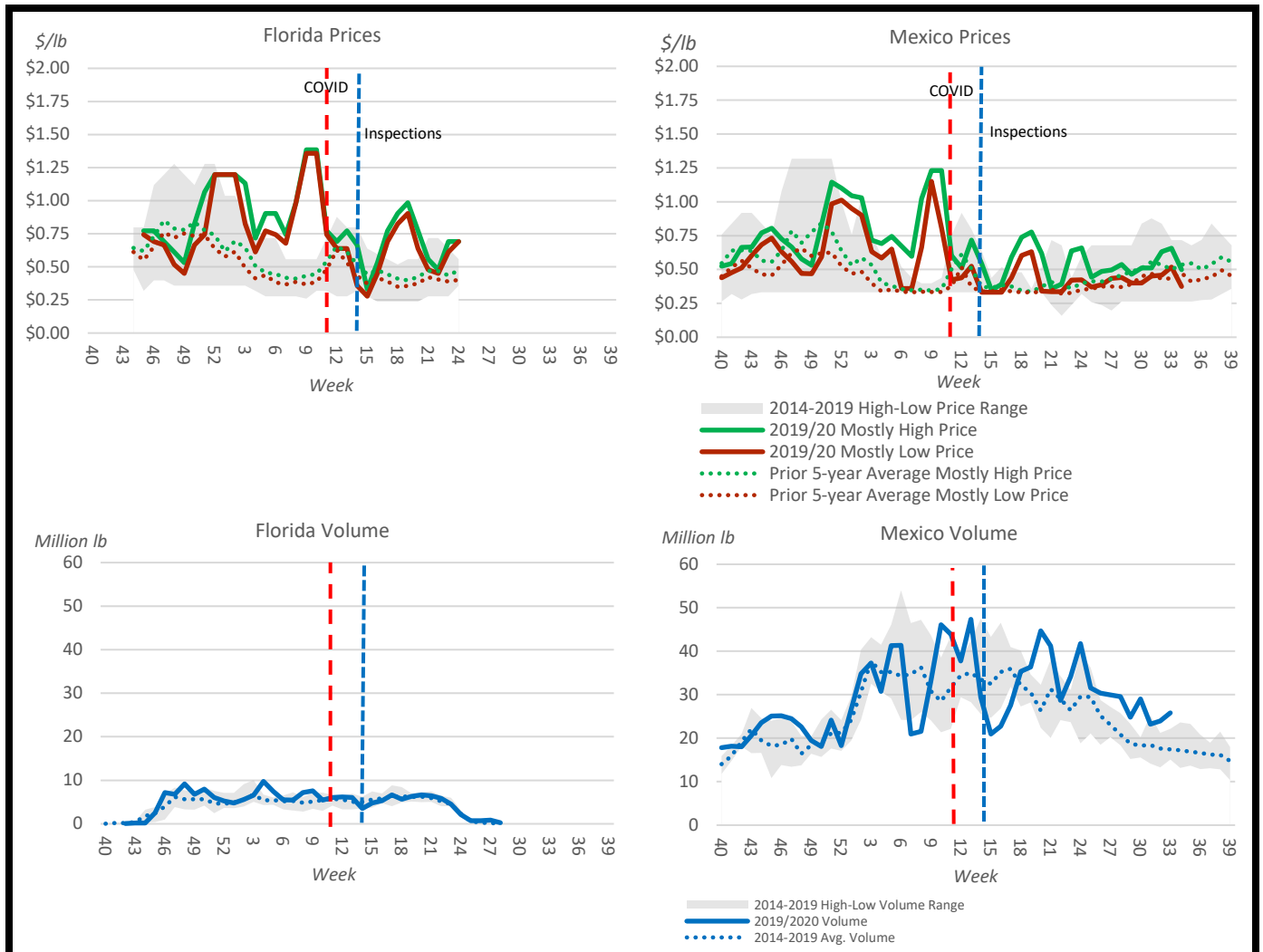


The decline and lack of rebound in round tomato shipments is consistent with the initial shutdown and weak rebound in food service retail trade in subsequent weeks.

Roma Tomatoes – Shipping Point Price & Volume

We observe similar price trends for Roma tomatoes of both Florida and Mexico origin in the 2019/2020 season. Prices are well-above average beginning in mid-December 2019, followed by a sharp decline at the onset of COVID-19 business closures. Thereafter, prices fluctuate, though they remain at or above the five-year average. With a few exceptions, weekly prices remain at or above the five-year average for the entire season (Figure 10).

Figure 10. Weekly High-Low Shipping Point Price Range & Averages (2014/15-2018/19 vs. 2019/20) & Weekly Shipping Point Volumes High-Low Range & Averages (2014/15-2018/19 vs. 2019/20) for Florida & Mexico Roma Tomatoes

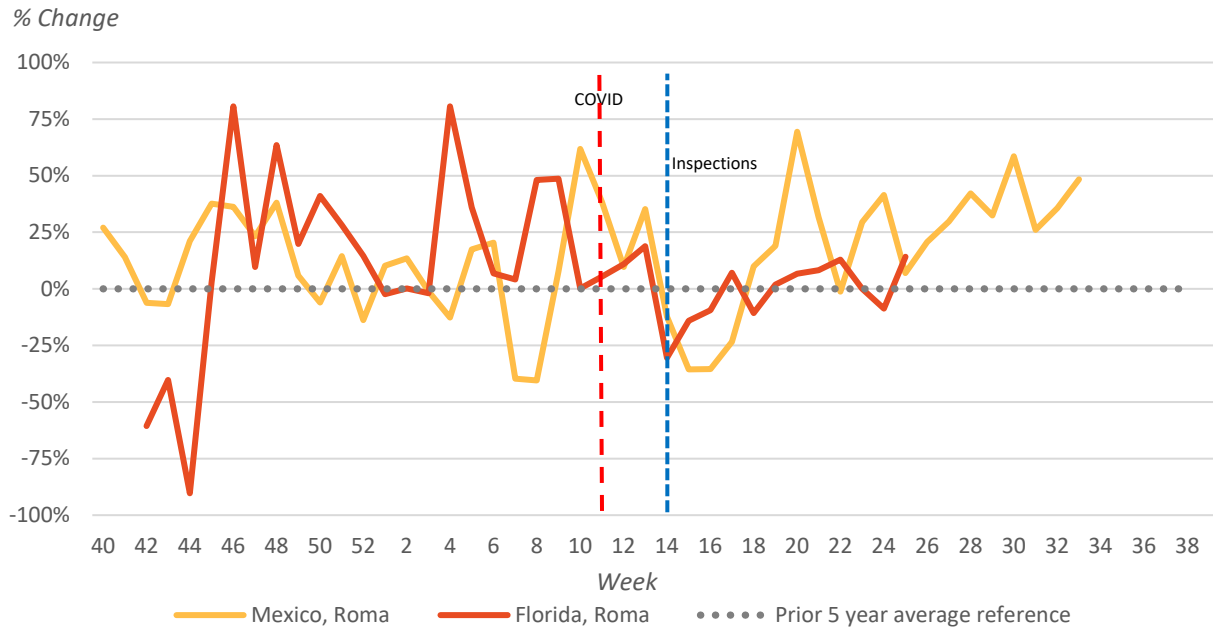


* Deviations in the high-low price range below the tomato suspension agreement reference price for tomatoes imported from Mexico may be observed in the graph due to conversions to a per-pound basis using estimated container weights

Florida Roma tomato shipment volumes in 2020 track very closely with the five-year average. Shipments of Roma tomatoes from Mexico also track with the five-year average, though 2020 data shows week-to-week fluctuations above and below the average trend. Again, in weeks 15 and 16, we see volume of Roma tomatoes from Mexico fall sharply. It is unclear if this deviation from the average is a result of COVID-related business closures or due to increased inspections beginning April 4th as part of the revised tomato suspension agreement.

In terms of percent deviation from the five-year average, 2020 shipments of Roma tomatoes from Florida stay at or above average for most of the growing season. Mexico shipments also fluctuate around the mean. For both Florida and Mexico Roma tomatoes, there appears to be a gradual shift from above-average weekly shipments around the time of COVID-related business closures, to below-average shipments in the weeks following, though both series eventually return to average or above-average levels by around week 18 (Figure 11).

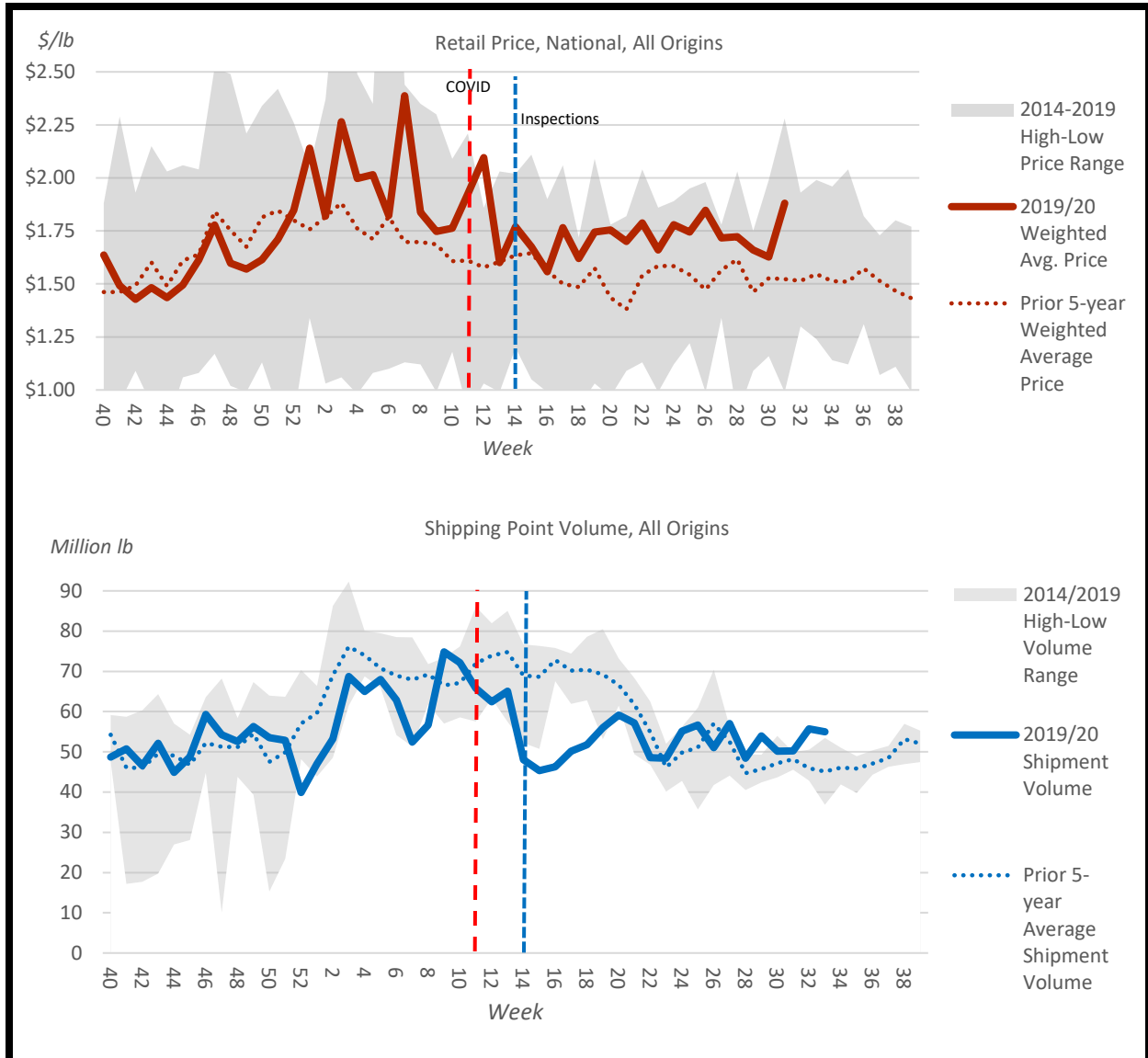
Figure 11. Percent Difference in 2020 Weekly Roma Tomatoes Shipping Volume Compared with Prior 5 Year Average, Florida vs. Mexico (week adjusted)



Round Tomatoes – Retail Prices

National retail prices for round tomatoes track very closely with their 5-year average for the 2019/2020 season (Figure 12). With the exception of a few weeks early in the calendar year, likely coinciding with the period of inclement weather in Mexico, prices remain close to average. In the weeks following the COVID-19 shock, retail prices remain relatively stable from week-to-week. During this same period, shipments of round tomatoes saw a sharp drop well below their 5-year average.

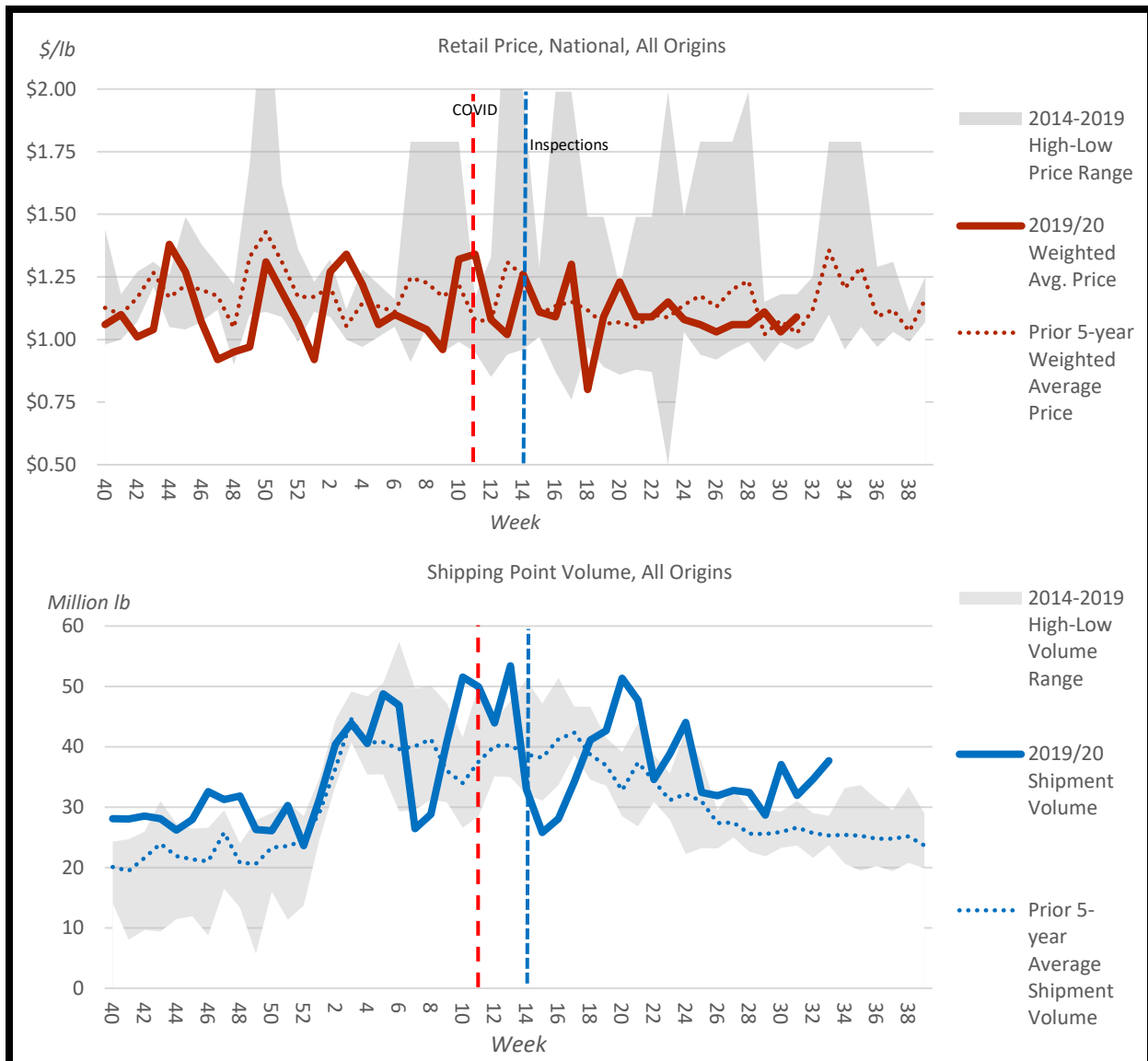
Figure 12. National Weekly High-Low Retail Point Price Range & Average (2014/15-2018/19 vs. 2019/20) & Weekly Shipping Point Volumes High-Low Range & Average (All Origins) (2014/15-2018/19 vs. 2019/20), Round Tomatoes



Roma Tomatoes – Retail Prices

National retail prices for Roma tomatoes also track very closely with their 5-year average (Figure 13). Shipping volume falls below its previous five-year average in February, rises above average around the onset of the COVID shock, and then again falls below average following the COVID shock.

Figure 13. National Weekly High-Low Retail Point Price Range & Average (2014/15-2018/19 vs. 2019/20) & Weekly Shipping Point Volumes High-Low Range & Average (All Origins) (2014/2015-2018/2019 vs. 2019/2020), Roma Tomatoes



Both round and Roma retail price trends contrast with other grocery commodities that exhibited significant price increases following the COVID-19 market shock, for example, meats and dairy products (Johansson, 2020).

Conclusions

Shipment volumes

- Round tomato shipping volumes saw significant declines following the start of COVID-19 related business closures. Mature greens saw the steepest drop, falling to 39% of their five-year average by week 13 (week of March 21st). Shipments from Mexico also fell to 77% of their five-year average by week 16 (week of April 11th).
- Roma tomato shipment volumes track with their five-year averages, though a modest decline in shipments in the weeks following COVID-related business closures can be seen, particularly in shipments from Mexico.
- The volume of Florida mature green tomato shipments persisted below its 5-year average trend for the duration of the 2019/20 season—18 out of 38 weeks—after shelter-in-place orders were enacted in early March 2020.
- The volume of Mexico vine ripe tomato shipments declined after shelter-in-place orders were enacted but eight weeks later rebounded to historical levels and even increased in subsequent weeks.

Shipping point prices

- Shipping point prices for round tomatoes (mature greens from Florida and vine ripers from Mexico) were at or above five-year average prices for nearly all of the 2019/20 season.
- Shipping point prices for Roma tomatoes of both origins were at or above their five-year averages throughout the 2019/20 season.

Retail prices

- Generally, round and Roma tomato retail prices track with their 5-year averages. This contrasts with prices for other grocery commodities following the shock, such as meat and dairy, which saw large price increases after the onset of the pandemic.

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