An Economic Analysis of the Competitive Dynamics in the U.S. Fresh Blueberry Market

Thomas J. Prusa, PhD

Rutgers University

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Executive Summary

- This study examines the factors that contribute to the price of fresh cultivated blueberries in the United States during the 2015-2020 period. I focus on price because, despite an increase in import volume, the domestic industry has nonetheless increased its production and sales volumes during the period. Analysis of price, therefore, allows me to discern the relationship between the domestic industry's health – for which price is a key factor – and the volume of blueberries, including both domestic and imported product.

- Several key characteristics of the U.S. fresh blueberry market influence the empirical analysis. My econometric model, which appears later in this report, takes into account variation in supply volume by source, seasonality in production, variations in yield and acreage planted across states and countries. **The estimates demonstrate that the change in domestic competition is the single largest factor affecting domestic prices over the period**.

- U.S. fresh blueberry production and shipments are heavily concentrated in a 20-week period, running from late-April to early-September. **Over 90% of U.S. fresh blueberries are sold during the 20-week peak season.** Large blueberry growing states like North Carolina and New Jersey sell all their blueberries in the peak weeks. Other large blueberry growing states like Georgia, California, Oregon, and Washington sell more than 90% of their crop in peak weeks. Every U.S. state except Florida sells at least 80% of its fresh blueberry crop in the 20-week peak U.S. season. As a result, only small volumes of domestic blueberries are sold during the weeks before and after this peak period.

- The seasonal nature of domestic production means that domestically grown blueberries are essentially unavailable for about half the year for most U.S. consumers. This off-season window is when the vast majority of imports service the U.S. market. **Approximately 80% of imported fresh blueberries enter the U.S. in the off-peak weeks –** in other words, the vast majority of imports enter when there is either very few or zero domestic blueberries available. **In addition, since 2015 86% of the *growth* in imported fresh blueberries has occurred during the off-peak weeks.** Given the lack of temporal overlap when the two sources of supply are present in the U.S. market, **imported and domestic blueberries are better seen as complements than substitutes**.

- Third, the econometric study focuses on pricing issues because other metrics not only show no injury but demonstrate robust growth for domestic growers. Whether one looks at volume produced, acres planted, or acres harvested it is clear the U.S. fresh blueberry industry has not only grown over the period but is also poised to grow into the future. **Annual domestic fresh blueberry production has increased by 68M pounds over the period (or 22% over the period), equivalent to an *annual* average growth rate of 5%**. Acres planted and acres harvested have grown, both nationwide and also in nearly every major growing state. Moreover, the U.S. Highbush Blueberry Council estimates another 15,000 acres are currently "in development" (equivalent to an additional 16% expansion in U.S. acreage) and will have harvest ready blueberries in the near future.

- Fourth, the single biggest development within the domestic blueberry industry has been the significant growth of fresh blueberries grown in three West Coast states, California, Oregon, and Washington. Unlike imports, these three states sell virtually all their fresh blueberries precisely during the same weeks that the traditional U.S. blueberry growers are active. ***During the peak season*, the growth in fresh blueberry production in these three states exceeds the growth of imports**. In fact, fresh blueberry production in Oregon and Washington *alone* has grown by more than imports from *all* sources during the peak U.S. blueberry season.

- Fifth, **East Coast producers have also faced significant weather-related challenges that have reduced their yields and production**. Growers in Florida, Georgia, Michigan, and Maine have all experienced multiple years of profound weather difficulties. For East Coast producers three of the four worst weather years over the last 40 years have occurred since 2015. Lower yields and reduced blueberry production volume from the East Coast states are largely explained by weather challenges and cannot be attributed to imports.

- Sixth, price movements over a calendar year are not consistent with a theory of imports being a substantial cause of serious injury. **Over a calendar year, fresh blueberry prices are consistently at their lowest during the peak summer weeks, which is exactly the period when imports are at their lowest level**. Conversely, domestic prices are higher during weeks when import volume is higher.

- Seventh, while prices in the spring and fall "shoulders" have fallen over the period, these lower prices affect less than 10% of U.S. fresh blueberry shipments. The vast majority of U.S. fresh blueberry shipments are conducted at prices during the peak weeks when import volumes are low, import growth has been modest, and domestic competition at its fiercest.

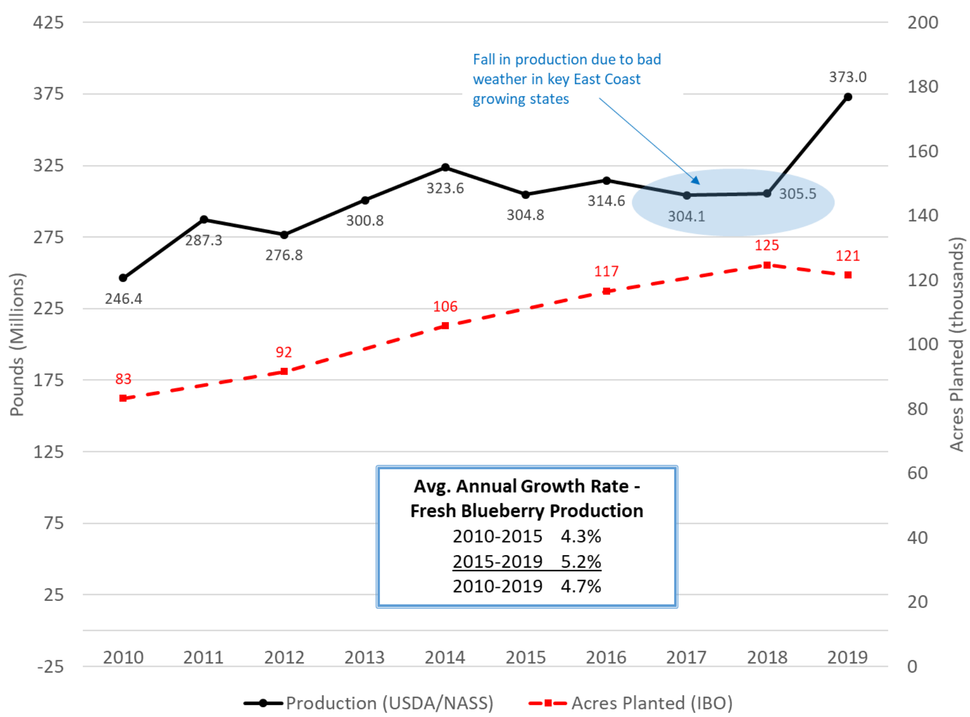
- The econometric study finds that changes in both domestic and imported blueberry volumes have an impact on market prices. However, the magnitude and source of the price effects vary by season. Import volumes play a large role in the off-peak weeks (when less than 10% of U.S. shipments occur). Domestic competition, primarily from the West Coast producers, has the largest impact during the peak season. **Over the entire period, changes in domestic competition account for 63% of the change in prices over the period. Focusing solely on the peak season, domestic competition accounts for 91% of the change in price**.

- As such, I conclude that domestic volumes have had a larger influence on domestic market prices than import volume.

I. Introduction

The U.S. cultivated blueberry industry's long-term growth has been impressive.[1] Over the last decade annual domestic fresh blueberry production has grown from 246M pounds to 373M pounds, equivalent to an average annual growth rate of 4.7%. Impressively, the annual growth rate actually accelerated in the more recent years, averaging 5.2% over the 2015-19 investigation period (**Figure 1**).

Figure 1 – U.S. Cultivated Fresh Blueberry Production Has Grown Over the POI



Source: USDA National Agricultural Statistics Service (NASS) Production Data ("Tame, Fresh Market Production") https://quickstats.nass.usda.gov/; International Blueberry Organization, https://www.internationalblueberry.org/

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[1] This report focuses exclusively on the U.S. cultivated (or "tame" or "highbush") blueberry industry. Wild blueberries are only produced in material volume in two locations, Maine and Canada. In addition, the volume of fresh wild blueberries is tiny compared to fresh cultivated blueberries. According to the USDA/NASS in 2019 the U.S. produced 373M pounds of fresh cultivated blueberries and 1.4M pounds of fresh wild blueberries. Therefore, the fresh wild blueberry sector is less than 0.4% the size of the domestic fresh cultivated blueberry sector.

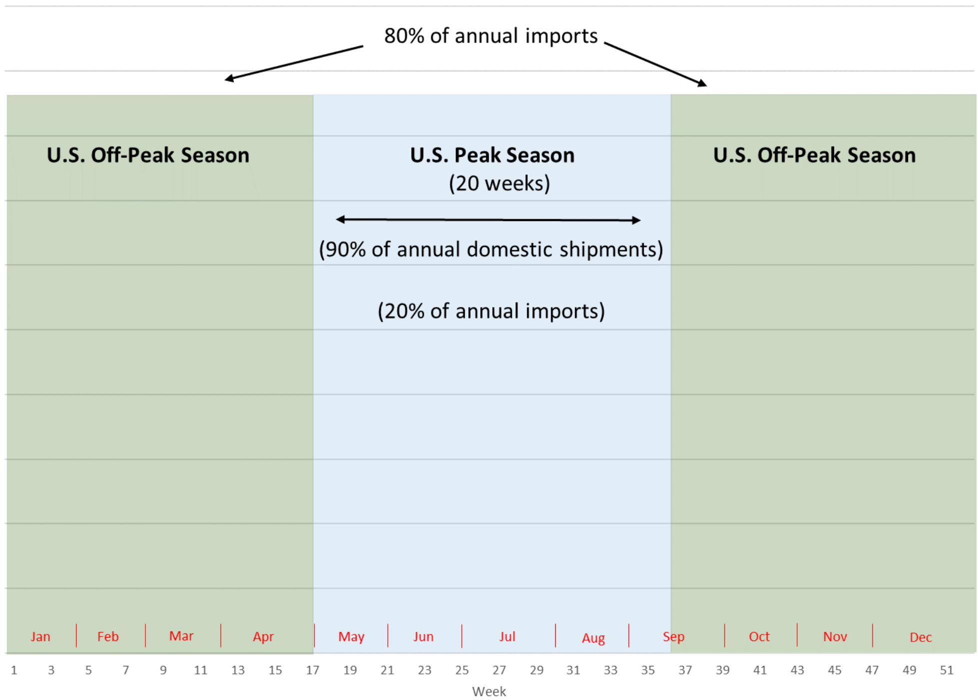
Growth has also been reflected by an increase in the number of acres planted. U.S. acreage grew from 83 thousand acres to 121 thousand acres in the last decade, equivalent to an average annual growth rate of 4.3%. The difference in the growth rates of production and acreage reflects the improving productivity (or "yield"). According to the International Blueberry Organization (IBO), the most efficient growers in the U.S. have experienced a 24% increase in yield over the last decade and a 21% during the investigation period.

While the annual statistics depict a healthy and growing domestic industry, annual trends alone cannot be the basis for understanding the economics of the fresh blueberry market. This is because annual statistics do not capture two essential characteristics of the fresh blueberry market: perishability and seasonality. Perishability is clear – fresh blueberries harvested in April are not a viable purchase option for a consumer looking for a healthy snack for a July 4th celebration or even a Memorial Day picnic. Fresh fruit has a relatively short window for prime taste and consumer desirability. Older fruit loses its tastiness, gets moldy and/or becomes mushy. None of these are qualities that consumers' desire. Fresh blueberries are sold and consumed within a short time after being harvested.

Seasonality is a different concept. In nearly all growing regions blueberries are only produced for a few weeks. For example, the blueberry season for Florida is only about 8 weeks in the spring. New Jersey's blueberry season is even shorter, lasting only about 6 weeks in the summer. Because Florida and New Jersey's seasons do not overlap, they do not directly compete with one another. On the other hand, Florida's season does overlap with California's burgeoning blueberry crop and increasingly Georgia's early crop. On the other hand, New Jersey's season overlaps with nearly all other U.S. states: Georgia, North Carolina, Michigan, California, Oregon, and Washington. Seasonality compresses the competition among U.S. suppliers to a short span of the year. Approximately 90% of annual U.S. blueberry shipments occur in a 20-week period (**Figure 2**).

Importantly, the peak season is not when the vast majority of imported fresh blueberries are present in the U.S. market. As shown in **Figure 2**, about 80% of imported blueberries enter the U.S. market in the off-peak U.S. season and only 20% enter during the peak U.S. selling season. Given that approximately 10% of domestic supply is sold in the off-peak season this temporal pattern means that the vast majority of imports do not compete with the vast majority of domestic supply. Moreover, for about half the year there is essentially no domestic supply, meaning that the competitive overlap is even less than the domestic industry's 10% off-season share suggests. From early-October to mid-April there is essentially no domestic supply. Imports cannot cause lost sales or lost revenue when a perishable imported product is sold during the time window when there is no domestic supply.

Figure 2 – The Complementary Nature of Domestic and Import Fresh Blueberry Supply



Source: USDA AMS Weekly Cultivated (Nonorganic & Organic) Volume ("Movement") Data (as compiled by Agronometrics), adjusted Canadian data (APHIS undercount); peak season is defined as weeks 17 through 36

The lack of temporal overlap means that the fresh blueberry market is effectively seasonally segmented, with domestic growers selling virtually all their blueberries from late-spring to early-fall and most import supply occurring from early-fall to early-summer. In other words, the two sources of supply – foreign and domestic supply – *complement* each other, providing U.S. consumers with year-around supply of fresh blueberries. Import supply is what allows U.S. consumers to enjoy fresh blueberries 52 weeks a year. And, year-around availability is key to changing consumer preferences in favor of consuming blueberries over other fruit and snack alternatives. This change in consumer preference benefits all blueberry producers.

While import supply is largely relegated to the off-peak season, there have been crucial developments during the peak season over the 2015-19 period. Most notably is the rapid growth of blueberry production in the West Coast of the United States: California, Oregon, and Washington. As shown in **Figure 3**, the growers in the three West Coast states have significantly expanded their fresh blueberry production over the period, rising from 105.7M pounds in 2015 to 175.7M pounds in 2019, which is equivalent to an annual average growth rate of 14%. By contrast, fresh blueberry production in the traditional blueberry states along the East Coast and Michigan has only grown by 1% over the period.[2]

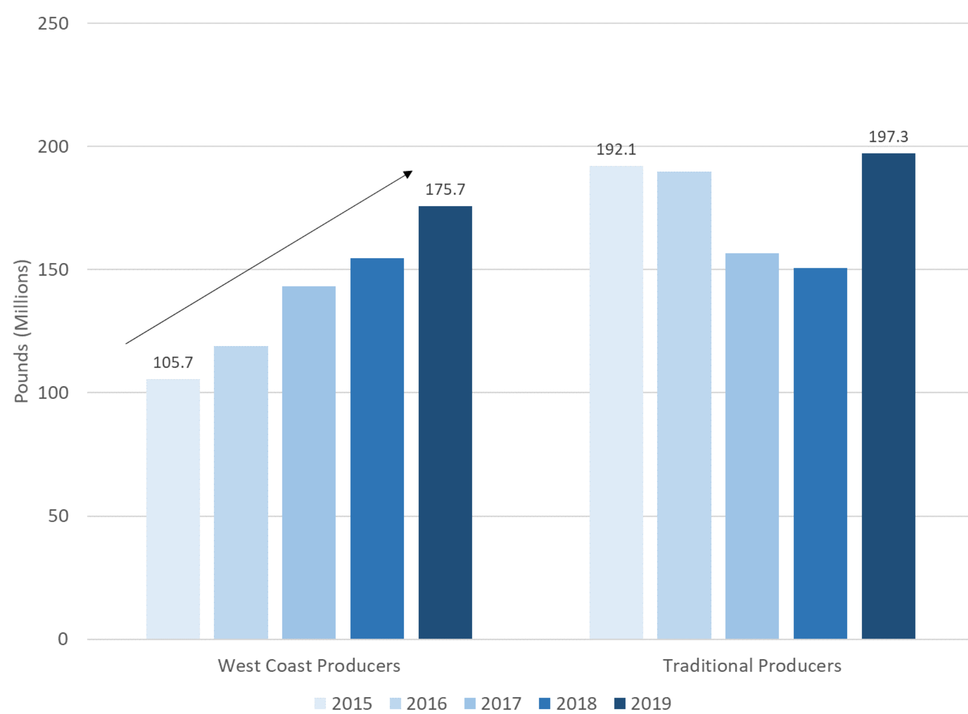
Two comments on the changing domestic competitive landscape are warranted. First, blueberry production in the traditional states has been heavily influenced by weather related events. All variety of weather events have challenged East Coast producers: too much rain at the wrong times, too little rain at other times, too hot at the wrong time followed by a sudden freeze, and even hurricanes. According to one Georgia grower, 3 of the 4 worst years he has experienced in the four decades he has been growing blueberries have occurred during the investigation period.[3] As a result (and as will be discussed below), acreage in the traditional states has grown faster than production during the investigation period.

[2] Throughout this report I will use the term "traditional" producers to refer to the five states that have historically dominated the U.S. cultivated blueberry industry: Florida, Georgia, North Carolina, New Jersey, and Michigan.

[3] Dick Byne of Byne Blueberry Farms in Waynesboro, Georgia reports that he experienced a 100% blueberry crop loss on March 16, 2017, a 44% crop loss on March 11, 2018, and a 90% crop loss on March 9, 2019. All were due to untimely freezes preceded by unusually warm weather (which lead to early season buds). See https://www.youtube.com/watch?v=5qt8LMYbKmg .

Second, unlike imports which almost entirely enter the U.S. market outside the peak U.S. season, the emerging West Coast blueberry volume competes precisely during the same window as traditional East Coast blueberry production. Florida and Georgia, which historically had little to no early season competitors, now go head to head with California's early season crop. Michigan, which historically had little to no late season competition, now faces large volumes from Oregon and Washington, two highly efficient U.S. locations.

***Figure 3 – Changing Nature of Domestic Competition*[4]**

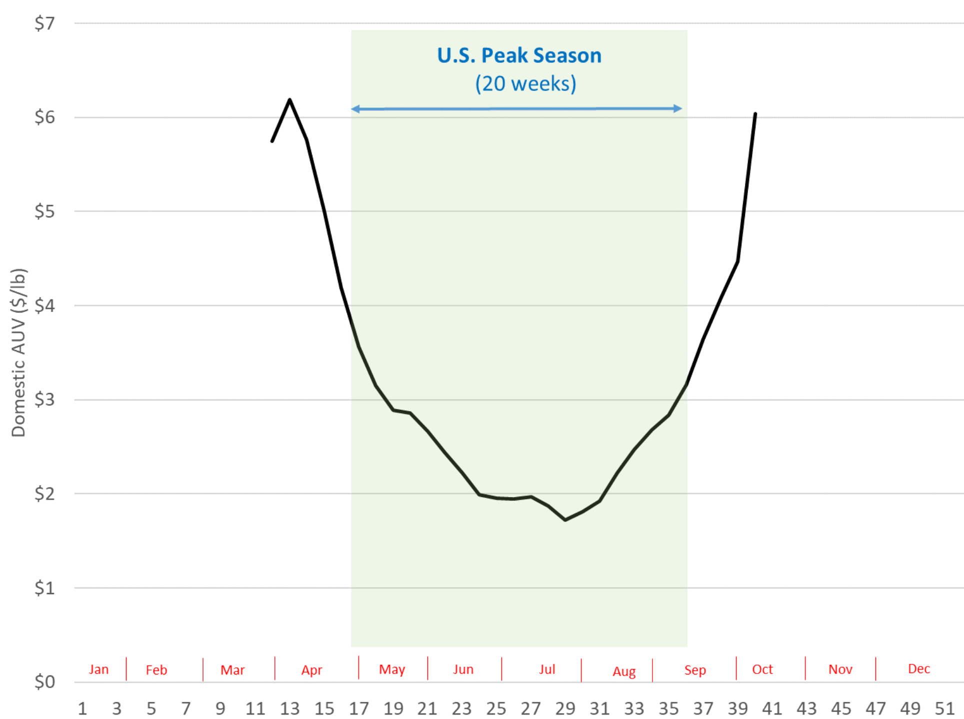


Source: USDA NASS Production Data ("Tame, Fresh Market Production")

[4] Uses the USDA/NASS yield and acres harvested data to estimated production for states with missing values for production. See Annex 10 for a discussion of the calculations.

The above set of facts make it highly improbable that imports are a substantial cause of serious injury with respect to domestic volume – after all, the domestic production of fresh blueberries is growing faster during the period than it did prior to the period. The focus of this report, therefore, is on the price effects that have occurred during the period. However, to understand price effects one needs to recognize long-run seasonal pricing patterns in the United States.

Figure 4 – Domestic AUV Falls During The Peak U.S. Season



Source: Weekly Domestic AUV over 2015-2019 (simple average across years); USDA AMS Weekly Cultivated (Nonorganic) Price Data (as compiled by Agronometrics), peak season is defined as weeks 17 through 36

Year-in and year-out domestic prices display a "U-shape" pattern. **Figure 4** depicts average weekly average unit value (AUV) for fresh blueberries over the 5-year period. As seen, prices start high, fall, and then recover.[5] Several important insights can be gleaned from the chart. First, the lack of U.S. volume for about 22 weeks each year (i.e., the first 10 weeks and the last 12 weeks of each calendar year) mean the U.S. Department of Agriculture (USDA) reports no pricing information for U.S. shipments during approximately 40% of the year. Pricing analysis is limited to just 30-32 weeks each year; within that window nearly 90% of domestic shipments occur within the even shorter 20-week peak season.

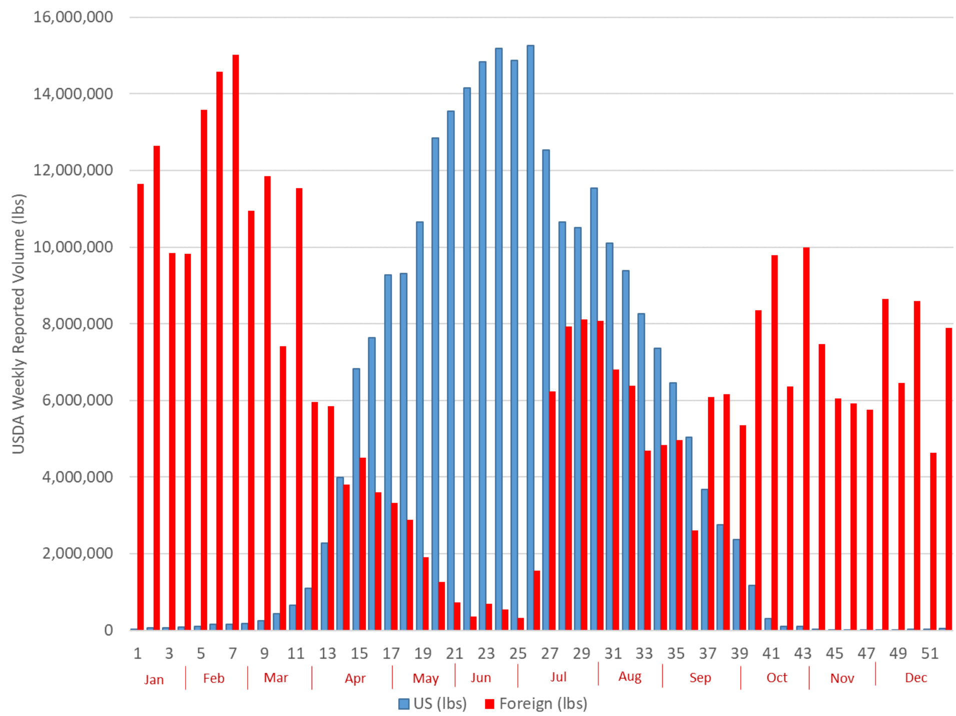
Second, U.S. prices are at their lowest levels of the entire year during the U.S. industry's peak season. Yet, as mentioned earlier, this is precisely the period of time imports are at their lowest levels. This can be seen by looking at weekly domestic shipments and import volume across a typical calendar year. **Figure 5** depicts weekly shipments for 2019.[6] As shown, imports essentially exit the U.S. market as the U.S. peak season begins. About halfway through the peak season Canadian blueberries enter the U.S. market. (Canada is the only significant source of imports during the U.S. peak season.) However, as seen in **Figure 4** U.S. prices begin to rise in the latter half of the peak season. Both trends – the falling prices when imports exit and rising prices when imports return – are the opposite of what one would expect if blueberry imports were depressing domestic prices. Third, domestic prices are higher in the spring and fall "shoulders". As will be discussed later, the shoulders are a key time in a calendar year where U.S. producers face

[5] Throughout this report I will use the terms "price" and "average unit value" interchangeably.

[6] A similar temporal pattern holds for each year. Imports are at their peak during the off-season and U.S. shipments are heavily concentrated in the 20-week peak season.

increasing import competition. However, very little U.S. shipment volume (less than 10% of all U.S. volume) occurs in the shoulder periods. Thus, any impact of imports on the U.S. industry's overall performance is clearly attenuated.

Figure 5 – Lack of Temporal Overlap of Supply (2019)



Source: USDA AMS Weekly Nonorganic & Organic Volume ("Movement") Data (as compiled by Agronometrics); adjusted Canadian data (APHIS undercount); peak season is defined as weeks 17 through 36.

The statistical approach taken in this report is shaped by the industry trends and production and product characteristics discussed above. Namely, this report will analyze the determinants of weekly domestic fresh blueberry prices over the period. The analysis will incorporate the changes in supply across markets by controlling for changes in yield and acreage. The analysis will also incorporate the perishability of the product, the seasonality of each state's supply and also import supply. As discussed, the competitive dynamics of a perishable product like blueberries is different in April than it is in June just as June is different from September. The modeling approach will capture the varying competition across the calendar year.

Quite sensibly, the statistical analysis finds that the U.S. market price for fresh blueberries has been affected by changes in U.S. and foreign supply over the period. However, the magnitude and source of the price effects vary by season. Imports play a larger role in the off-peak weeks (when less than 10% of U.S. shipments occur). Domestic competition, primarily from the West Coast producers, has the largest impact during the peak season. Over the entire period, changes in domestic competition account for 63% of the change in prices over the period. However, when we focus on the peak U.S. season, when 90% of U.S. blueberries are shipped, domestic competition accounts for 91% of the changes in price over the period.

The rest of this report is organized as follows. Section II discusses the trends and competitive dynamics faced by the domestic industry. Section III looks at the trends for imports. Section IV provides the results of my econometric analysis.

II. Domestic Volume Market Developments and Competitive Dynamics

Lesson #1 – Domestic Volume Has Grown Over the Period

The first key trend to acknowledge is that the U.S. industry has grown significantly over the period. As shown in **Table 1** (based on USDA data) fresh blueberry production has increased by 68M pounds and total blueberry production (fresh and processed) has grown by 117M pounds over the 2015-19 period.[7] By either production metric the domestic industry has grown by more than 20% since 2015, equivalent to a cumulative average annual growth rate of 5%.

Table 1 – The Growth of U.S. Blueberry Production, USDA (lbs)[8]

	2015	2016	2017	2018	2019	Pct Change	CAGR %
Cultivated Fresh Blueberries							
Total U.S.	**304,820,000**	**314,600,000**	**304,110,000**	**305,460,000**	**373,010,000**	**22%**	**5%**
West Coast Producers	105,695,981	118,883,982	143,320,177	154,650,000	175,730,000	66%	14%
Traditional Producers	192,100,000	189,734,648	156,637,720	150,810,000	197,280,000	3%	1%
Cultivated Frozen Blueberries							
Total U.S.	**250,500,000**	**274,190,000**	**208,630,000**	**250,160,000**	**300,040,000**	**20%**	**5%**
West Coast Producers	159,040,595	176,555,137	145,333,564	179,670,000	212,980,000	34%	8%
Traditional Producers	88,330,000	94,866,751	62,451,686	70,490,000	87,060,000	-1%	0%
Cultivated Fresh & Frozen Blueberries							
Total U.S.	**555,320,000**	**588,790,000**	**512,740,000**	**555,620,000**	**673,050,000**	**21%**	**5%**
West Coast Producers	264,736,576	295,439,119	288,653,741	334,320,000	388,710,000	47%	10%
Traditional Producers	280,430,000	284,601,399	219,089,406	221,300,000	284,340,000	1%	0%

Source: USDA NASS Production Data ("Tame, Fresh Market Production", "Tame, Processing Production", "Tame, Utilized Production") https://quickstats.nass.usda.gov/; See Annex 10 for state production estimates.

[7] The vast majority of processed blueberries are frozen; some are canned or used for juice.

[8] Uses the USDA/NASS yield and acres harvested data to estimate production for states with missing values for production. See Annex 10 for a discussion of the calculations.

Data from the International Blueberry Organization (IBO) confirms the impressive growth reported by the USDA.[9] As seen in **Table 2** according to the IBO, domestic fresh blueberry production has grown by 50M pounds and total domestic blueberry production (fresh and processed) has grown by 120M pounds over the 2014-19 period.[10]

Table 2 – The Growth of U.S. Blueberry Production, IBO, (lbs)[11]

	2014	2016	2018	2019	Pct Chang	CAGR
Fresh						
Total U.S.[12]	**320,590,159**	**293,384,216**	**303,075,073**	**371,399,558**	**16%**	**3%**
West Coast Producers	103,529,115	114,221,362	151,895,717	172,099,795	66%	11%
Traditional Producers	204,757,584	168,095,661	141,438,016	186,099,779	-9%	-2%
Processed						
Total U.S.	**228,564,278**	**272,213,250**	**245,865,344**	**298,299,646**	**31%**	**5%**
West Coast Producers	119,033,476	176,171,184	175,524,163	212,599,747	79%	16%
Traditional Producers	103,329,058	94,057,908	69,010,208	85,299,898	-17%	-5%
Fresh & Processed						
Total U.S.	**549,154,437**	**565,597,466**	**548,940,417**	**669,699,204**	**22%**	**4%**
West Coast Producers	222,562,591	290,392,546	327,419,880	384,699,542	73%	12%
Traditional Producers	308,086,642	262,153,569	210,448,224	271,399,677	-12%	-3%

Source: International Blueberry Organization, https://www.internationalblueberry.org/ (converted from metric tons)

[9] The International Blueberry Organization is a global organization composed of leaders from around the blueberry world in all segments of the industry, including blueberry producers and marketers, affiliated business, and governmental organizations worldwide. A key function of the IBO is to gather and distribute information about the global blueberry industry and facilitate industry growth. The IBO exists to advance the health and sustainability of the blueberry industry. The IBO's most recent study for 2020 is available at https://report.internationalblueberry.org/ and the data provided there can be found at Annex 2.

[10] As seen, while the USDA and IBO report very similar numbers for total blueberry production, they differ in their estimates for fresh and frozen, reflecting different approaches to measuring end use.

[11] The IBO data used in this report is provided in Annex 2.

[12] A few smaller states are classified neither as a traditional nor as a West Coast produced (e.g., Indiana, Mississippi) but are included in the national total.

It should be noted that while the IBO and USDA/NASS independently collect their data, the two sources report broadly similar trends. Both data sources indicate impressive growth for the domestic industry (fresh & processed) over the period: +21% using USDA data and +22% using IBO data.[13]

Lesson #2 – Other Metrics Also Show the Domestic Industry has Grown Over the Period

Other metrics also demonstrate the health of the domestic industry over the period. For instance, **Table 3** presents data on acres planted. As seen, nationwide there were 15,713 additional acres planted over the period. That is equivalent to a 15% increase over the period. Washington leads the way with a 50% increase in acres over the period, but traditional blueberry states like North Carolina (+39%) and Florida (18%) also demonstrated impressive growth. The aggressive increase in planting acreage increase suggests the industry participants are bullish for the future.

[13] The biggest difference in the two sources related to the state-level reporting. Due to reporting restrictions related to survey sample size, NASS/USDA does not report state level production for some states in some years. In those cases, other NASS/USDA data can be used to accurately compute state level production. See Annex 10. The IBO reports state-level production for each state in each reporting year.

Table 3 – Acres Planted (U.S.)

	2014	2016	2018	2019	Overall Change	Overall Pct Change	CAGR
Oregon	10,615	12,602	13,097	14,048	3,434	32%	6%
Washington	13,106	15,914	19,274	19,637	6,532	50%	8%
California	7,293	7,042	8,698	8,349	1,056	14%	3%
New Jersey	8,154	8,154	8,154	8,077	-77	-1%	0%
Michigan	21,498	21,745	21,992	19,996	-1,502	-7%	-1%
Georgia	22,079	23,599	24,216	23,608	1,529	7%	1%
North Carolina	7,303	9,373	10,255	10,127	2,824	39%	7%
Florida	5,502	7,413	7,907	6,504	1,001	18%	3%
Total[14]	**105,741**	**116,530**	**124,702**	**121,454**	**15,713**	**15%**	**3%**
West Coast Producers	*31,013*	*35,558*	*41,069*	*42,034*	*11,021*	*36%*	*6%*
Traditional Producers	*64,537*	*70,284*	*72,525*	*68,313*	*3,776*	*6%*	*1%*

Source: International Blueberry Organization, https://www.internationalblueberry.org/. Conversion from hectares to acres of 2.47105

Table 4 provides information on USDA reported acres harvested and the results confirm the growth demonstrated in the prior tables. Overall, domestic producers harvested 11,780 more acres in 2019 than they did in 2015, a 13% increase. West Coast states again demonstrated the greatest growth, but large traditional blueberry states like Georgia (+26%, +4,500 acres) and Michigan (+6%, +1,200 acres) also expanded significantly.

[14] A few smaller states are not listed individually but are included in the national total.

Table 4 –Acres Harvested (U.S.)

	2015	2016	2017	2018	2019	Overall Change	Overall Pct Change	CAGR
Oregon	10,000	11,900	11,700	13,500	13,300	3,300	33%	7%
Washington	11,000	13,400	13,700	14,400	16,700	5,700	52%	11%
California	6,200	6,400	6,600	6,600	7,300	1,100	18%	4%
New Jersey	9,700	9,300	9,300	9,000	9,300	-400	-4%	-1%
Michigan	19,400	20,300	20,000	19,700	20,600	1,200	6%	2%
Georgia	17,200	16,900	8,800	13,300	21,700	4,500	26%	6%
North Carolina	8,000	7,200	6,300	7,500	8,700	700	9%	2%
Florida	5,500	4,700	5,200	5,200	5,100	-400	-7%	-2%
All Others	3,920	2,700	2,300	#N/A	#N/A	#N/A	#N/A	#N/A
TOTAL	**90,920**	**92,800**	**83,900**	**89,200**	**102,700**	**11,780**	**13%**	**3%**
TOTAL (excluding "all others")	**87,001**	**90,100**	**81,599**	**89,201**	**102,701**	**15,700**	**18%**	**4%**
West Coast Producers	27,200	31,700	32,000	34,500	37,300	10,100	37%	8%
Traditional Producers	59,800	58,400	49,600	54,700	65,400	5,600	9%	2%

Source: USDA, "Tame Acres Harvested", https://quickstats.nass.usda.gov/

Lesson #3 – Domestic Volume Will Continue to Grow Over the Next Several Years

Third, it is important to recognize that the U.S. industry will continue to grow significantly over the next few years. There is a delay in the time between the date when a new blueberry field is planted and when the blueberries produced on that field enter the commercial market. While there is some variation across planting locations, the IBO estimates that for blueberry farms in the United States the delay from planting to the first commercial crop is 2 to 3 years.[15] Thus, any blueberry fields planted in 2019 and 2020 are "in the pipeline" and new supply from these fields will soon enter the market.

[15] Annex 2, "IBO Yield Calculations Methodology".

In December 2019 the United States Highbush Blueberry Council (USHBC) assembled statistics from the USDA and summarized the number of acres "in development" across all major blueberry growing states. The results are reproduced in **Table 5**. As seen, in *every* state new blueberry fields have been planted and new production is soon to come online. And, the growth is not just limited to the fast growing West Coast states. According to the USHBC/USDA, Michigan acreage is expanding by 13.7%, Georgia acreage by 17%, and Florida acreage by 20%. Overall, for the entire country, acreage (and hence production) is expected to expand by 16% in the imminent future.

To reiterate, the "in development" acres are not forecasted new fields that will be planted in the future. "In development" acres are fields that have *already been planted* and will soon enter commercial production. It is difficult to see how the domestic industry that has grown by more than 20% over the period and which is projected to grow another 16% over the next couple of years can be seen as seriously injured.

Table 5 – U.S. Acres Currently "In Development" (blueberries, tame)

	Avg. Acres "In Development"	Implied Percent Change in Acres Harvested
Oregon	1,863	15.3%
Washington	2,384	18.1%
California	893	13.0%
New Jersey	1,496	17.3%
Michigan	2,769	13.7%
Georgia	2,416	17.0%
North Carolina	659	8.1%
Florida	1,120	20.1%
All Others	1,476	26.7%
National	**15,076**	**16.0%**

Source: U.S. Highbush Blueberry Council; *The Economic Impact of Blueberry Growers in the United States*, 2020, https://ushbc.org/resources/economic-impact-report/. See Annex 3.
Note: USHBC estimates U.S. acreage in production slightly differently than NASS. USHBC averages acreage data from National Agricultural Statistics Service (NASS) and the USDA Census of Agriculture (Census). Therefore, the numbers in this table cannot be directly compared to those reported in **Table 4**.

Lesson #4 – Intensifying Competition among Domestic Producers Over the Period

Looking at the individual state trends in the above table reveals a growing level of competition between the emerging U.S. producing states on the West Coast and the traditional blueberry states. For instance, the USDA data in **Table 1** reveals that at the beginning of the period the West Coast states produced 105.7M pounds of fresh blueberries at the beginning of the period and 175.7M pounds at the end of the period. The USDA also reports overall blueberry production (fresh and processed) in the West Coast states grew from 264.7M pounds to 388.7M pounds. The IBO data in **Table 2** shows a similar pattern. For example, according to the IBO total blueberry production in the West Coast states rose from 222.6M pounds to 384.7M pounds.

By contrast, the blueberry production in the traditional growing states struggled over the period in spite of the increase in acres planted (**Table 3**) and acres harvested (**Table 4**). According to the USDA production statistics (**Table 1**) overall blueberry production in the traditional growing states fell by 60M pounds in 2017 and 2018 (relative to 2015 level). However, production in the traditional growing states rebounded in 2019, ending the period about the same level as in the beginning of the period. The IBO production data portray a similar pattern for traditional producers – a significant decline in the middle of the period followed by a sharp increase in 2019 (**Table 2**).

In **Table 6** I summarize the difference in blueberry production between the West Coast and traditional producers. The table makes it clear that while overall U.S. production is growing, over the period the West Coast producers have thrived while the traditional producers have been challenged.

Table 6 – Cumulative Annual Avg. Growth Rates

	USDA – 2015-19	IBO – 2014-19
Cultivated Fresh Blueberries		
Total U.S.	5%	3%
West Coast Producers	14%	11%
Traditional Producers	1%	-2%
Cultivated Frozen Blueberries		
Total U.S.	5%	5%
West Coast Producers	8%	12%
Traditional Producers	0%	-4%
Cultivated Fresh & Frozen Blueberries		
Total U.S.	5%	4%
West Coast Producers	10%	12%
Traditional Producers	0%	-4%

Source: Production (lbs); USDA NASS Production Data ("Tame, Fresh Market Production", "Tame, Processing Production", "Tame, Utilized Production") https://quickstats.nass.usda.gov/; International Blueberry Organization, https://www.internationalblueberry.org/ (converted from metric tons)

The data on acres planted (**Table 3**) and acres harvested (**Table 4**) suggest the production numbers for the traditional users are not telling the full story of their condition. In particular, **Table 3** shows that both sets of producers – West Coast and traditional – have expanded the number of acres planted. Of note, acres planted for traditional blueberry growing states grew by 6% over the period. Likewise in terms of acres harvested (**Table 4**) both traditional blueberry states (+9% over the period) and West Coast states are growing (+37% over the period).

Over the period the traditional blueberry states have planted more acres and also harvested more acres. Yet, their production has gone down. Why? The answer is quite simple: a series of serious weather events that have hurt the traditional blueberries states' production. The impact is seen through the "yield" metric. This issue will be discussed next.

Lesson #5 – West Coast Producers Are More Productive than their Traditional U.S. Competitors

Table 7 presents information on productivity across U.S. states. The average yield for the entire United States blueberry industry has declined over the period. While this might be seen as a troublesome development, the overall decline in yield is entirely a result of the struggles of the traditional blueberry states. Oregon's yield, already the nation's highest at 11.69 metric tons production/hectare in 2014, increased to 13.608 in 2019. Washington's yield increased from 9.996 in 2014 to 11.269 and California's yield increased from 7.621 to 10.685.

By contrast, the yield for every traditional blueberry state declined over the period. Consider New Jersey, for example. At the beginning of the period New Jersey's blueberry growers had nearly the same productivity as California. By 2019 New Jersey's productivity was less than half that of California blueberry growers.

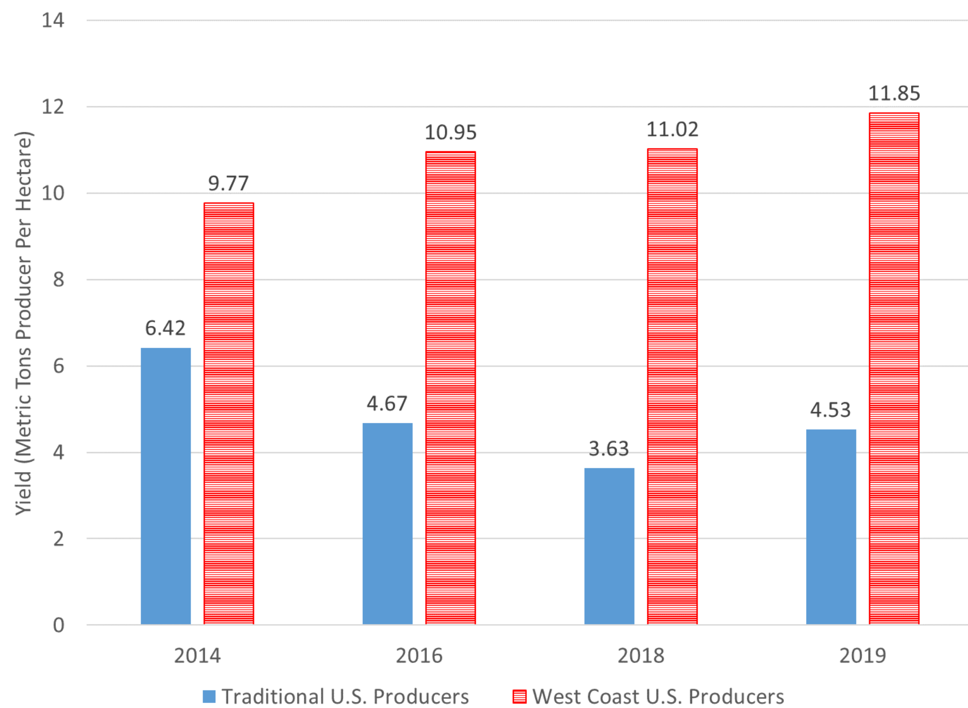
Table 7 – Yield Trends (U.S.)

	2014	2016	2018	2019
West Coast Producers				
Oregon	11.690	13.382	12.953	13.608
Washington	9.996	11.001	10.045	11.269
California	7.621	8.467	10.064	10.685
Traditional Producers				
New Jersey	7.576	4.882	5.225	5.273
Michigan	4.870	5.260	3.604	4.682
Georgia	7.576	3.402	2.377	4.426
North Carolina	7.549	7.072	3.955	4.189
Florida	4.536	2.753	2.995	4.067
Average	**6.886**	**6.121**	**5.400**	**6.585**
West Coast Producers	*9.769*	*10.95*	*11.021*	*11.854*
Traditional Producers	*6.421*	*4.674*	*3.631*	*4.527*

Source: International Blueberry Organization, https://www.internationalblueberry.org/ (yield measured as metric tons production/hectare)

Overall, as depicted in **Figure 6**, over the period traditional producers' productivity fell (from 6.421 in 2014 to 4.527 in 2019) while productivity rose for West Coast producers (from 9.769 to 11.854). By the end of the period, West Coast states yield is 150% greater than traditional blueberry growing states.

Figure 6 – Blueberry Yield, Traditional U.S. vs. West Coast Producers



Source: International Blueberry Organization, https://www.internationalblueberry.org/

The decline in productivity is almost entirely explained by weather problems. For Michigan blueberry growers 2018 was a terrible crop year – the worst since 2005.

> I think the main reason for the poor blueberry crop in 2018 was poor pollination conditions with cold, rainy conditions at the beginning of bloom and very hot conditions at the end of bloom.
>
> … almost all this loss is due to a very short crop in the later varieties, which would have harvested in August, September and October. The 2018 harvest ended a month early due to a lack of crop. [16]

As seen in **Table 7** Michigan's yield fell from 5.260 in 2016 to 3.604 in 2018.

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[16] Mark Longstroth, "2018 Michigan blueberry crop lowest since 2005," Michigan State University Extension, November 20, 2018 at https://fruitgrowersnews.com/news/msu-2018-michigan-blueberry-crop-lowest-since-2005/ . See Annex 4.

Georgia was plagued by bad weather events nearly the entire period. 2017 and 2018 both featured natural weather disasters. The following report describes the disastrous March 15th 2017 freeze:

> The unseasonably warm weather hit Georgia and South Carolina in late February and early March, which caused the fruit crops to begin to bud—the first step they take each year toward ripening into mature fruit. But on March 15, temperatures took a dive into the low 20s, killing those buds, which likely will not regrow again until next year.
>
> Representatives from the Georgia Department of Agriculture estimate that farmers lost 80% of their blueberry crop.[17]

A year later in 2018 the Atlanta Business Chronicle reported:

> For the second consecutive year, Georgia has seen significant loss in its blueberry crops, with overall losses of both highbush and rabbiteye varieties possibly exceeding 60 percent, according to University of Georgia Extension. This follows the late spring freeze of 2017 that claimed 80 percent of south Georgia's blueberry crop.
>
> … Unlike last year's devastating freeze that hit the growing region March 15-16, after a mild winter, the 2018 losses are not directly attributed to one catastrophic freeze event, according to the Georgia Department of Agriculture.
>
> "We had another warm February leading many of our plants to enter full bloom," said blueberry farmer and Blueberry Commission member Russ Goodman. "Then March brought back-to-back weeks of freezing temperatures that damaged some fruits and blooms, followed by a cool, cloudy and windy April."
>
> The Georgia Department of Agriculture said the unseasonable

[17] Joe Sevier, "2017 Peach and Blueberry Crops Threatened by the Deep Freeze in the South," March 22, 2017, at https://www.epicurious.com/expert-advice/blueberry-peach-shortage-2017-article . See Annex 4.

> weather didn't allow blooms to fully recover from the cold and hampered pollination efforts for honeybees.
>
> … Georgia produced 95 million pounds of blueberries in 2014. Last year's crop dropped to 30 million, with similar losses expected for 2018. Original expectations for this year's crop was around 120 million pounds.[18]

Unfortunately 2019 was not much better for Georgia blueberry farmers with reports of a blueberry harvest 50% below forecasted levels due to weather related poor pollination.[19]

With their blueberry crop being adversely affected in multiple years, Georgia blueberry growers qualified for natural disaster assistance in September 2019:

> The United States Department of Agriculture (USDA) has announced that agricultural producers affected by natural disasters, including Georgia blueberry growers who were devastated by unusually harsh freezes, are now eligible to apply for assistance beginning on September 11, 2019.[20]

Florida blueberry growers also suffered from bad weather. Consider this story from 2016:

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[18] Eric Mandel, 'Hard pill to swallow': Georgia blueberry crop sees second consecutive year of 'significant loss', Atlanta Business Chronicle, May 16, 2018, at https://www.bizjournals.com/atlanta/news/2018/05/16/hard-pill-to-swallow-georgia-blueberry-crop-sees.html . See Annex 4.

[19] Pam Knox, "GA and NC blueberry harvest down up to 50 percent this year," Georgia Agricultural Extension, June 26, 2019, at https://site.extension.uga.edu/climate/2019/06/ga-and-nc-blueberry-harvest-down-up-to-50-percent-this-year/ . See Annex 4.

[20] "USDA Disaster Assistance Applications Available for First District Blueberry Growers," September 9, 2019, at https://buddycarter.house.gov/news/documentsingle.aspx?DocumentID=6326 . See Annex 4.

> Florida blueberry growers had a tough season, coming into the marketplace late, with about 30 percent of their usual crop… "What a disaster," says Bill Rowe, owner and vice president of operations for W.G. Rowe and Sons in Winter Haven, which markets blueberries. "We starved the market for fruit."
>
> "We are hoping the USDA [U.S. Department of Agriculture] will declare a disaster […]," says Bill Braswell, a Florida Blueberry Growers Association board member who grows and markets blueberries.
>
> …An unseasonably warm winter and an El Niño weather pattern — followed by cloudy and cooler weather during fruit set and development — delayed the crop. This year, blueberries just didn't get enough chill hours to produce as they should have.[21]

Hurricanes Irma (2017) and Michael (2018) contributed to Florida's reduced yield.

Consider this 2018 press report:

> Hurricane Irma will be partially responsible for a smaller blueberry crop in Florida this year after the powerful hurricane destroyed some of the plants in September, growers in central Florida said…. In addition to the damage caused by Irma, several other factors are also likely to contribute to a smaller blueberry yield in 2018. Severe freezes damaged additional crops this winter, and Gall Midge flies caused more problems, WCJB.com also said.[22]

Clearly, the traditional blueberry growing states have been hit hard by weather related events that have reduced their productivity.

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[21] Cheryl Rogers, "The 2016 blueberry season roundup," June 17, 2016, at https://centralfloridaagnews.com/2016-blueberry-season-roundup/ . See Annex 4.

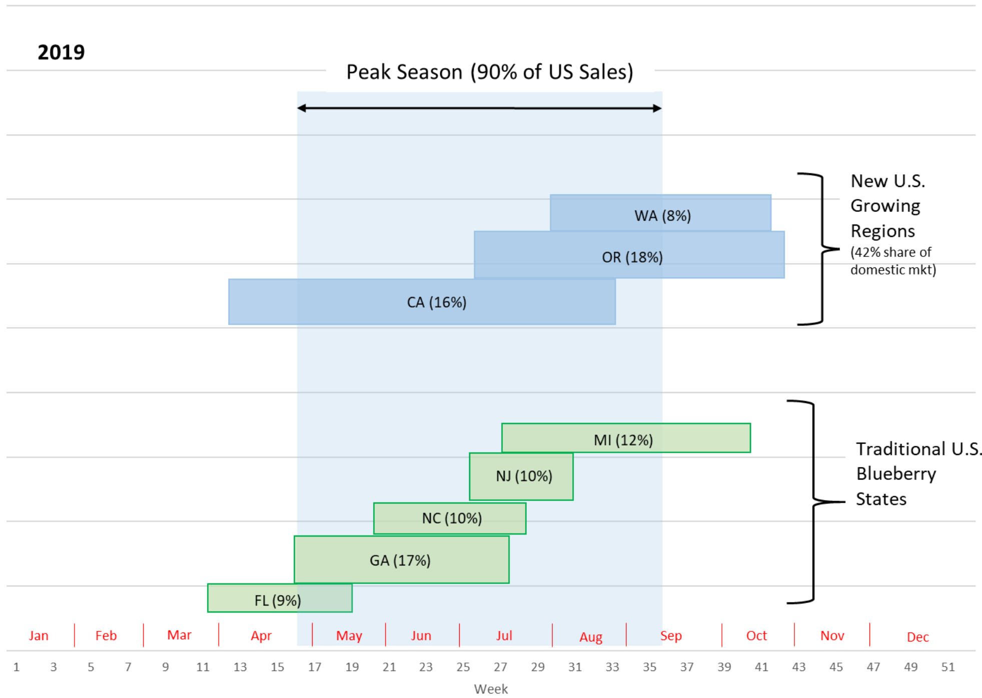
[22] Sean Breslin, "Hurricane Irma Likely to Put a Dent in Florida's Blueberry Crop This Year: Experts" at https://weather.com/en-CA/canada/news/news/2018-05-01-florida-blueberry-crop-losses-hurricane-irma . See Annex 4.

Lesson #6 – The Growing Season for West Coast Producers & Traditional U.S. Producers Overlap

The growth of the West Coast blueberry producers are particularly relevant for the economics of the traditional blueberry producers because of the overlap in growing and selling seasons. Using weekly data from the USDA I was able to determine the weeks when each state is active in the blueberry market. The results are depicted in **Figure 7** for the 2019 calendar year.[23] Along the horizontal axis each week of the year is indicated (from 1 to 52). The traditional blueberry growing states are depicted in the lower part of the chart in green. The West Coast producers are depicted in the upper part of the chart in blue.

[23] The exact weekly timing and precise volume in each state varies from year to year, but the chart is qualitatively similar across all years. The main change over the period is that the volume accounted for by the West Coast producers has increased markedly.

Figure 7 – Competitive Overlap of Domestic Producers



Source: USDA AMS Weekly Nonorganic & Organic Volume ("Movement") Data (as compiled by Agronometrics); peak season is defined as weeks 17 through 36; the number in parenthesis is each state's share of annual domestic fresh blueberry shipments

According to USDA data Florida's blueberries arrived on the market about week 11 and continued through week 19. In that 8-week window Florida accounted for about 9% of annual domestic fresh blueberry shipments. Georgia's fruit arrived on the market beginning in week 16 and ending in week 28. In that window Georgia accounted for about 17% of annual domestic shipments.[24]

The bars for each state can be similarly interpreted. Each bar depicts when each state's blueberries are being shipped and each state's share of total U.S. domestic

[24] As discussed previously, throughout much of the period the series of natural disasters reduced Georgia's volume.

shipments is indicated. The seasonality of fresh blueberries is clearly depicted in the chart as most traditional blueberry growing states are "in" the market for only 6 to 12 weeks and the West Coast states for somewhat longer.[25]

Traditionally, the blueberry producers in the lower part of the chart accounted for virtually all domestic shipments. However, over the last decade blueberry production in the West Coast states has grown significantly and by 2019 the fraction of domestic shipments from traditional blueberry growing states had fallen to 58%.

The West Coast producers are particularly important because their volume directly overlaps with the window when the traditional producers sell their blueberries. These three Western states sell virtually all their fresh blueberries precisely during the same weeks that the traditional U.S. blueberry growers are active. For example, Florida now has significant competition from California well before Georgia enters the market. As the summer progresses, New Jersey and North Carolina now face significant competition from Oregon and Washington blueberry growers. And, as discussed above, Oregon and Washington are not only more productive but their volume has grown significantly over the period, meaning greater and greater competition during the peak part of the year. Later in the

[25] California is the clear exception. This is because California is such a geographically diverse state its blueberry production reflects at least two distinct growing areas, effectively expanding California's market presence. Nonetheless, different California growers are in the market during different windows of time. The USDA/AMS divides California into two reporting areas, Southern California and Central California. In this report I add the two regions together and just report California. Doing so expands the window that California (combined regions) is in the market.

summer Michigan competes head-to-head with the highly productive and growing producers in Oregon and Washington.

This newfound late season domestic competition is one of the crucial developments in the market. Only a few years ago Michigan growers had the late season pretty much to themselves. Traditionally Michigan growers extended the length of their late season monopoly by storing fresh blueberries using "modified atmosphere" or "controlled atmosphere" storage.[26] Michigan's late season volume is based on blueberries that were harvested weeks prior. Most of Michigan's blueberries are harvested by early- to mid-September.[27] These storage techniques use a combination of high CO2 and low O2 plus very low temperatures to slow the degradation in the quality of the berry.[28] Nevertheless, blueberries subjected to modified/controlled atmosphere storage lose quality, with loss of flavor, firmness, and sweetness/acidity. Given the timing of its harvest, any blueberries shipped by Michigan growers in October have been stored in modified/controlled atmosphere environments. Thus, late season fresh blueberry consumers faced far higher prices for controlled atmosphere blueberries than they paid for fresh, better quality fruit just a few weeks prior.

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[26] Mark Longstroth and Eric Hanson, "The Michigan Blueberry Industry", Michigan State University, at Annex 4.

[27] Mark Longstroth and Eric Hanson, "The Michigan Blueberry Industry", Michigan State University, at Annex 4.

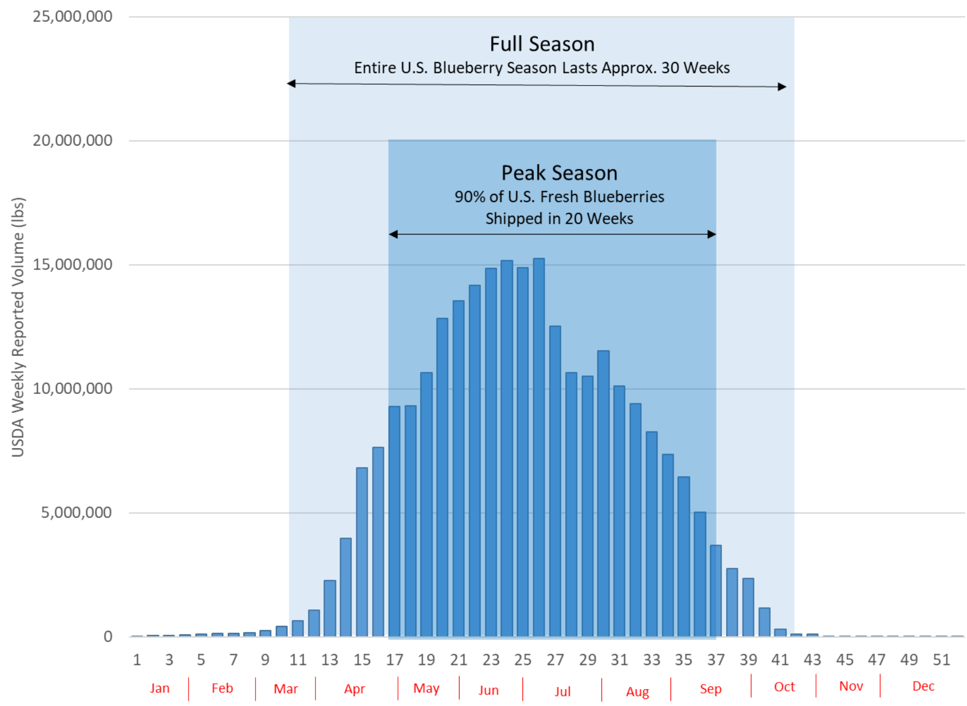
[28] Blueberry Storage, at https://www.van-amerongen.com/en/blueberry-storage (Annex 4).

Lesson #7 – The Peak U.S. Season Lasts Just 20 weeks and Accounts for 90% of All U.S. Fresh Blueberry Shipments

Using the USDA weekly data one can calculate how much volume is shipped by each market participant in each week. Over the entire country, approximately 90% of all U.S. fresh blueberries are shipped in a 20-week window that runs from week 17 through week 36. This is a critical finding. The domestic industry can only provide significant supply for about 20 weeks each year. Given the perishable nature of the product, the domestic industry's economic fortunes hinge heavily on what happens during the peak season.

Moreover, virtually all of the remaining 10% of U.S. fresh blueberry harvest is shipped in just a slightly wider window encompassing an additional 10-12 weeks (see **Figure 8**). For all intents and purposes the entire U.S. blueberry crop is shipped from mid-March to early-October. As a result, this means the domestic industry's economic performance is mostly determined by the 20-week peak season and *entirely* determined by the slightly longer 30-32 week shipment window. Consequently, it is not possible that imports entering the U.S. market outside the narrow window when U.S. blueberries are available could impact U.S. growers.

Figure 8 – U.S. Fresh Season Is Short Lived



Source: USDA AMS Weekly Nonorganic & Organic Volume ("Movement") Data (as compiled by Agronometrics); peak season is defined as weeks 17 through 36; 2019 season depicted

Importantly, the peak season does not define the key economic window for just one or two states. It is relevant for all U.S. producers. As seen in **Figure 7** (where the peak season was depicted with the blue shading), every U.S. state sells during the crucial peak window. **Table 8** reports the percentage of each U.S. state's shipments that occur in the 20-week peak season. Large blueberry growing states like North Carolina and New Jersey ship all their blueberries in the peak season. Other large blueberry growing states like Georgia, Oregon, and Washington ship more than 90% of their crop in peak season. Every U.S. state except Florida ships at least 80% of its fresh blueberry crop in the 20-week peak U.S. season. Florida, depending on the year (i.e., weather), ships between one-third and three-quarters of its output during the peak season.

Table 8 – Percentage of Annual Shipments During U.S. Peak Season, by State

	Florida	Georgia	N Carolina	N Jersey	Michigan	California	Oregon	Wash
2015	49%	100%	100%	100%	83%	92%	95%	96%
2016	75%	99%	100%	100%	94%	93%	98%	94%
2017	38%	87%	100%	100%	89%	87%	89%	82%
2018	41%	97%	100%	100%	96%	80%	91%	92%
2019	32%	93%	100%	100%	83%	84%	94%	92%

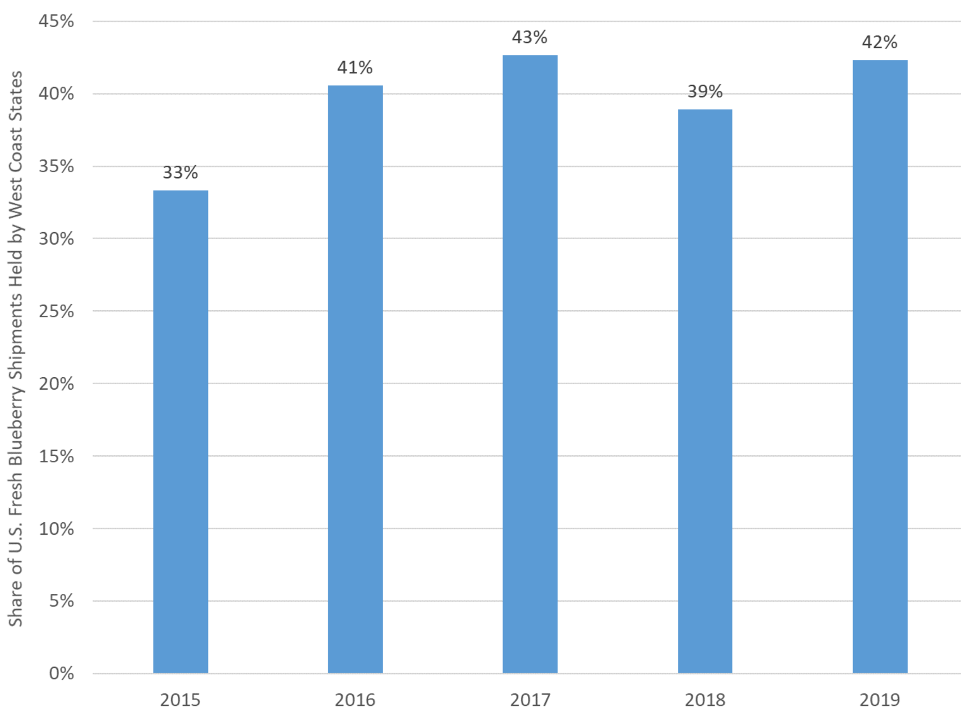
Source: USDA AMS Weekly Nonorganic & Organic Volume ("Movement") Data (as compiled by Agronometrics); peak season is defined as weeks 17 through 36

Lesson #8 – The Growth of West Coast Production Has Occurred Primarily During the Peak Season

Given the previous lessons, it should not come as a surprise that the large growth in production by West Coast producers has primarily affected the blueberry market during the peak season. The USDA and IBO data in **Table 1** and **Table 2** indicate that West Coast fresh blueberry volume increased by about 70M pounds during the investigation period. In terms of all blueberry production (fresh & processed), the IBO and USDA data indicate West Coast blueberry volume increased by about 120M pounds. **Table 8** reports that well over 90% of the West Coast states' shipments occur during the peak season.

What does this mean for the competitive dynamics of the market? The overlap in growing seasons means that nearly all the *new* blueberry volume from West Coast producers is shipped during the peak season. **Figure 9** depicts how the West Coast producers' share of domestic shipments has grown during the vital 20-week peak season over the 2015-19 period. Since 2015 the share of domestic shipments held by West Coast producers has gained 9 percentage points at the expense of the traditional blueberry producers, growing from 33% to 42%.

Figure 9 – Growth of Domestic Competition During the Peak Season



Source: USDA AMS Weekly Nonorganic & Organic Volume ("Movement") Data (as compiled by Agronometrics); peak season is defined as weeks 17 through 36

III. Import Market Developments and Competitive Dynamics

Lesson #1 – Imports Are Concentrated in the Off-Peak U.S. Season

As discussed above, 90% of the U.S. fresh blueberry crop comes to market in a narrow 20-week window. The off-peak season is when most imported fresh blueberries enter the market. Quoting the U.S. Highbush Blueberry Council

> The North American blueberry season and harvest runs from April to late September. Then, imports from South America fill the grocery store shelves from October to March. In our winter, they're experiencing sunny summer – perfect for harvesting blueberries. It's always summer somewhere, so you get twelve months of plump, juicy blueberry bliss.[29]

The USHBC refers to this supply pattern as "season swap" (**Figure 10**) and it is what economists call "lack of temporal overlap" or counter seasonal supply. As depicted in **Figure 5** imports are primarily in the U.S. market when domestic producers are not, and import volume drops sharply during the window when domestic growers service the market.

[29] Blueberry Season, at https://www.blueberrycouncil.org/about-blueberries/blueberry-season/

Figure 10 – Lack of Temporal Overlap or "Season Swap"[30]

Similar to what was done with domestic shipments, the weekly data from the USDA can be used to calculate the volume of import shipments per week. As seen in **Table 9**, the USDA data confirms what the USHBC dubbed "season swap".

[30] https://www.blueberrycouncil.org/about-blueberries/blueberry-season/

Table 9 – Percentage of Annual Shipments During U.S. Peak Season: Domestic vs. Imports

	Domestic	Imports
2015	90.6%	25.0%
2016	95.7%	18.8%
2017	85.9%	20.5%
2018	88.6%	19.3%
2019	86.5%	21.8%

Source: USDA AMS Weekly Cultivated (Nonorganic & Organic) Volume ("Movement") Data (as compiled by Agronometrics), adjusted Canadian data (APHIS undercount); peak season is defined as weeks 17 through 36

As shown, whereas approximately 90% of all U.S. fresh blueberries are sold during the peak season only about 20% of import volume is sold during that season. And even that 20% figure likely overstates the role of imports in the peak season as the "in season" supply is nearly all from Canada which has a long and stable relationship to domestic supply and demand. (Canada's unique position in the market is discussed more in the following section.)

The monthly HTS data in **Table 9** confirms that only about 20% of imports enter during the peak U.S. season. Because the HTS import data is only available on a monthly basis, it lack the granularity of the USDA weekly shipment data, making it difficult to properly match the HTS data with the timing of the true U.S. peak season. To address this shortcoming, two windows for measuring the peak season using the monthly HTS data are presented. Each alternative window is approximately 20 weeks long. The first window defines the peak season as five full months, May through September. The second window defines the peak U.S. season as running from mid-April to mid-September. As shown in **Table 10**, using either of these windows, the HTS monthly import data confirm that the vast majority of import enter the U.S. in the off-peak season. And, just as was seen with the USDA weekly data, the HTS trade data confirms that over the investigation period the share of imports entering during the peak season has declined.

Table 10 – Percentage of Annual Imports that Occur During U.S. Peak Season (HTS Import Data)

	Peak Season:	
	May to September	**Mid-April to Mid-September**
2015	27%	27%
2016	20%	21%
2017	22%	22%
2018	21%	21%
2019	23%	22%

Source: HTS imports from USITC Dataweb (0810400026, 0810400029); mid-month values are assumed to be ½ the reported full month volume.

Lesson #2 – Canadian & U.S. Fresh Blueberry Industries Are Tightly Integrated

Canada plays a unique role in the U.S. market. Canada is the only major source of imports whose blueberry harvest is not largely (or entirely) counter-seasonal with the U.S. growing season. Nearly all Canadian fresh cultivated blueberries are grown in British Columbia. Not only is the distance between British Columbia and Oregon/Washington small, the climates are similar. As a result, imports from Canada peak in July and August. To the extent there are imports that enter in the U.S. peak season, the vast majority are of Canadian origin.

Several comments about Canada's role in the market are warranted. First of all, U.S. and Canada supply and demand markets are tightly integrated. One sign of this is found in IBO reports which often report Canada along with U.S. states under the title "U.S. and Canada" or "North America". [31]

Second, Canada is the only country whose blueberries enter under North American Inspection Program-Canadian Origin (NAIPCO). NAIPCO allows Animal Plant Health Inspection Service (APHIS) to survey a smaller fraction of Canadian shipments. In effect, Canadian imports are treated differently than any other foreign source.

Third, and perhaps most importantly, the volume of imports of fresh cultivated imports from Canada has been stable, or even declining, for most of the period. In **Table 11** fresh cultivated imports from Canada are reported for the two key peak season months when Canada ships most of its harvest, July and August. From 2015 to 2018 the trend would be described as flat. Then, after a one-year increase in 2019 due to a bumper crop, imports from Canada in July and August 2020 were near their lowest level of the entire investigation period.[32]

Table 11 – Fresh Cultivated Blueberry Imports from Canada (July & August), pounds

	2015	2016	2017	2018	2019	2020
July-Aug	45,645,169	37,382,163	46,213,405	46,359,942	59,603,897	38,017,662

Source: USITC Dataweb, HTS codes: 0810400026, 0810400029.

[31] Cort Brazelton, Kayla Young & Nancy Bauer, "Global Blueberry Statistics and Intelligence Report," International Blueberry Organization, April, 2017, pp 8-9. Annex 7.
[32] Taking cultivated and wild fresh blueberries together, import volume from Canada fell over the period, from 90.7M pounds in 2015 to 79.7M pounds in 2019. Import volume fell again in 2020 to 53.1M pounds. Prehearing Staff Report at Table IV-3.

Fourth, Canada is by far the largest destination market for U.S. exports of blueberries. During the period Canada accounted for about 90 percent of fresh blueberry exports. This reflects the tight integration of the Canadian and U.S. supply and demand markets. During the two months imports from Canada are at their peak (July and August), the U.S. is also exporting a considerable volume of fresh blueberries to Canada (**Table 12**). And, over the period exports to Canada consistently grew. In July and August 2019, for example, U.S. exports to Canada were nearly 7.7M pounds larger than during the same two months in 2015. And the U.S. fresh blueberry exports to Canada were even larger in 2020: 12.2M pounds larger than during the same two months in 2015.

Table 12 – Fresh Cultivated Blueberry Exports to Canada (July & August), pounds

	2015	2016	2017	2018	2019	2020
July-Aug	5,817,933	7,868,730	11,996,078	16,778,924	13,529,155	18,045,295

Source: USITC Dataweb, HTS codes: 0810400026, 0810400029.

Subtracting exports from imports, we can compute net supply from Canada into the United States. In terms of net supply, *in every year except 2019 Canada volume has fallen relative to its 2015 level* (**Table 13**). In fact, in 2020 Canada's net supply is about half of what it was at the beginning of the period.

Table 13 – Fresh Cultivated Blueberry Net Supply from Canada (July & August), pounds

	2015	2016	2017	2018	2019	2020
July-Aug	39,827,236	29,513,433	34,217,327	29,581,018	46,074,741	19,972,367

Source: USITC Dataweb, HTS codes: 0810400026, 0810400029.

Thus, while Canada is the only major source of imports during the domestic peak season, nothing about Canada's supply during the period is indicative of that its supply being a substantial cause of serious injury. To begin with, Canada has long been a market presence during July and August. That is not a new development. By contrast, as I will document in the next section, the dramatically larger production of Oregon and Washington during the exact weeks Canada is in the market is a new development. Those two states have increased their production during the peak season by 52M pounds, more than 4 times as much as Canada's one year peak increase in 2019 (as measured by total imports in **Table 11**) or more than 7 times as much as Canada's one year peak as measured by net imports (**Table 13**). Moreover, unlike Canada whose volume fell to near period lows in 2020, Oregon and Washington continue to ship much larger volumes in the peak season and in the fall shoulder.

Summing up, Canada's supply has been flat or even declining for 4 of the 5 years since 2015. And, Canada is a growing export destination for U.S. fresh blueberries. This two-way trade highlights the inter-connection between the two markets.

Lesson #3 – The Growth in Imports Has Been Concentrated to the Off-Peak Season

Over the period, imports of fresh blueberries have grown considerably. As shown in **Table 14**, the volume of fresh imports has nearly doubled over the period.

Table 14 – Imports of Cultivated Fresh Blueberries (lbs)

	2015	2016	2017	2018	2019	Change	CAGR%
Fresh Imports	234,960,335	295,375,037	303,610,411	382,377,682	458,527,331	223,566,996	18%

Source: Imports and exports from USITC Dataweb (0810400026, 0810400029)

Yet, once again the "season swap" attenuates the impact of this volume on domestic producers: **virtually all of the *growth* in imported fresh blueberries has occurred in the off-peak weeks**. Specifically, using the weekly data from the USDA I find that 86% of the growth in imported fresh blueberries has occurred in the off-peak season (**Table 15**). The monthly HTS trade data confirms this finding. The HTS trade data also show that 82-83% of the growth in imports has occurred during the off-peak season. Thus, whatever the preferred metric for measuring the timing of imports (i.e., weekly USDA data or monthly HTS data) there is no disputing that the vast majority of the increase in imports has occurred during the U.S. off-peak season.

Table 15 – Percentage of Import Growth That Has Occurred in the Off-Season Period

USDA Weekly Data	86%
HTS – Peak Season: May-September	82%
HTS – Peak Season: mid-April to mid-Sept	83%

Source: USDA AMS Weekly Nonorganic Volume ("Movement") Data (as compiled by Agronometrics), adjusted Canadian data (APHIS undercount); peak season is defined as weeks 17 through 36; HTS imports from USITC Dataweb (0810400026, 0810400029)

Using the percentage derived from the more precisely measured weekly data, we can deduce that of the 223.5M pound increase in fresh blueberry imports over the period (reported in **Table 14**) only 31.3M pounds occurred during the peak season.[33] The other 192.2M pounds occurred during the off-peak weeks when little (or no) U.S. volume was sold. In fact, when one considers that during 70% of the off-peak weeks there is essentially no U.S. volume sold, the vast majority of the increase in imports has literally no impact on domestic producers.

The 31.3M pound increase during the peak season requires some perspective. First, according to **Table 1** West Coast producers increased their annual volume of fresh blueberries by 70M pounds over the period. **Table 8** indicates that about 90% of the West Coast volume occurs during the peak U.S. season. These figures mean that during the peak U.S. season West Coast producers have increased their peak season volume by 63M pounds over the period – more than twice as much as imports.

[33] 14% x 223.5M = 31.3M.

Second, California's harvest occurs earlier in the calendar year than does Oregon's and Washington's harvests and hence California competes more directly with Florida and Georgia than late season states. On the other hand, Oregon and Washington's blueberry season heavily overlaps with Michigan's harvest. **Table 16** shows that, each taken separately, the increase in Oregon and Washington peak season harvest is about the same as the increase in imports from all supplying countries and taken together the increase from these two states in the peak season is 72% larger than imports from all supplying countries.

Table 16 – Growth of Oregon and Washington vs. Imports, Full Year and Peak Season (lbs)

	Change: 2015-19 (Full Year)	Change: 2015-19 (Peak Season)
Oregon	30,740,000	28,895,600
Washington	27,330,000	25,143,600
Imports	223,566,996	31,299,379

Source: USDA NASS Production Data ("Tame, Fresh Market Production") https://quickstats.nass.usda.gov/. See Annex 10 for state production estimates. Peak season growth is derived using **Table 8**.

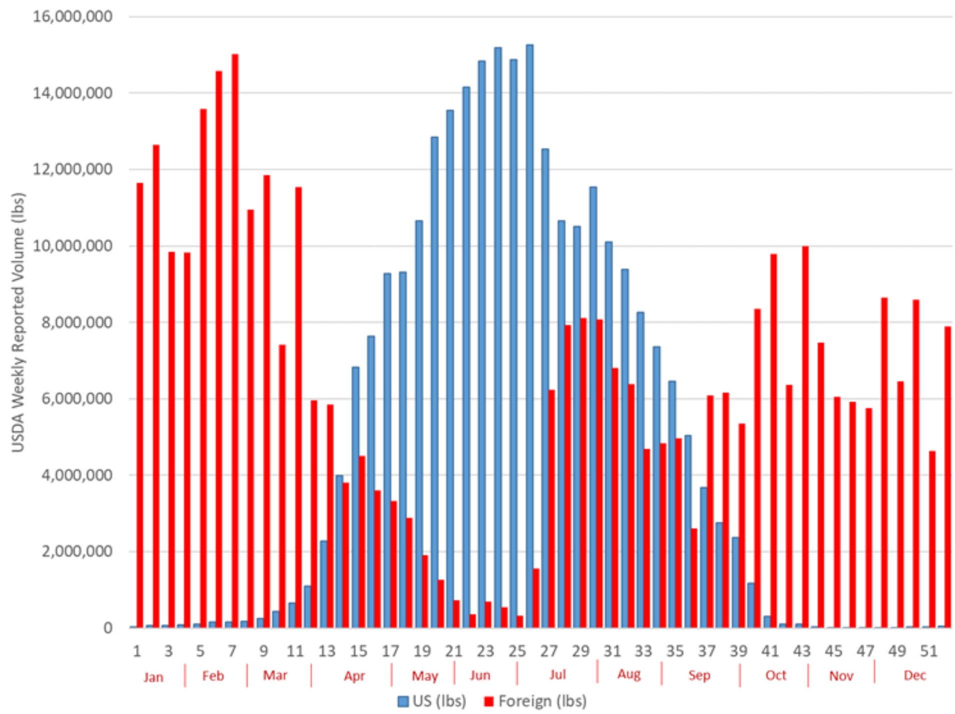
What do these figures mean? During the crucial 20-week period when traditional blueberry producers sell 90% (or more) of their harvest, by far the largest amount of new volume in the U.S. market has not come from imports but rather is sourced from the new U.S. producers. In the early peak season the volume increase is driven by California while in the second half of the peak season the volume increase is driven by the Pacific Northwest states, Oregon and Washington.

Lesson #4 – "Season Swap" and Competitive Dynamics in the U.S. Blueberry Market

The differing growing seasons for U.S. blueberry growers and blueberry growers south of the United States means there is very little competitive overlap between imports and U.S. growers during the peak season when 90% of U.S. fresh blueberries are sold. The lack of temporal overlap is depicted for the year 2019 in **Figure 5**. While there is some year-to-year variation in weekly supply, the general trend depicted in **Figure 5** is seen every year (for convenience **Figure 5** is reprinted below).

As seen, nearly all U.S. shipments occur between week 17 and week 36. Imports, on the other hand, are predominantly entering the U.S. market outside the peak U.S. season.

Figure 5 - Lack of Temporal Overlap of Supply (2019)



Source: USDA AMS Weekly Nonorganic & Organic Volume ("Movement") Data (as compiled by Agronometrics); adjusted Canadian data (APHIS undercount); peak season is defined as weeks 17 through 36.

This means the competitive dynamics of the U.S. market has six phases.

- **Phase 1** – Week 1 through week 11 – essentially no U.S. shipments; U.S. consumers served by imports
- **Phase 2** – Week 12 through week 16 – early season ("spring shoulder"); U.S. volume begins to come on the market; import supply recedes
- **Phase 3** – Week 17 through week 26 – first part of peak U.S. season; U.S. supply at its peak; import competition very low
- **Phase 4** – Week 27 through week 36 – second part of peak U.S. season; U.S. harvest begins to taper down; Canada is the primary source of imports
- **Phase 5** – Week 37 through week 40 – late season ("fall shoulder"), U.S. shipments recede; import supply from sources other than Canada begin to re-enter the U.S. market
- **Phase 6** – Week 41 through week 52 – essentially no U.S. shipments; U.S. consumers served by imports

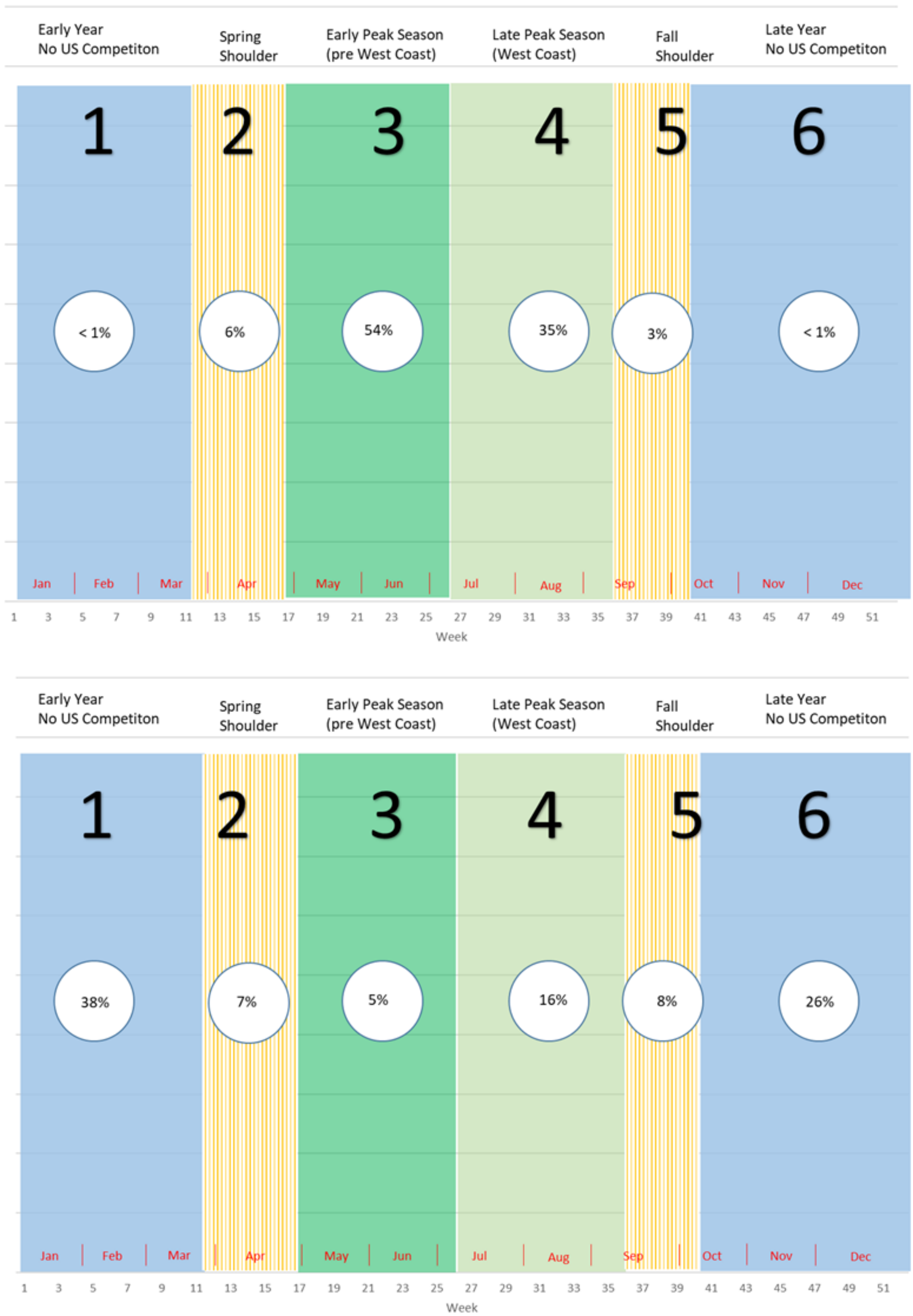
Figure 11 graphically depicts the six phases. The upper panel reports the fraction of annual volume shipped by U.S. producers in each phase. The lower panel reports the fraction of annual import volume in each phase. The lack of temporal overlap is remarkable. In particular, phase 1 and phase 6 (taken together) account for less than 2% of annual U.S. volume. On the other hand, phase 1 and phase 6 (taken together) account for 64% of annual import supply.

Contrast this with phase 3 and phase 4. Taken together these two phases account for 89% of annual U.S. shipments. On the other hand, only 21% of annual import supply occurs during phase 3 and phase 4.

Figure 11 – Six Phases of the U.S. Fresh Blueberry Season

U.S. Producers

Imports

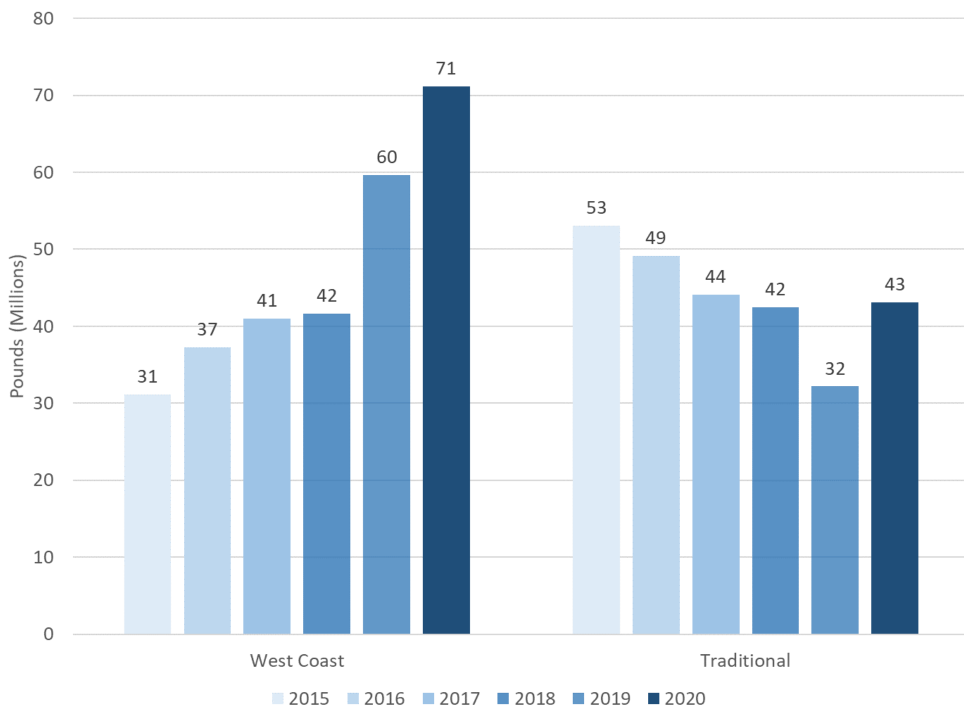


Source: USDA AMS Weekly Nonorganic & Organic Volume ("Movement") Data (as compiled by Agronometrics); adjusted Canadian data (APHIS undercount). The percentages are the average share of annual U.S. volume over the 5-year POI, 2015-19 (upper panel) and the average share of annual import volume over the 5-year POI, 2015-19 (lower panel).

The two "shoulders" account for about 9% of annual U.S. sales. The spring shoulder (phase 2) accounts for about 6% of annual U.S. shipments and the fall shoulder (phase 5) accounts for about 3% of annual U.S. shipments.

A key difference between the two halves of the peak season (phase 3 and phase 4) is the entry of Oregon's and Washington's burgeoning blueberry volume during phase 4. **Figure 12** depict shipments during phase 4 according the USDA weekly survey. As seen, West Coast producers have more than doubled the volume shipped in phase 4 since 2015, increasing from about 31M lbs. in 2015 to 71M lbs. in 2019. **Figure 12** tells a different story for the traditional producers during phase 4. Largely as a result of a series of very poor growing seasons, traditional producers' volume dropped by nearly 40% between 2015 and 2019. Overall, total domestic volume has increased in phase 4 over the period. In 2020, for example, 114M lbs. were shipped in phase 4 while in 2015 only 84M lbs. were shipped, equivalent to a 36% increase.

Figure 12 – Growth in West Coast Supply in Second Half of Peak Season



Source: USDA AMS Weekly Nonorganic & Organic Volume ("Movement") Data (as compiled by Agronometrics).

Figure 12 highlights the changing competitive dynamics among domestic producers. There are six critical ideas that underlie these changes. First of all, as was documented in **Table 1** traditional producers' production volume declined in the middle of the period and then recovered thanks to better weather. According to the USDA annual production statistics (**Table 1**) if we look just at fresh production, traditional producers' volume grew from 192.1M pounds in 2015 to 198.2M pounds in 2019. **Figure 12** shows that the traditional producers have especially lagged their West Coast counterparts' volume in the second half of the peak season.

Second, in "typical" USITC cases declining (or event flat) production by a set of domestic producers would be expected to be associated with factory closings and capacity utilization falling. That is not the case here. Traditional producers have not pulled back. To the contrary, acres planted by the traditional producers has expanded. In **Table 3** we saw that acres planted by traditional users increased by 6% over the period. In **Table 4** we saw that acres harvested by traditional producers increased by 9% over the period. Further, every traditional producer has a sizeable amount of additional acres currently under development (**Table 5**).

Third, the diverging patterns between production (which is falling) and acreage (which is expanding) is explained by the challenging weather environment that traditional users have faced over the period. "Mother nature" has caused falling yields (**Table 7**) which are reflected in reduced production by traditional producers. Nevertheless, the traditional producers' expansion plans indicate a bullish outlook for the future.

Fourth, despite the production challenges experienced by some part of the domestic industry there is no evidence that the U.S. industry *on the whole* is experiencing injury. Growth in volume by California, Oregon, and Washington more than offset the any volume reductions by traditional blueberry growing states (**Table 1**). As shown in **Table 1**, the highly efficient West Coast producers produce far more blueberries in 2019 than they did in 2015. West Coast producers' production of fresh blueberries increased by nearly 70M pounds over the period fueling overall growth for total domestic fresh production.

Fifth, both the traditional producers and the West Coast producers primarily ship in the peak season (**Table 8**). The changing competitiveness between the two set of U.S. producers has resulted in the West Coast producers gaining market share at the expense of the traditional producers. This pattern was reported in **Figure 9**.

Sixth, **Figure 12** demonstrates that this changing pattern of domestic supply is especially visible during phase 4, the second half of the peak season. This is precisely when Oregon and Washington ship most of their production.

Lesson #5 – The Importance of Varieties

Blueberry production is largely determined by climate; bushes are dormant part of the year and require a minimum number of hours below 45 degrees (or "chill hours") to bud and bear fruit. Different varieties are therefore better suited for northern and southern climates. Historically, blueberries could be broadly classified into two broad groupings: "high chill" or "low chill" varieties.

Over the last two decades, however, intense efforts have been made to produce newer varieties of blueberries with higher yield, better flavor, and more resistant to pests.[34] The traditional two categories – "high" and "low" chill –no longer adequately describe of the type of and quality of the blueberry being grown. New varieties are often developed for specific growing regions (e.g., varieties specifically for Northern Florida and other varieties for Central or South Florida). This, along

[34] Breeding the best blueberry, Michigan State University, October 27, 2020, at https://msutoday.msu.edu/news/2020/breeding-the-best-blueberry. (Annex 4).

with their genetics, allows the newer blueberry varieties to achieve higher yields. Second, the berry size and flavor profiles of the newer varieties are highly desired by consumers. Newer varieties bear fruit with taste and firmness characteristics more desired by consumers. This allows more blueberries to be sold at higher prices.

In 2016 the IBO described the importance of genetics not primarily in terms of better yield (i.e., greater production) but rather in terms of driving consumer demand:

> Genetics, especially private genetics, will continue to become more important. As gaps in the supply are filled by increased production, *much of which is being done today with 'open' varieties such as Biloxi, Elliott, Bluecrop, etc. with good yields and weaker taste, the big chains will start to demand better flavored more consistent quality fruit.* This will drive need for better genetics, both the development and the need for differentiated positions in varieties.[35] (emphasis added)

The thrust of the IBO's argument is that newer varieties produce a higher quality blueberry and a higher quality product drives consumer demand (i.e., consumers will buy more blueberries at higher prices as compared to when only the older varieties were available).

Genetics has clearly been embraced by the fast growing West Coast growers. In **Table 17** I list the major blueberry varieties grown in Oregon, Washington, and

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[35] Cort Brazelton, Kayla Young & Nancy Bauer, "Global Blueberry Statistics and Intelligence Report," International Blueberry Organization, April, 2017, pp 8-9. Annex 7.

California. Newer varieties are highlighted in blue and, when possible, I have also indicated the dates the variety was awarded a plant patent is listed. As seen, the West Coast producers have adopted a large number of new varieties. It is not a coincidence that these same producers have experienced rapid growth in production and sales.

Table 17 – West Coast Producers Embrace New Varieties[36]

Oregon & Washington	California
• Duke • Draper (2003) • Liberty • Aurora • Calypso (2013) • Valor (2015) • Blue Ribbon (2012) • Top Shelf (2012) • Last Call (2013) • Elliott	• Snowchaser (2005) • Emerald • Jewel • Star • Suziblue (2009) • Legacy • Proprietary (about 20% of the CA production)

The situation is far different in most growing areas in the traditional growing states (**Table 18**). For instance, Michigan's three main blueberries (Jersey, Bluecrop, and Elliott) are all old (or *very* old) varieties and two were politely described as having "weaker taste" by the IBO. Georgia's blueberry crop is dominated by a large number of rabbiteye varieties, which are native to the Southeastern U.S. and are best known for being low-chill (making them particularly vulnerable to crop loss due to warmer days following by a spring freeze). New Jersey's three primary

[36] Affidavit of Soren Bjorn, Driscoll's of the Americas (Appendix B).

blueberry varieties are all very old: Duke, Bluecrop, and Elliott. All of North Carolina's varieties are old. When one considers the impact of the changing climate on the local growing conditions, the role of older varieties is further apparent.

Table 18 – Traditional Producers Predominantly Grow Older Varieties[37]

Michigan • Jersey (very old) • Bluecrop • Elliott • Proprietary	**North Carolina** • Star • Camellia • Legacy • Duke
Georgia • Very old Rabbiteye varieties (Brightwell, Powderblue, Premier, Tifblue, Climax, Columbus) • Emerald • Suziblue (2009) • Legacy	**New Jersey** • Duke • Bluecrop • Elliott • Draper (2003)

The Southern suppliers have also embraced newer genetics. Mexico and Peru are two clear examples (**Table 19**). Approximately 60% of both Peru's and Mexico's production is based on new varieties. Adoption of the newer varieties is a key reason why imported blueberries have been so quickly and widely accepted by U.S. consumer – again, mostly during the months when domestic product is unavailable.

[37] Affidavit of Soren Bjorn, Driscoll's of the Americas (Appendix B).

***Table 19 – Foreign Producers Also Embrace Newer Varieties*[38]**

Peru	**Mexico**
• Biloxi (21 year old public variety) – about 40% of production • Ventura (2012) – about 30% of production • Rocio (2008) – about 10% of production • New Proprietary – about 20% of production	• Biloxi (21 year old public variety) – about 30% of production • Atlas (2016); about 10% of production • Ventura (2012) – about 5% of production • Proprietary genetics (new) – 50% or more of production

IV. Statistical Analysis of U.S. Fresh Blueberry Pricing

The above discussion makes it clear that the domestic industry has not experienced any adverse volume effects from imports. Domestic production is up significantly over the investigation period – over 22%. And, while imports have increased over the period, 86% of the increase in imports have occurred during the off-peak season. By contrast, the increase in volume during the peak season has been driven by the increased production by the rapidly growing West Coast producers, especially Oregon and Washington. Overall, the USDA/NASS and IBO data demonstrate a healthy blueberry domestic industry (as measured by volume) and where "season swap" has allowed fresh blueberries to become a 12 month fruit. Consumers are primarily served by U.S. producers in the peak season and by import supply in the off-peak season and one where the subject product.

Therefore, I believe the critical question is what has been the impact of imports on domestic pricing. This is a classic econometrics question – how does the volume from various suppliers, along with other factors, affect prices? The preceding

[38] Affidavit of Soren Bjorn, Driscoll's of the Americas (Appendix B).

discussion also demonstrated that the fresh blueberry is a quick moving market, where the prices, volumes, and the source of the fresh blueberry supply varies on a week by week basis. Consequently, the best way to understand fresh blueberry pricing dynamics is by analyzing weekly prices.

Formally, we can write the price-quantity relationship as

$$p_{t,w} = f\left(q_{t,w}^{trad}, q_{t,w}^{WCoast}, q_{t,w}^{imports}, I_{t,w}\right),$$

where

- $p_{t,w}$ denotes the domestic price of fresh blueberries in year t and week w;
- $q_{t,w}^{trad}$, denotes the volume of fresh blueberries shipped ("moved") by blueberry producers located in the traditional blueberry growing states of the U.S., in year t and week w;[39]
- $q_{t,w}^{WCoast}$, denotes the volume of fresh blueberries shipped ("moved") by blueberry producers located in the West Coast blueberry growing states of the U.S., in year t and week w;[40]
- $q_{t,w}^{imports}$, denotes the volume of imported fresh blueberries in year t and week w; and
- $I_{t,w}$ denotes other exogenous variables that influence prices in year t and week w;.

A potentially vexing statistical complication is that prices and quantities are simultaneously determined. That is, microeconomic theory asserts that higher supply volumes will lower prices and also that higher prices will spur greater supply. If we write the estimating equation as a linear function we have

[39] The "traditional" producers are Florida, Georgia, North Carolina, New Jersey, and Michigan.
[40] The West Coast producers are California, Oregon, and Washington.

$$p_{t,w} = \alpha + \beta_1 q_{t,w}^{trad} + \beta_2 q_{t,w}^{WCoast} + \ \beta_3 q_{t,w}^{imports} + \gamma I_{t,w} + \ \epsilon_{t,w}\ .$$

The simultaneity issue can cause the endogenous variables (the quantities) to be correlated with the error term. The econometric solution is to use "instruments" to eliminate the simultaneity. Said differently, "instruments" control for factors that are related to the quantity supplied but which are not themselves influenced by the price, $p_{t,w}$.

Given that the product under investigation is a perishable agricultural product, a set of instrumental variables is relatively easy to construct. The key is that the variables need to influence supply but should not be a function of the realized price in year t, week w. This means, for example, that acreage is a good "instrument". Acres planted affect supply, but the acreage decision was made years in advance and hence are independent of the price in year t, week w. Likewise, the variation in the yield will affect supply quantity but yield is not affected by price in year t, week w. Once a set of instruments have been identified, the estimation approach involves running a first stage regression to purge the quantities of the simultaneous influence of price and then run a second stage to estimate the impact of quantities on price ("two stage least squares").

Before estimating the equation, several preliminary issues need to be discussed.

Data The weekly AMS pricing and movement data are the primary source of pricing and quantity data.[41] Because of the seasonality issue, the AMS only reports domestic prices for the weeks where there is sufficient U.S. volume. As a result, in a typical year AMS reports domestic prices for 25-30 weeks. Also, in most weeks that domestic prices are reported, the AMS reports prices from more than one U.S. state. For each year *t* and for each week *w* a weighted average domestic price is created using the state level price and quantities.

With respect to imports two comments are warranted. First, for most of the period the AMS used quantity data from the surveys conducted by APHIS (Animal Plant Health Inspection Service). This creates a complication with respect to Canada. As discussed above, imports from Canada are subject to the NAIPCO program. NAIPCO allows APHIS to survey a smaller fraction of Canadian shipments. As a result of this program, the AMS data (which uses the APHIS surveys) undercounts Canadian import quantities.[42] To adjust for this undercount the weekly Canadian imports are scaled upwards so the aggregated annual totals using the AMS import data for Canada matches the annual trade quantities in the HTS import statistics.

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[41] See Annex 5 for a description of all data used in this report. Annex 6 contains the weekly USDA data..

[42] As a result of the undercount issue with the APHIS Canadian data, AMS recently switched to using U.S. Customs and Border Patrol Automated Commercial Environment (ACE) to source weekly data.

Second, the U.S. exports and re-exports a large quantity of fresh blueberries every year. Weekly import quantities are adjusted to account for the exported quantities yielding a measure that captures foreign volume balance on the U.S. market.

Time varying yield and acreage are calculated using the annual data for each state and country. The effective weekly acreage is computed by trade weighing the yield (or acreage) for the participants in that week. For example, if in a given week (and a given year) domestic blueberries are shipped from Florida and Georgia, the effective domestic yield for that week (and year) will be the weighted average of Florida's and Georgia's yield. As different states enter and exit the U.S. fresh blueberry market over a calendar year, the effective yield across the weeks will vary. Effective domestic acreage is similarly calculated. A similar procedure is followed to calculate effective yield and effective acreage for import supplying countries.

Phases As discussed above, competition in the U.S. market varies substantially across the year. In **Figure 11** I described how the fresh blueberry market is best thought of having six distinct competitive phases. Therefore, the estimation equation is expanded to capture the impact by phase,

$$p_{t,w} = \alpha + \sum_{j=1}^{6} \beta_{1,j} q_{t,w}^{trad} + \sum_{j=1}^{6} \beta_{2,j} q_{t,w}^{WCoast} + \sum_{j=1}^{6} \beta_{3,j} q_{t,w}^{imports} + \gamma I_{t,w} + \epsilon_{t,w} ,$$

where the j subscript denotes the phase that week w falls under. For example, prices in week 12 through week 16 would correspond to phase 2 (j = 2). Given the lack of domestic shipments in phase 1 and phase 6, the estimates in phases 2-5 are of primary interest.

Time Series Issues Because the price data is a time series, one must test to see if the price series has a unit root. If it does, adjustments must be done to control for the unit root. If it does not, the estimating equation can be estimated in levels rather than first differences. In **Table 20** I report the results of the Phillips-Perron test for unit root for the weekly domestic AUV. As seen, the null hypothesis of a unit root is rejected at all common significance levels.[43]

Table 20 – Unit Root Test, Weekly AUVs, 2015-20

```
Phillips-Perron test for unit root                 Number of obs   =        158
                                                   Newey-West lags =          4

                              ---------- Interpolated Dickey-Fuller ---------
                  Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(rho)          -34.846           -19.993           -13.816           -11.077
 Z(t)             -5.310            -3.491            -2.886            -2.576
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0000
```

Instruments The set of instrumental variables used are

- Acres Planted
  - by West Coast Producers, weighted by weekly supply (for each phase);
  - by Traditional U.S. Producers, weighted by weekly supply (for each phase);
  - by Foreign Producers, weighted by weekly supply (for each phase);
- Yield
  - by West Coast Producers, weighted by weekly supply (for each phase);
  - by Traditional U.S. Producers, weighted by weekly supply (for each phase);

[43] The augmented Dickey-Fuller test produces nearly identical results and strongly reject the presence of a unit root.

- by Foreign Producers, weighted by weekly supply (for each phase);

- Fraction of Domestic Supply Accounted by West Coast Producers, (for each phase).

Estimation Results

The results of the two stage least squares (2SLS) estimation is given in **Table 21**. Several comments are in order. First, despite the gaps in the pricing data due to domestic producers not supplying volume during certain weeks during the year, the estimation equation fits the data quite well. Second, given the strong "U-shape" pattern to prices across each calendar year (as depicted in **Figure 4**), the average weekly AUV across the 2013-14 years was included as an additional exogenous variable.

Third, the regression estimates are sensible. The parameters indicate that domestic supply and import supply both affect the domestic price. In particular, increases in supply will lower the price. The question, of course, is by how much and also how much the effect varies by phase. The estimates confirm that in the phases where there is the most direct head-to-head competition between imports and domestic supply, the point estimate of the impact of import volume is less than domestic supply.

Fourth, as discussed above Canada is the main source of imports in phase 4 and its volume has been stable over the period. Thus, the ultimate impact of Canada's imports on the price in phase 4 is small. Fifth, the positive coefficient on West

Coast supply in phase 2 likely reflects the higher prices California berries receive due to their higher quality.

Table 21 – 2SLS Estimates of U.S. Fresh Blueberry Pricing, 2015-20

	AUV_{tw}
Quantity – U.S. $Traditional_{t,w}$, phase 2	-0.694***
	(0.107)
Quantity – U.S. $Traditional_{t,w}$, phase 3	-0.183***
	(0.0342)
Quantity – U.S. $Traditional_{t,w}$, phase 4	-0.0479
	(0.0510)
Quantity – U.S. $Traditional_{t,w}$, phase 5	0.966***
	(0.297)
Quantity – U.S. $WCoast_{t,w}$, phase 2	2.694***
	(0.606)
Quantity – U.S. $WCoast_{t,w}$, phase 3	-0.119**
	(0.0586)
Quantity – U.S. $WCoast_{t,w}$, phase 4	-0.158***
	(0.0597)
Quantity – U.S. $WCoast_{t,w}$, phase 5	-0.793***
	(0.282)
Quantity – $Imports_{t,w}$, phase 2	-0.225**
	(0.112)
Quantity – $Imports_{t,w}$, phase 3	-0.236***
	(0.0876)
Quantity – $Imports_{t,w}$, phase 4	-0.272***
	(0.0706)
Quantity – $Imports_{t,w}$, phase 5	-0.382***
	(0.117)
AUV Trend $(2013\text{-}14)_w$	0.350***
	(0.0862)
Constant	3.477***
	(0.543)
Observations	161
R-squared	0.721

Notes: Quantities measured in millions lbs.
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Using the Estimation Results to Derive Market Impact

There are two reasons why the point estimates by themselves are insufficient to evaluate the relative impact of imports versus domestic competition. First, the change in volume from each supplier varies across years and phases. Second, the overall impact on the domestic prices must aggregate the individual impacts during various phases. Given the wide variation in domestic and import supply across the phases it is critical to aggregate the price effects properly. A 5 cent price reduction during the peak season (phase 3 and phase 4) might impact 200M pounds of domestic sales. On the other hand, a 7 cent price reduction in phase 2 and phase 5 might only affect 20M pounds of domestic sales. Obviously, the former has a greater impact on the domestic industry than the latter. Therefore, to evaluate the impact on the domestic *industry* we must capture the amount of volume affected in each phase.

Given the estimated parameters in **Table 21**, the overall impact is computed in the following four steps: (i) for each of the three suppliers compute the change in quantity supplied in each phase between 2015 and 2019; (ii) calculate the implied price impact of those supply changes in each phase using the parameter estimates; (iii) compute the impact on 2019 revenue of the observed change in imports and domestic supply in each phase, and (iv) aggregate the impact across phases.

In the context of the earlier example, suppose 4 cents of the 5 cent price reduction during the peak season were due to domestic competition, then the domestic price impact is \$8M ($\$0.04\ x\ 200M$) and the import price impact is \$2M ($\$0.01\ x\ 200M$). In the other phases suppose only 2 cents of the 7 cent price reduction is due to domestic competition and 5 cents is due to import supply. In this case the domestic price impact is \$0.4M ($\$0.02\ x\ 20M$) and the import price impact is \$1M ($\$0.05\ x\ 20M$). Aggregating across the two phases in this example the total impact from domestic competition is \$8.4M and from import competition \$1.4M. Therefore, in this example of the total price impact (\$9.8M), 86% is due to domestic competition ($\$8.4M\ /\ 9.8M$) and 14% is due to import competition.

Now, applying these calculations to the actual parameter estimates and observed change in supply, the results of this decomposition exercise are given in **Table 22**.

Table 22 – Implied Price Impact from Regression Analysis

	Entire Year	**Peak Season Only**
Domestic Intra-Industry Competition	63%	91%
Import Supply	37%	9%

The implied impacts are consistent with the earlier discussion. In particular, because the vast majority of the increase in imports largely occurred outside the peak U.S. season, the amount of U.S. volume affected by the price effects associated with the off-peak season change in imports is modest. By contrast, the increase in competition (i.e., volume) from West Coast producers largely occurred during the peak U.S. season. Consequently, the amount of volume subject to those price effects is large.

Across the entire year the estimates indicate that 63% of the change domestic price between 2015 and 2019 was due to domestic competition. Thus, imports were not the most important factor influencing domestic prices over the period. Change in import supply only accounted for 37% of the change in price.

The evidence supporting this conclusion is even more compelling if we focus attention on the price impacts in the peak U.S. season (phase 3 and phase 4): the estimates imply that 91% of the change domestic price between 2015 and 2019 was due to domestic competition. This finding is again consistent with the insights found in the figures and tables presented earlier in this report. Ninety percent of U.S. shipments occur in the peak season. During that window less than 15% of the growth in imports occurred. However, in that peak season window there was a large increase in supply from West Coast producers. It therefore follows that the competition between U.S. producers was the overwhelming cause of price changes in the critical peak season.

V. Concluding Comments

This review of the U.S. blueberry industry demonstrated (i) that the domestic industry is not experiencing injury and (ii) that an increase in intra-industry domestic competition was the single largest cause of price changes over the period.

With respect to "no injury", the data are quite clear. The domestic blueberry industry has grown over the period and will continue to grow in the future. Consider that between 2015 and 2019,

- Domestic fresh production has increased by 21%,

- Domestic frozen production has increased by 20%,
- Domestic acres planted have increased by 15%,
- Domestic acres harvested have increased by 18%, and
- Over 15,000 acres in the United States are currently in development, equivalent to a 16% increase in acres harvested in the next one to two years.

Imports have also grown over the investigation period, but their impact is attenuated for several reasons. First, 90% of domestic supply occurs in just 20 weeks in the summer. Second, only 20% of imports enter the U.S. during the peak season. Third, the increase in imports during the peak season has been small – 86% of the increase in imports has occurred in the off-peak weeks. As a result, for nearly all weeks in a year imports and domestic supply are complements, not substitutes. The U.S. Highbush Blueberry Council dubs this symbiotic relationship between domestic and import supply "season swap".

With respect to imports being a "substantial cause", a formal econometric study of the factors that have affected U.S. pricing over the period confirms the broad trends described throughout this report. Namely, the growing domestic competition during the peak season has had the single biggest impact on domestic pricing. Because U.S. producers sell so little of their production in the off-peak weeks, the import growth in those weeks has had little effect on the overall domestic industry.