

# IMPACT OF US IMPORTS OF FRESH BLUEBERRIES ON THE DOMESTIC INDUSTRY

by

AJIT KHANAL

(Under the Direction of Gopinath Munisamy)

## ABSTRACT

Domestic blueberry producers have contended that rising imports has negatively impacted domestic prices and revenue. However, the United States International Trade Commission found no significant evidence of harm to the domestic industry. Unlike the investigation, this study specifically examines the impact of fresh blueberry imports and distinguishes them from frozen. Using a partial equilibrium model of trade and a range of price data, the study simulates a scenario where above-average import growth is reduced to get counterfactual level of imports. Results indicate that revenue loss has been increasing regardless of the type of price used. By estimating state-level monthly revenue changes, this study provides a more accurate understanding of the impact of fresh blueberry imports on the domestic industry.

INDEX WORDS: domestic blueberry producers, fresh blueberry imports, impact on domestic industry, counterfactual level of imports, revenue loss

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This thesis is dedicated to Kṛṣṇa.

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## 1. INTRODUCTION

Blueberries are indigenous to North America (United States Highbush Blueberry Council, USHBC, 2014). Both North and South America account for most of the global blueberry production (FAOSTAT 2021).<sup>1</sup> The United States is the world's leading producer of blueberries followed by Peru, Canada, Chile, and Mexico. In the United States, wild and cultivated blueberries exist. In 2021, utilized production of cultivated blueberries totaled 660 million pounds and the value of the crop totaled \$1.02 billion (USDA, 2022). Both fresh and frozen blueberries are consumed in the US. In 2021, Oregon, Washington, California, Georgia, and Michigan, were the five largest fresh blueberry producing states in the USA and were responsible for 94.13% of production (USDA NASS, 2021).

However, the demand exceeds the supply and the US imports blueberries to meet year-round consumer demand (Fonsah, 2019). According to the US Census Bureau (2023), in 2022, Peru, Chile, Mexico and Canada accounted for 99.7% of the U.S. imports of fresh blueberries by value of which Peru accounted for the largest share (46.1%) followed by Mexico (29.5%). US Census Bureau data also reveals that the value of fresh blueberry imports in the US more than doubled between 2014 and 2021: It rose from \$511 million in 2014 to \$1.2 billion in 2021.<sup>2</sup> Domestic farmers, in recent years, therefore, have contended that competition with US imports in the market has negatively affected the price of domestic blueberries resulting in revenue loss amid

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<sup>1</sup> FAO, FAOSTAT database, places blueberries under CPC (Central Product Classification) code 01355.01 with the description: "This subclass includes blueberries, species of *Vaccinium myrtillus* (European blueberry, wild bilberry, whortleberry) and *Vaccinium corymbosum* (American blueberry) (Unofficial definition)"

<sup>2</sup> Fresh blueberries, in this study, do not include fresh organic blueberries or fresh wild blueberries. Under HTS schedule these are classified under 10 digits as 0810400029 Blueberries, Cultivtd (incl Highbush), Fresh Nesoi kg.

high production costs. The United States Trade Representative (USTR) asked the United States International Trade Commission (USITC) to launch an inquiry under Section 201 global safeguards in this matter in September 2020 (Office of the United States Trade Representative, 2020). The USITC determined that increased imports of fresh, frozen, or chilled blueberries were neither harming the domestic industry nor possessing a threat of harm (USITC, 2021a).

This study takes an alternative approach to analyze the impact on domestic farmers. Specifically, while the USITC study treated fresh and frozen blueberries as domestic ‘like’ products, this study recognizes the distinct differences between fresh and frozen. Under optimal storage temperature and humidity conditions, the storage life of fresh blueberries is typically two to three weeks (Mishra et al, 2007). They can be stored in a freezer and sold after 10 to 12 months as frozen blueberry. So frozen blueberry producers can dodge the period of import competition unlike fresh blueberry producers. In the USITC investigation, not only the proponents but also the parties that opposed safeguard measures made several points that fresh and frozen are not similar products. Although, practices of handpicking and machine harvesting prevail for both frozen and fresh blueberries, the former is primarily machine harvested and the latter is primarily handpicked. Both fresh and frozen blueberries go into cooling to extend their shelf life, but frozen blueberries go additional step of freezing. Marketing channels for frozen and fresh blueberries are also different (USTIC, 2021a). These differences hint that these two blueberries are not like products, and they should be treated separately while measuring the impact of US imports. Additionally, unlike our study, the USITC study did not utilize the model used in similar investigations of cucumbers and squash. In addition to estimating revenue loss for each year for the whole domestic industry as in the USITC investigations, this study estimates the revenue loss by month and by state for the seven largest fresh blueberry producing states. Contrary to the investigation, this study

also recognizes the fact that marketing season varies within the US, i.e., geographically, and if the domestic industry (in this case fresh blueberry industry) is facing import competition, only certain producing states which are marketing during that period are affected.

This study is structured into seven chapters:

Chapter 2 presents review of literatures and studies associated with this study.

Chapter 3 provides specific objectives of the study.

Chapter 4 explains the methodology used in the study, including data sources, and econometric modelling.

Chapter 5 discusses the findings of the research.

Chapter 6 points out some limitations of the study and discusses avenues for further research.

Chapter 7 draws conclusions of the study.

## 2. LITERATURE REVIEW

The three most widely grown species of blueberries in the world are highbush blueberry, rabbiteye blueberry, and low bush blueberry. These three species belong to the genus *Vaccinium*. In addition to these, half-high types-hybrid of highbush and lowbush species- are also cultivated. Northern, southern, and intermediate varieties are types of highbush cultivars (Fonsah et al., 2007 and Fonsah et al., 2008). These three types of highbush blueberries have different chilling requirements and, as a result, are suited for different climatic conditions (Retamales and Hancock, 2012).

### 2.1 History of Blueberries

Elizabeth White, a cranberry farmer, in the 1890s started conducting her own research into the wild highbush blueberry (USDA, 2021). Frederick Coville of the United States Department of Agriculture began his research on cultivating wild blueberries in 1908 (USDA,2021). Coville persisted through years of failures, finally figuring out acidic soil requirement, cross pollination need and chilling requirement for the plant. In 1910, his work titled ‘Experiments in Blueberry Culture’ was published by the USDA (JSTOR,2016). After reading Coville’s work, White invited Coville to work with her on her family farm. White persuaded local people to search the woods for bushes with large berries. She not only gave cash to people who discovered the largest berries but also named the bushes after the finder (The State of New Jersey). They became business partners in 1911 and in 1916, they harvested and sold their first commercial blueberry (USHBC,2023).

From 1910 to 1940, the significant blueberry industries started emerging across the USA- New Jersey in 1910, North Carolina in 1920, Michigan in 1930, and Washington in 1940 (Eck and Childers, 1966). The best rabbiteye blueberry selections from private wild seedling collectors were gathered and planted at the University of Georgia Tifton Campus in 1925. The UGA Alphaha Research Station created a blueberry breeding research station in the flatwoods district in 1944. Release of cultivars started in 1950

with "Callaway" and "Coastal," and the first cultivar of good commercial quality, "Tifblue," was released in 1955 (Krewer and NeSmith, 2002). In British Columbia and Oregon, during the 1970s and the beginning of the 1980s, vast new plantings started to emerge. Large-scale new northern highbush plantings started appearing in New York and Indiana in the 1980s. Both California and Mexico became significant producers of blueberries for the first time in the early 2000s (Retameles and Hancock, 2012).

In 1923, a Mr. Borgesius planted highbush blueberries for the first time outside of North America at Assen, the Netherlands. In Germany, Dr. Walter Heermann brought in northern highbush blueberry in the 1930s. (Retameles and Hancock, 2012). The table below depicts first planting and major growth periods of blueberries across different countries.

Table 1: First plantings and major growth period of blueberry production in different nations

Region	Country	First Plantings	Major Growth Period
Africa	South Africa	1970s	1990s
Asia	China	1980s	2000s
	Japan	1950s	2000s
Europe	Poland	1970s	Mid 1990s
	Germany	1960s	Late 1990s
	France	1980s	Late 1980s
	Netherlands	1970s	Late 1980s
	Spain/Portugal	1990s	2000s
	Italy	1970s	Early 1980s
	UK	1950s	2000s
Pacific Rim	Australia	1960s	1990s
	New Zealand	1970s	Late 1980s

South America	Chile	1980s	2000s
	Argentina	1990s	2000s
	Uruguay	2000s	2000s

Source: Retameles and Hancock 2012

## 2.2 Types of Blueberries Grown in the U.S.

Northern highbush, southern highbush, rabbiteye, and low bush are the four main varieties of blueberries farmed in the United States (wild). Native to the eastern coast of the United States, northern highbush is primarily cultivated in New Jersey and Michigan (Krewer and NeSmith,2006). These blueberries are also grown in some areas of Idaho and eastern Oregon and Washington (C Strix et al, 2014).

Southern highbush are hybrids of *V.corymbosum* and a native Florida species (*V. darrowii*). This type was developed to grow blueberries in low-chill areas and are grown in Florida and California (C Strix et al, 2014).

Rabbiteye blueberries are native to the southeastern United States and are grown in southeast Alabama, South Georgia, and north Florida (Fonsah et al., 2013). Rabbiteye is widely grown across the state of Georgia. These varieties of blueberries bloom early, so they are not suited for the mountains. Instead, in the mountain highlands, northern highbush performs well. As far as southern highbush varieties are concerned, they grow well in South Georgia. However, there are some higher chilling hour-requiring cultivars of southern highbush, such as Ozark Blue and Reveille, that do not perform well in South Georgia (Krewer and NeSmith, 2006).

Lowbush blueberries are native from Minnesota to Virginia and to the northeastern United States (C Strix et al, 2014). These are also known as wild blueberries and are mostly grown in Maine (NIFA,2022).

Blueberries in the United States includes fresh or chilled and frozen blueberries. Blueberries are either wild or cultivated and maybe conventional or certified as organic. Seasonal availability of blueberries is primarily between April and October; Florida grown blueberries are available typically first and blueberries from Michigan, Oregon and Washington are mostly last available (USITC,2021a).

### 2.3 Production

In 2021, the US commercial blueberry industry harvested a total of 774.1 million pounds of blueberries, which is the highest volume of blueberry production in the world. This was done on 102,400 acres of land, and the total value of the blueberry industry was \$1.1 billion. This accounted for 26% of the total value of the berry crop industry in the US for that year. From 2000 to 2021, the annual harvested blueberries increased from 40,820 acres to 99,400 acres and the average yields per acre rose from 4,480 pounds per acre to 6,730 pounds per acre (Morgan,2021). In 2021, the USA was the largest producer of blueberries in the world. As far as fresh blueberry production is concerned, in 2021, the production value was 765 million dollars with production volume at 354 million pounds.<sup>3</sup> Oregon was the largest producer of fresh blueberries followed by Washington, California, and Georgia (USDA 2022b).

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<sup>3</sup> USDA NASS, Quick Stats reports production value of fresh market blueberries under the Data Item: BLUEBERRIES, TAME, FRESH MARKET-PRODUCTION MEASURED IN \$. It reports production amount under the Data Item: BLUEBERRIES, TAME, FRESH MARKET-PRODUCTION, MEASURED IN LB.

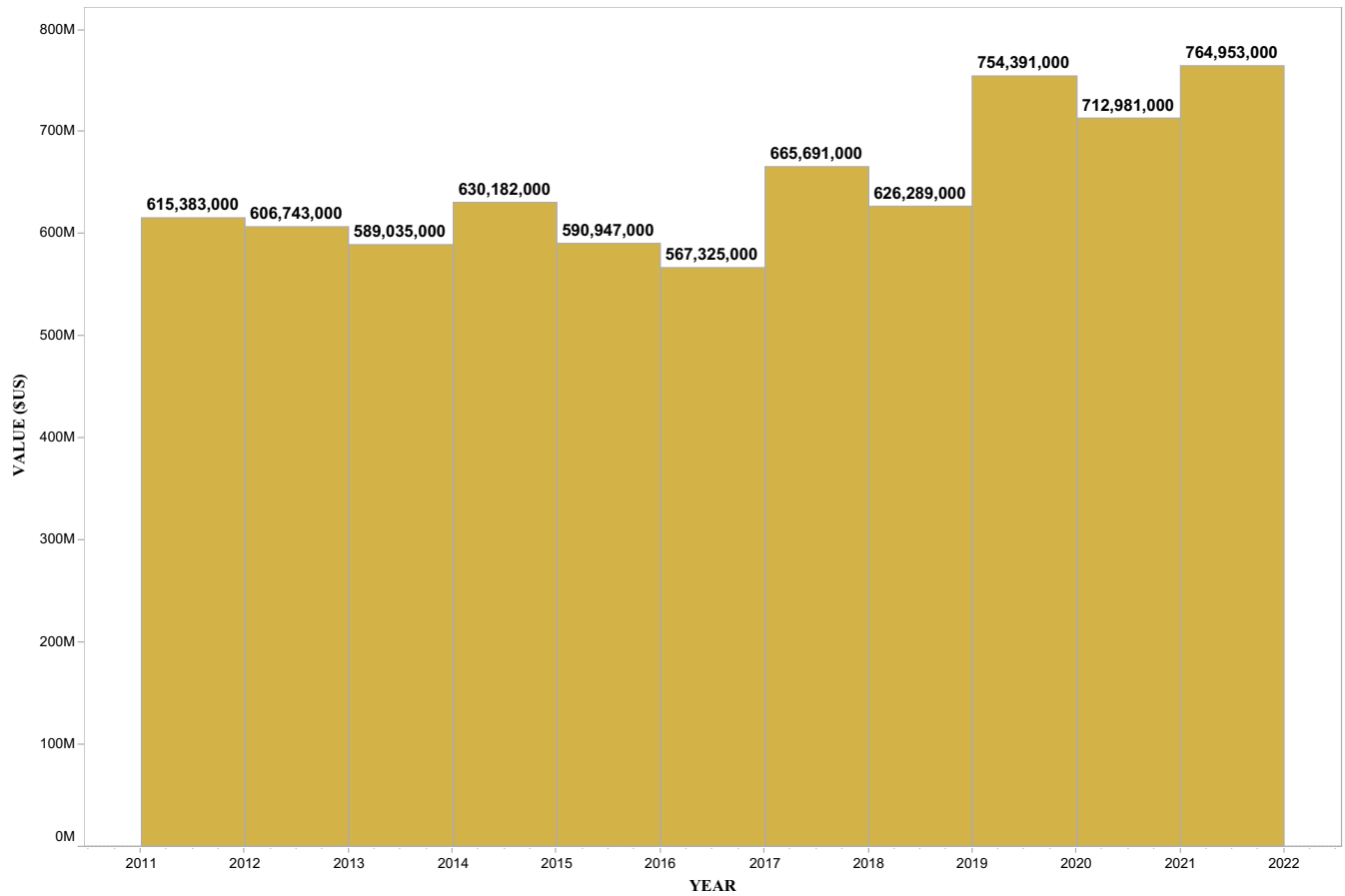


Figure 1: Value of fresh market blueberry in the U.S. (Developed using USDA NASS data)

#### 2.4 Consumption in the U.S.

Fresh blueberry consumption rose from 79.1 million pounds in 2000 to 373 million pounds in 2019 and over the same time processed blueberry consumption rose from 103.8 million pounds to 300 million pounds (USDA, ERS, 2023).

United States Department of Agriculture, Economic Research Service Food Availability Data System (FADS) has per capita food availability data and per capita loss-adjusted food availability data. These data serve as proxy for per capita consumption in the USA. After the per capita food availability data is adjusted for food loss prior to ingestion- spoilage and wastes that

accumulate as the food reaches from farm to fork and wastages in home, the per capita loss-adjusted food availability is estimated.

For fresh blueberries, both the per capita food availability before and after adjusting for loss were below half a pound per person from 1980 to 2003. Both increased rapidly from 2004 to 2019. The per capita food availability more than quadrupled to 2.33 pounds in 2019 and the per capita food availability adjusted for loss reached to 1.71 pounds in 2019 (USDA ERS, 2023).

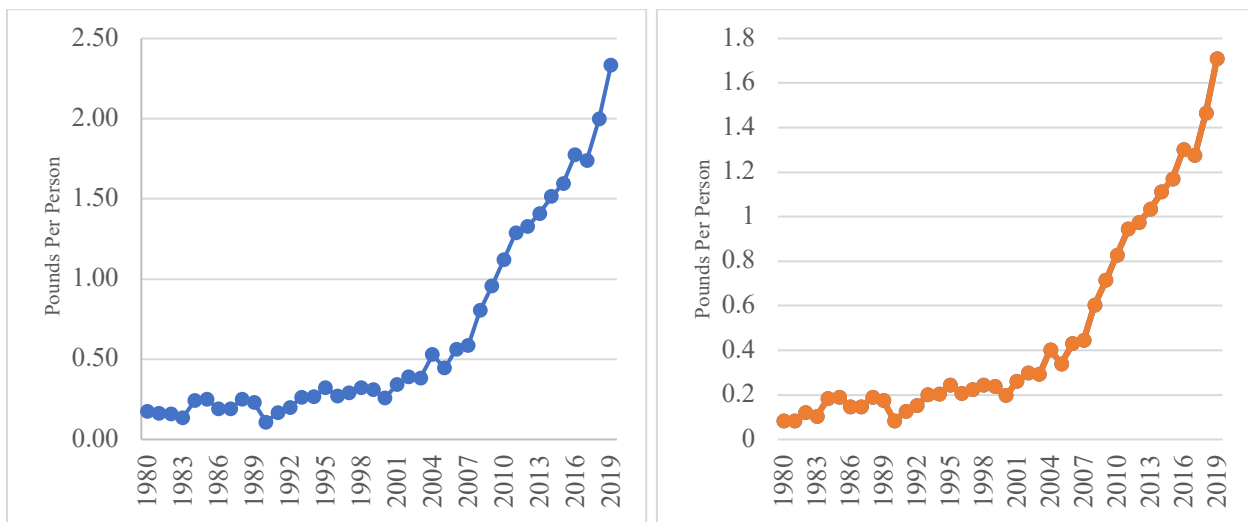


Figure 2: Per capita fresh blueberry availability before adjusting for loss (left panel) and after adjusting for loss (right panel)

This increase in consumption can be attributed to the real (inflation-adjusted) price of blueberries decline over the years, and blueberries being relatively less expensive compared to all other items in the US economy. In addition to this, increase in U.S. personal income over the period, the relatively lower price of blueberries compared to other berries and USHBC's marketing initiatives encouraged consumption (Kaiser, 2020). The USHBC's 2023 annual budget proposal pledges \$6 million for market promotion and publicity, \$3 million for export market promotion and \$0.5 million for industry relations (USHBC,2023). Kaiser in 2020 found that a 1% increase in

the USHBC public relations and promotion expenditures in the domestic market (excluding free publicity) increased per capita demand for blueberries- fresh plus processed by 0.1% in the short run (less than one year) and by almost (0.2%) in the long run holding all other demand drivers constant. The study also asserts that domestic blueberry consumption would have been 114.2 million pounds lower annually had USHBC not conducted any domestic promotion from 2014 through 2018.

The North America Blueberry Council (NABC) established a Blueberry order. The Blueberry order established a grower assessment program which is administered by the USHBC. Under this program, fees collected from producers and importers of blueberries were used to invest in medical research trials (Kaiser, 2020). These trails have documented the health benefits of blueberry consumption and inspired USHBC to officially start ‘Grab a Boost of Blue’ consumer marketing campaign in 2021 to increase demand (USHBC, 2021).

According to the USITC (2021), most blueberries are consumed as fresh or frozen berries, rather than being processed into products such as blueberry jams, muffins, or pie fillings. A survey of 42 firms was conducted to rate the importance of 27 factors in their purchasing decision for fresh and frozen blueberries. Over half of the firms rated quality meeting industry standards as the most important factor. Size, variety, USDA grade, firmness, flavor, color, and texture were among the factors that several firms claimed they consider when evaluating the quality of fresh or chilled blueberries. Availability and price were also important factors, with availability being the second most important factor for fresh or chilled blueberries, and price being the second most important factor for frozen blueberries.

## 2.5 Marketing

“Flats 12 6-oz cups with lids” and “Flats 12 1-pt cups with lids” are the most common types of containers for transporting fresh blueberries into and within the U.S. (USITC,2021). Farmers can market their fresh blueberries either directly or indirectly. Direct market option is a scenario where farmers sell to the consumers directly (Dellachiesa et al, 2005). This can occur via Pick-your-own (PYO) and Already-picked sales at farmers’ markets or via roadside markets. PYO sales allow customers to come to the farm and pick blueberries on their own directly from the field. Already Picked sales, on the other hand, involve the farmer or their staff harvesting the produce and offering it to sale to customers.

Options for indirect marketing include local retail markets (grocery stores), processors, auctions, marketing cooperatives, and wholesale markets (Dellachiesa et al, 2005). First handlers (individuals, businesses, or organizations) acquire agricultural commodities directly from farmers or at the port of entry. They are involved in packaging, processing, and transporting. These agents sell blueberries on the open market. Open market refers to the market where agricultural products are sold to buyers who are not pre-arranged customers or part of a contract. In the open market, products are sold to any potential buyer who is willing to pay the market price. The shipping point price typically covers various costs, including but not limited to brokerage fees, commissions, customs fees, and duties. The price also includes packaging and freight costs within the United States that are paid by the seller/shipper before the first sale (USDA AMS, 2023). Marketing cooperatives can act as first handlers. These are established by group of growers or other entrepreneurs who develop facilities to grade, receive and market blueberries.

Terminal markets or wholesale markets are usually located in major cities. Here blueberries are sold by wholesalers to retailers or other large users in wholesale lots (USDA AMS, 2023). The

buyers at these markets sometimes include major retailers, but are often small retailers, restaurants, and institutions (e.g., schools and jails) (USITC, 2021).

## 2.6 Blueberry Imports

United States is a net importer of blueberries. In 2022, the value of fresh blueberries imported in the USA crossed 1 billion dollars which is around 255.6 % increase from 2011 (US Census Bureau, 2023).<sup>4</sup> The major harvesting season of fresh blueberries is April through September. During this period, as of 2022, the value of fresh blueberries imports was around 450 million dollars which is around 478.41% increase from 2011.<sup>5</sup> About 98.5% of U.S. fresh blueberries imports by weight were from Peru, Chile, Mexico, and Canada. The increase in imports is a likely because of increased cultivation of newer varieties and because relatively newer producers of blueberries, Peru, and Mexico, devoted more land to cultivation of blueberries (Kramer, 2020). Peru and Mexico are relatively new exporters to the USA. USA Trade Online data reveals that Peru started to export fresh blueberries from 2014. From 1% import share by weight in 2014, the share of Peru imports has reached 45% by 2021. Mexico' share has also increased from 2% import share by weight to 25% in 2021. On the other hand, the import share from Chile and Canada has been declining.<sup>6</sup>

Imports of fresh blueberries from Mexico in early spring have grown (Kramer,2020). This overlaps with harvesting months for Florida, Georgia, and California. In 2019, Peru accounted for

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<sup>4</sup> Customs Value was used to calculate these numbers. According to US Census Bureau, Customs Value is “The value of goods imported as appraised by U.S. Customs and Border Protection. This value is generally defined as the price actually paid or payable for merchandise when sold for exportation to the U.S. It excludes U.S. import duties, freight, insurance, and other charges incurred in bringing the merchandise to the U.S”. See Appendix 1 which depicts value of fresh blueberries imported in the USA from 2011 through 2022.

<sup>5</sup> See Appendix 1 which shows value of fresh blueberries imported from 2011 through 2022 (April through September).

<sup>6</sup> See Appendix 2 which shows shares of Peru, Chile, Mexico, and Canada from 2011 through 2021.

about 70% of import shipments in September and October and this has increased competition for producers in Michigan, Washington, and Oregon. The imports from Peru in the month of September has been increasing in subsequent years. As of 2021, around 48 million pounds of fresh blueberries arrived in the month of September while around 25 million pounds arrived in September 2019. Both Peru and Mexico are starting to send shipments of fresh blueberries in other months also.

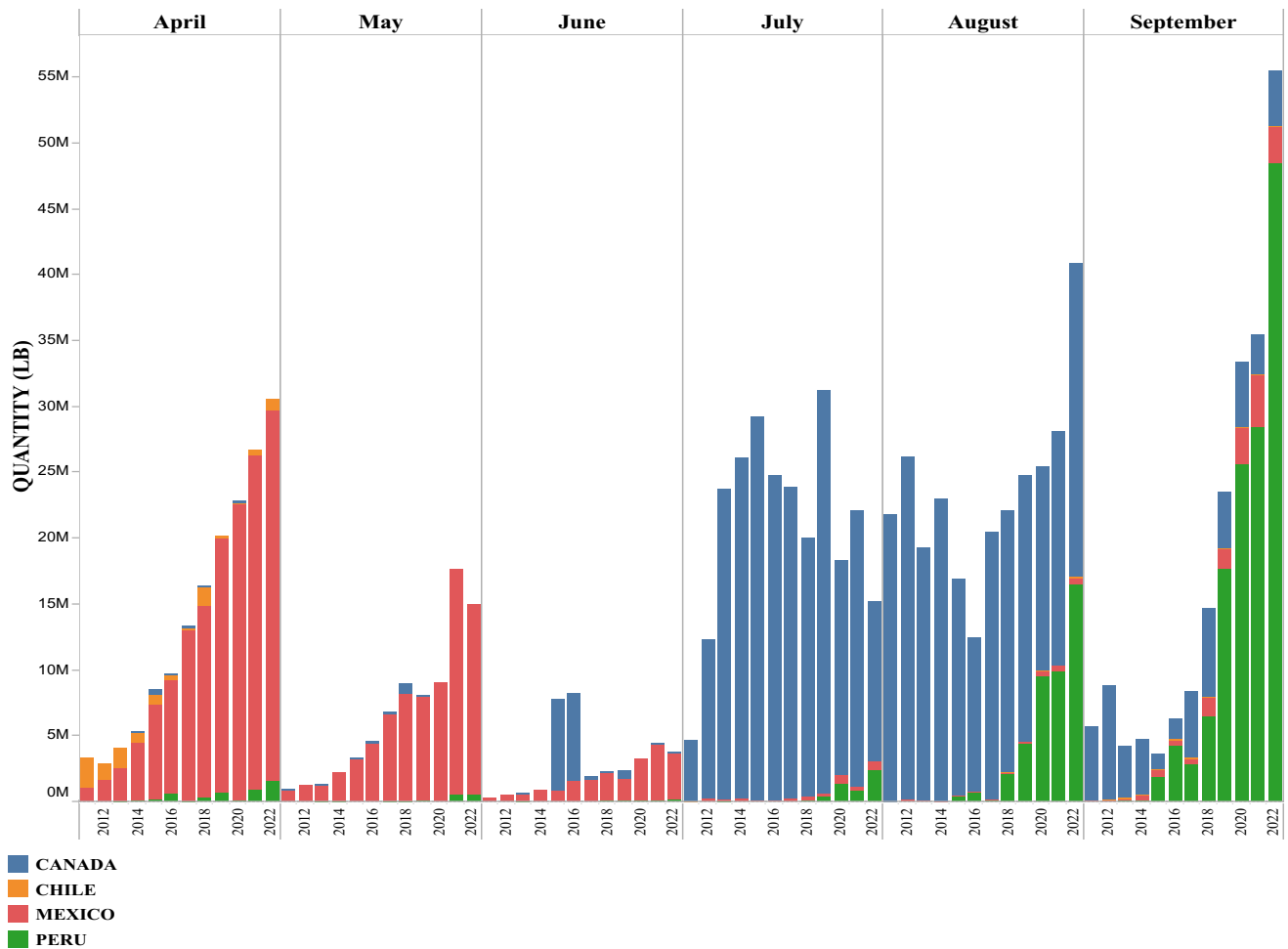


Figure 3: Monthly imports of fresh market blueberries from Peru, Chile, Mexico, and Canada (utilized the U.S. Census Bureau data)

The quantity of Mexican blueberries entering the United States has increased due to several reasons. According to Wu et al. (2018), one reason for the success of Mexican agriculture is the

government's subsidy program, which includes the promotion of protected culture technology. The National Development Plan of 2007-2012 included five programs to enhance agriculture, increase productivity, and improve efficiency. These programs were the Support Program for Investments in Equipment and Infrastructure, Agricultural Income Enhancement for Better Living, Prevention and Risk Management, Capacity Development, Technological Innovation, and Rural Extension, and finally Sustainability of Natural Resources. The Support Program for Investments in Equipment and Infrastructure had eight sub-programs. One of them was Strategic Project for Protected Agriculture. This is administered by SAGARPA (Secretariat of Agriculture, Livestock, Rural Development, Fishery, and Food) and it started in 2009 (Dorfman et al, 2019). For protected agriculture, shade houses, plastic tunnels, and greenhouses were employed. For blueberries, the two major protection structures are high tunnels and shade houses. During the year 2014, the subsidy rate for high tunnels was 200,000 pesos (equivalent to US\$14,451) per hectare, with a maximum limit of 2.7 million pesos (equivalent to US\$21,676) per hectare. Furthermore, the subsidy rate for each project could go up to 2.7 million pesos (equivalent to US\$0.2 million) (Wu et al, 2021). In 2019, the maximum amount, for all types of eligible structures, increased to 4 million pesos per project (Wu et al, 2022). Protected area in Mexico has increased to 133,808 acres by 2019 from 1952.13 acres in 2000. Because of these favorable policies, farmers shifted from open field to production in protected areas. Protected structures increase yield and quality, and farmers can extend growing seasons.

An additional reason for the increased production of blueberries in Mexico is due to its higher profitability compared to other crops. In the 2019/2020 season, blueberry production in the Michoacán region under protected structures was found to be 1.5 times more profitable than strawberry production, as reported by the Trusts Established in Relation to Agriculture in Mexico.

The availability of cheap labor, as well as reduced capital constraints from government policies, have also contributed to this increase in production. Additionally, the demand for blueberries in the United States and the free access to the US market through NAFTA/USMCA have further encouraged production in Mexico (Wu et al., 2021).

In 2006, Carlos Gereda imported 14 varieties of blueberry plants from Chile to test if they would grow in his native soil. Of the 14 varieties four flourished and as of blueberries as of 2022 are a \$1 billion per year business in Peru (World Economic Forum, 2022).

The climate in Peru allows for nearly year-round harvests. Production is in the coastal regions. The coastal regions offer more opportunities for labor availability, access to seaports and airports, irrigation projects and transportation and logistical needs. In the coastal regions, approximately 50% of production is in the northern coastal region of La Libertad (FAS USDA, 2023).



Figure 4: Fresh market blueberries producing regions in Peru (adapted from FAS USDA,2023)

The increased profitability of blueberry production is another factor driving the increase in production, as stated by FAS USDA (2023). This profitability has prompted fruit growers to expand their operations and focus on producing blueberries. Additionally, foreign investors, including those from Peru, have shown interest in investing in the blueberry industry due to its profitability. According to FAS USDA (2023), U.S. investment in Peru's blueberry industry covers an area of approximately 5,700 hectares, which is valued at approximately \$360 million dollars. To establish one hectare of blueberries, an estimated investment of \$30,000 to \$150,000 is required, and a complete return on investment can be achieved in as little as two years, even at the higher end of the investment range.

The adoption of newer and improved blueberry varieties has also played a significant role in the increase in production. According to FAS USDA (2023), farmers are transitioning to newer blueberry varieties, many of which are sourced from U.S. genetics. The U.S.-Peru Free Trade Agreement (PTPA) has facilitated the export of a significant amount of U.S. blueberry genetics to Peru without tariffs. This agreement has also enabled Peru to export blueberries to the U.S. without tariffs.

Peru's blueberry industry has gained a reputation for innovation, consistency, and quality in global markets, establishing itself as a major exporter of blueberries. Additionally, in June 2022, Peru enacted Law 31518, which declared the formulation of targeted public policies to promote the production, export, and industrialization of berries, with special emphasis on those that receive less attention and have less development, such as strawberries, raspberries, blackberries, and aguaymanto. The blueberry industry in Peru is also expected to benefit from this (FAS USDA, 2023).

## 2.7 Exports

In 2022, the U.S. exported 18.13 million kilograms of fresh market blueberries valued at around 98.14 million dollars (US Census Bureau, 2023).<sup>7</sup> In 2022, around 97.4% of the domestic exports by value was to Canada.<sup>8</sup> Exports in 2021 was around 5.6% of total production in pounds.

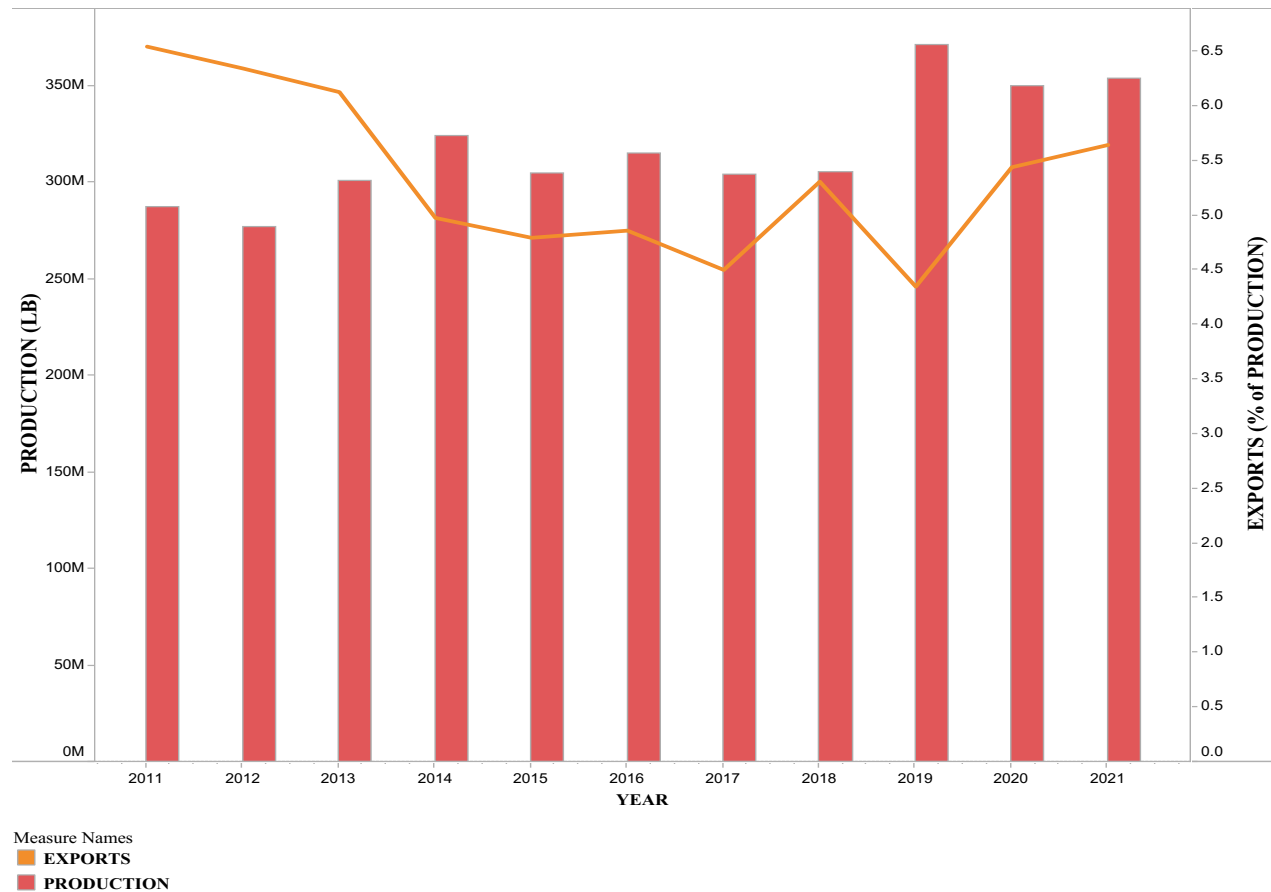


Figure 5: U.S. exports of fresh market blueberries as percentage of production.

<sup>7</sup> According to U.S. Census Bureau, Value of exports (Value (\$US)) is, 'The total value of the goods for export at the U.S. port of export in U.S. dollars'. Quantity of exports (Quantity 1) is, 'The physical volume of exports based on the primary quantity measurement as spelled out in the Schedule B. Measured at the 10-digit HS level only'.

<sup>8</sup> See Appendix 3 to know where U.S. exported fresh blueberries to in 2022.

In 2022, around 9.23% of fresh blueberry imports (\$147 million) that entered the U.S. were re-exported.<sup>9</sup> Around 99.5% of the re-exports by value were to Canada (U.S. Census Bureau, 2023).<sup>10</sup>

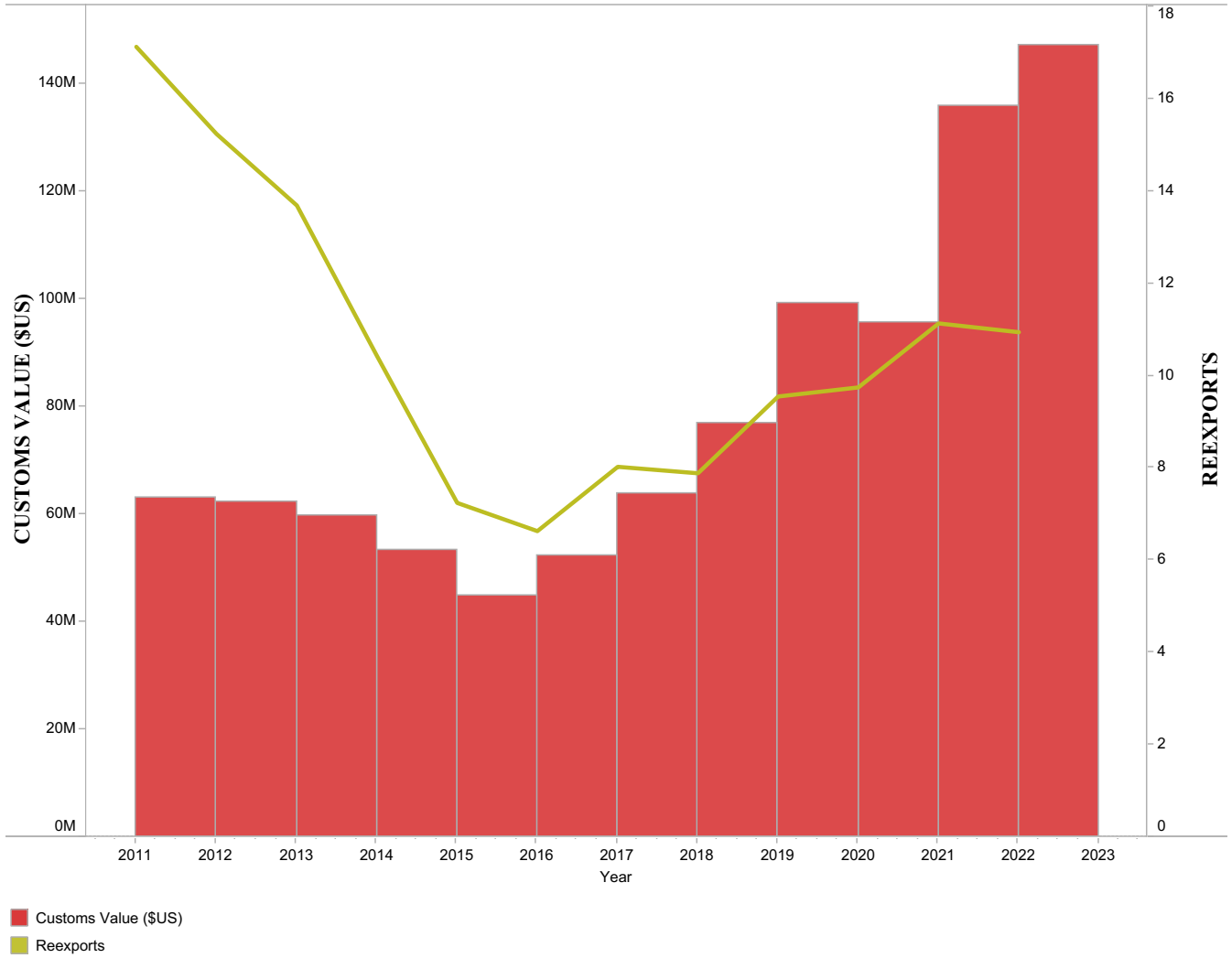


Figure 6: U.S. reexports as a percentage of the import value.

<sup>9</sup> Exports of foreign goods (re-exports) consist of commodities of foreign origin that have previously been admitted to U.S. Foreign Trade Zones or entered the United States for consumption, including entry into a CBP bonded warehouse, and which, at the time of exportation, are in substantially the same condition as when imported.

<sup>10</sup> See Appendix 4 to know to which countries U.S. reexported fresh blueberries to in 2022.

## 2.8 Terminologies used in import impact assessment

Dumping occurs when a foreign producer sells a good in the US below the price at which it would sell in their home market, a market in a third country, or below their cost of production. However, for a foreign manufacturer's actions to be considered as dumping according to U.S. law, they must meet a specific legal definition. If the actions do not meet this definition, then the foreign manufacturer's actions may be legal, even if they sell their products at a lower price than American products. (U.S. International Trade Administration, 2023).

When a government provides aid and subsidies to manufacturers who export goods to the United States, enabling them to sell the products at a lower price than domestic manufacturers, countervailing duties (CVD) cases are established (U.S. Customs and Border Protection, 2023).

For products that are perishable, the marketing season varies depending on the different geographical areas within a country. This means that if the industry is facing competition from imported products, only producers who are marketing during that season are affected. As these products cannot be stored to avoid the import period, the impact is significant. However, if a country is accused of implementing measures against ADM (Anti-Dumping Agreement) and ASCM (Agreement on Subsidies and Countervailing Measures), the entire import period is considered, causing a delay in relief for producers as the whole industry is considered instead of just a segment. There is a need for clarification and improvement of the regulations regarding anti-dumping and countervailing duty proceedings as they relate to perishable and seasonal agricultural products (Delegation of the United States, 2006).

To decide if an industry in the US has been or is likely to be harmed by imports from a foreign country, the terms "domestic like product" and "the industry" are defined. Section 771(4)(A) of the Tariff Act of 1930, as amended defines domestic like product as “a product which is like, or in the absence of like, most similar in characteristics and uses with, the article subject to an investigation under this subtitle”.<sup>11</sup> According to the act, ‘industry’ means “the producers as a whole of a domestic like product, or those producers whose collective output of a domestic like product constitutes a major proportion of the total domestic production of the product”(Cornell Law School, 2023).<sup>12</sup>

## 2.9 Previous studies

On March 30, 2001, The Desert Grape Growers League and its members claimed that imports of spring table grapes from Chile and Mexico were causing harm to the grape industry, by being sold at less than fair value. However, in June 2001, the US International Trade Commission concluded that there was no evidence that the imports were causing significant injury to the domestic grape industry, nor were they hindering the establishment of a grape industry in the US. The commission based its decision on several factors, including an increase in production, shipments, capacity, and domestic prices during the period of investigation, as well as a minimal overlap between the imported grapes and domestic products. The petitioners argued that domestic like products should only refer to spring table grapes due to their seasonal nature and

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<sup>11</sup> See 19 U.S. Code § 1677(10)).

<sup>12</sup> See 19 U.S.C. §1677(4)(A)).

susceptibility to spoilage, but the commission disagreed and considered all table grapes to be domestic like products. (USITC,2001).

Commissioner Dennis M.Devaney disagreed with several aspects of the investigation. His disagreement was on the definition of domestic like products, domestic industry, and the conclusion of the investigation. According to him, the industry should have been defined as all the producers producing spring table grapes and the study should be focused on the impact of import on spring table grapes. He posited that imports were harming spring table producers. The production capacity of Mexico and Chile had increased. Larger percentage of the increased capacity in Mexico had been exported to the USA and Chilean were attempting to plant new late season grapes that compete directly with spring table grapes. Furthermore, higher tariffs in the EU would provide incentive for them to export more to the U.S. which had zero tariffs. Prior to transportation, Chilean grapes could well be preserved for up to 90 days, which could be hazardous to the domestic industry in the U.S. (USITC, 2001).

In 2021, the USITC concluded that U.S. imports of fresh, chilled, or frozen blueberries neither caused significant harm to the domestic industry nor possessed a potential threat. The domestic industry showed an increase in acreage, production, employment, and productivity, and continued to invest in the industry. While profits declined in recent years, the industry remained reasonably profitable during the investigation period, with no significant idling of productive facilities or unemployment. The commission also found that the capital expenditures declined slightly in 2015 to 2016, but remained stable from 2016 through 2019, and R&D expenditures increased. In addition, the commission assessed the potential for other countries to increase their exports of blueberries to the US and found that the share of shipments from Argentina, Canada,

and Chile declined from 2015 to 2019, while the share of shipments from Peru and Mexico remained relatively stable. As far as the definition of domestic industry is concerned, the commission defined it as all the producers of fresh and frozen blueberries (USITC, 2021a).

In 2021, the USITC simulated a scenario where above-average increases in imports of fresh market cucumbers from 2008 to 2020 was hypothetically removed to examine the effect of increased U.S. imports of cucumbers on the domestic market. In the hypothetical scenario, there would be higher import prices, higher prices of domestically produced cucumbers and thus, increased production due to higher prices. The growing period of cucumbers was divided into two seasons and in each season above-average increases were removed. Domestic output would have increased by an average of 37.2% during the November-May season. Domestic revenue, on the other hand, would have increased by an average of \$31.4 million per period, and operating income by an average of \$6.6 million per period. During June-October, domestic production would have increased by 27.1 percent, domestic revenue by \$35.6 million and operating income by \$7.5 million on average (USITC,2021b).

The USITC investigated, in 2021, to analyze how imports of squash affect the U.S. seasonal markets, specifically in the southeast region. The study focused on fresh squash and divided the production season into two seasons, summer, and winter. Data from 2000-2020 was used to estimate the model, and a scenario was simulated using a partial equilibrium model to determine the impact of a hypothetical removal of above-average imports. The results showed that the removal would increase U.S. producers' revenue and operating income for summer squash by an average of \$16.3 million and \$5.3 million per period, respectively, and domestic production by an average of 37.2 percent per period during November-May of 2015-2020. For June-October, the

increase in domestic production would be 12.0 percent, with operating income and domestic revenue increasing by \$3.9 million and \$11.9 million on average, respectively. For winter squash, domestic revenue would increase by \$1.88 million on average during November-May and \$2.27 million on average during the June-October season (USITC ,2021c).

Following USITC's investigation on the effect of US imports of blueberries on domestic producers, Muhammad et al (2021), further assessed how imports of fresh blueberries affect US prices of blueberries. This study took a two-step approach where first, the relationship between import quantities and import prices was examined. Then how import price affect US prices was answered. Imports were disaggregated by source of imports. The sources included Chile, Mexico, South America, and Rest of the World. The study found that there was no clear relationship between imports and the prices charged by US producers. In 2013, when imports from Chile and other South American countries increased, the US producer price decreased by approximately 8 percent the following season. However, when imports grew even more in late 2014 and early 2015, US prices only dropped by about 3 percent. Although import growth for Chile and other South American countries peaked at over 50 percent in late 2016 and early 2017, US producer prices did not decrease. In fact, there was the largest price increase since 2012. Although imports from Mexico grew since 2012, no discernible pattern indicating the impact on US prices was observed.

### 3. STUDY OBJECTIVES

The objective of this study is to quantify the impact of U.S imports of fresh blueberries on fresh blueberry producing states in the USA. The specific objectives of the study are:

- a) To compare domestic and foreign produced blueberry prices at different stages of distribution process
- b) To estimate how much more revenue states in the USA would have earned in absence of above average increase in imports on a monthly, yearly, and seasonal basis using a range of price.
- c) To estimate revenue change on a monthly, yearly, and seasonal basis using after removing reexports from imports.

While similar studies noted in the previous section exist, this study is different in the following ways:

- This study uses a range of price data to estimate revenue unlike others.
- Considers fresh and frozen blueberries as different products in contrast to other recent studies.
- Accounts for exports and re-exports from imports when assessing revenue losses.
- Estimates monthly state-level revenue losses as opposed to previous studies that estimated seasonal revenue losses for the entire domestic industry.
- Recognizes the perishability of blueberries and only considers states that are harvesting during the import competition while estimating revenue losses.

Understanding import competition and its effects on domestic producers is especially important in recent years characterized by protectionist tendencies of major developed economies, e.g., Brexit, U.S.- China trade war and others.

## 4. METHODOLOGY

### 4.1 Modelling Framework

This study employs the model used in USITC 2021b and USITC 2021c in the investigation of the effect of U.S. of imports of cucumbers and squash on domestic producers. The model is a partial equilibrium framework. This model relaxes the assumption of zero industry profits in the long run and keeps initial number of firms in foreign and domestic country constant. The model is described as follows (Ahmed, 2019):

Consumers in the home economy have preferences for products that are available in the industry. Consumers can either buy from home country ( $d$ ) or foreign country ( $s$ ). The consumer preferences for these products is modeled using a Constant Elasticity of Substitution (CES) framework. Consumers can substitute between fresh blueberries produced in the home country and fresh blueberries produced in foreign at a constant rate. This constant rate is the elasticity of substitution( $\sigma$ ). Home produced and foreign produced blueberries are imperfect substitutes. Each source country  $i \in \{d,s\}$  has  $n_i$  homogenous firms. The utility maximization problem that individuals in the home country encounter can be stated as follows:

$$U = (\sum (n_i b_i q_i^{\sigma-1/\sigma}))^{\sigma/1-\sigma} \text{ s.t. } E = \sum n_i p_i q_i \quad (1)$$

In this context,  $p_i$  represents the price paid by consumers for varieties produced by firms in country  $i$ ,  $q_i$  refers to the amount demanded from a firm in country  $i$ ,  $b_i$  is a parameter capturing

asymmetries in consumer preferences, and  $E$  denotes the level of aggregate expenditure for the industry in the home economy.

After solving the utility maximization problem, we get Marshallian demands:

$$q_i = E\beta_i p_i^{-\sigma} P^{\sigma-1} \quad (2)$$

where,

$$P = [\sum_k n_k \beta_k p_k^{1-\sigma}]^{1/1-\sigma} \quad (3)$$

$P$  is the industry's aggregate CES Price index and  $\beta_i = b_i^\sigma$

Suppose  $\theta < 0$  is the price elasticity of total demand and  $k$  is an aggregate demand parameter. Then,

$$E = kP^{\theta+1} \quad (4)$$

$$q_i = k\beta_i p_i^{-\sigma} P^{\sigma+\theta} \quad (5)$$

$$V_i = n_i k \beta_i p_i^{1-\sigma} P^{\sigma+\theta} \quad (6)$$

$V_i$  refers to the overall home sales made by all the firms operating within the country  $i$ . Equation (5) illustrates the demand curve for the product produced by a specific company in the source country  $i$ , by utilizing the CES model.

#### 4.1.1 Calibration:

Consumers, in this model, can either buy domestically produced fresh market blueberries or imported blueberries. These demand functions are represented by equation 5. Since in this study, we only consider seven states- Oregon, Washington, California, Georgia, Michigan, North Carolina, and New Jersey-when  $i$  equals  $d$ ,  $q_d$  represents the aggregate demand for fresh market blueberries produced by these states.<sup>13</sup> The price  $p_d$ , then represents the average price of the fresh

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<sup>13</sup> According to USDA NASS, 2023, these states produced 94.14 percent of fresh market blueberries by weight in 2021. See Appendix 6 to know the share of these states in production from 2011 through 2021.

market blueberries produced by the seven states in a given period (a season or a month of a particular year).

Also, for foreign producers, this study only considers Peru, Chile, Mexico, and Canada, therefore, when  $i$  takes on the value of  $s$ ,  $q_s$  represents the aggregate demand for blueberries produced by these producers.<sup>14</sup>

Following USITC 2021b and USITC 2021c, the aggregate domestic supply function, on the other hand, can be represented as:

$$q_d = a_d p_d \varepsilon_d \quad (7)$$

where, the parameter  $a$  is a supply shifter and  $\varepsilon_d$  is domestic price elasticity of supply.

Before diving into calibration, it is important to note some model assumptions:

- Producers compete in a free market.
- Domestic blueberries and imported blueberries are imperfect substitutes.
- The elasticity of substitution between imported and domestic fresh blueberries, price elasticity of total demand and elasticity of domestic supply are constant.

To understand how the calibration and the model works, let's consider April 2013 and let's consider terminal market price. Since producers compete in a free market, equilibrium prices and quantities are determined by the market. The total supply of fresh market blueberries by the states after removing domestic exports and total supply by the foreign producers in April 2013 are thus the base equilibrium quantities. The average terminal market price of blueberries produced by the actively producing states in April 2013 and the average terminal market price of fresh market blueberries produced by the four foreign countries are the base equilibrium prices. The product of

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<sup>14</sup> These four nations were responsible for about 98.5 percent of the U.S. imports (by weight) of fresh market blueberries in 2021. See Appendix 6 to know the combined share of these countries from 2011 through 2021.

base equilibrium price of domestically produced blueberries and quantity supplied by domestic states give the base revenue.

As the elasticities are constant for every time period, we use these elasticities and the base equilibrium prices and quantities to calibrate the parameters in the demand equation (the aggregate demand parameter ( $k$ ), and  $\beta$ ) and in the supply equation ( the supply shifter ( $a$ )). Furthermore, we know that in the long run, firms in perfect competition earn zero economic profits. Therefore, this model keeps the number of firms in home and foreign constant. This means the number of firms ( $n_i$ ) also needs to be calibrated.

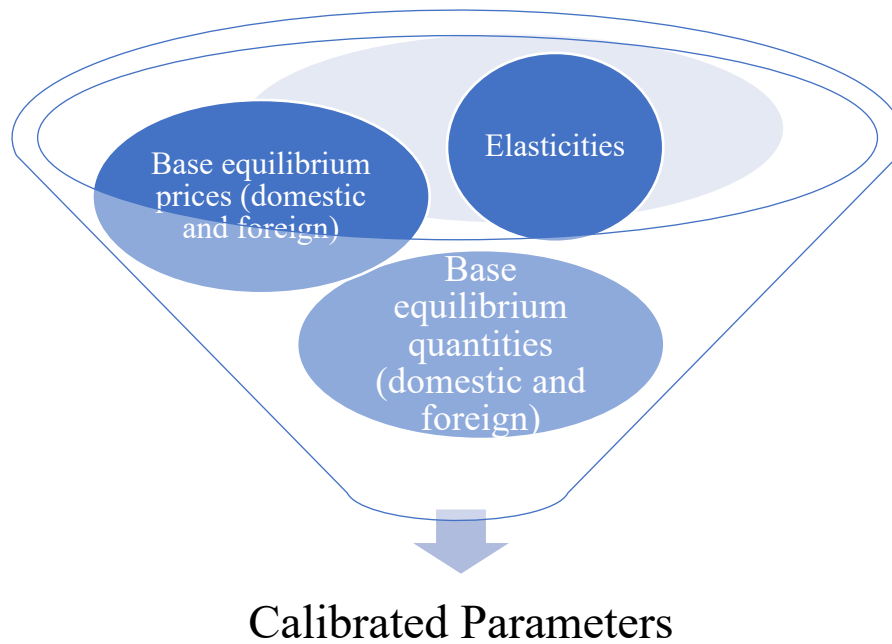


Figure 7 : Model inputs for calibration

To calibrate the demand parameters, normalize  $n_d\beta_d = 1$ . Using equation 6- where  $i \in \{d,s\}$ , the ratio of total home sales of all firms in home and total home sales of all firms in foreign is given by,

$$\frac{V_d}{V_s} = \frac{p_d^{1-\sigma}}{n_s \beta_s p_s^{1-\sigma}} \quad (8)$$

$$n_s \beta_s = \frac{V_d p_s^{1-\sigma}}{V_s p_d^{1-\sigma}}$$

From equation 6, we know that:

$$V_d = n_d k \beta_d p_d^{1-\sigma} P^{\sigma+\theta}$$

So, the aggregate demand parameter can be calibrated as:

$$k = \frac{V_d}{P^{\sigma+\theta} p^{1-\sigma}} \quad (9)$$

$$\text{where } P = [n_s \beta_s p_s^{1-\sigma} + p_d^{1-\sigma}]^{1/1-\sigma} \quad (10)$$

The supply shifter  $a_d$  in equation 7 can be calibrated as:

$$a_d = q_d p_d^{-\varepsilon_d}$$

#### 4.1.2 New Equilibrium Calculation

The model then assumes that these parameters remain constant after imports are reduced. Then we use these calibrated parameters, elasticities, and the counterfactual imports to calculate new equilibrium prices and quantities i.e., the equilibria in the simulated scenario.<sup>15</sup>

Recall equation 10,

$$P_I = [n_s \beta_s p_{s1}^{1-\sigma} + p_{d1}^{1-\sigma}]^{1/1-\sigma} \quad (11)$$

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<sup>15</sup> Counterfactual level of imports is established after removal of above-average growth rates. The complete description on the calculation of counterfactual level of imports is described under Counterfactual Imports section of Chapter 4.

In this equation  $P_{11}$  is the price index,  $p_{s1}$  is the average price of foreign fresh market blueberries, and  $p_{d1}$  is the average price of domestic fresh market blueberries in the hypothetical scenario. And  $n_s$  and  $\beta_s$  are the calibrated parameters.

As producers operate in the free market, equating demand and supply equations give new equilibrium prices and quantity.

$$a_d p_{d1} \varepsilon_d = k p_{d1}^{-\sigma} P_1^{\sigma+\theta} \quad (12)^{16}$$

$$q_c = k n_s \beta_i p_{i1}^{-\sigma} P_1^{\sigma+\theta} \quad (13)$$

Notice that in equation 13, the quantity of imports is set to the counterfactual level  $q_c$ . Upon solving equation 11, 12 and 13 we get the values for  $p_{s1}$  and  $p_{d1}$ . Using the left-hand side of equation 12, we get supply of fresh market blueberries in home by domestic producers. This new price and quantity are used to calculate the revenue in the simulated scenario. The difference between actual revenue and revenue in the simulated scenario gives the revenue change.

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<sup>16</sup> As supply equation is defined in a slightly different manner in this study when compared to USITC 2021b, USITC 2021c, the equilibrium calculation, as a result, also becomes slightly different. The model in the USITC study added exports to the right-hand side.

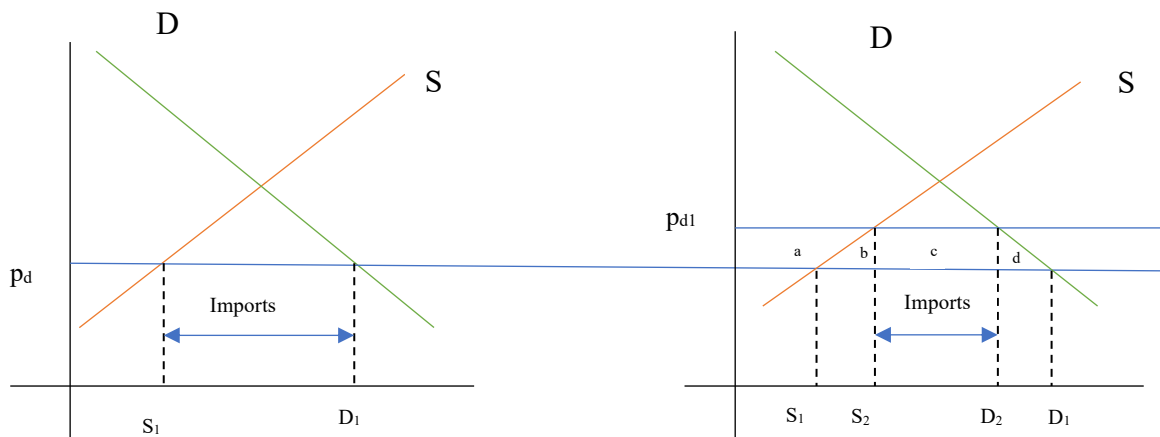


Figure 8: Domestic industry in free trade (left panel) and domestic industry with import quota (right panel)

The figures above show the underlying theory of the model. In the figures, D and S are domestic demand and supply curves respectively. For simplicity, assume that this was the scenario in April 2013. Under free trade, domestic demand was  $D_1$  and domestic supply in the home market by domestic producers was  $S_1$ . Imports were  $D_1 - S_1$  and domestic producers were getting price  $p_d$  for the fresh market blueberries they produce. The imports reduction in the hypothetical scenario pertains to imposing import quota. This means that in the simulated scenario (for April 2013), the imports were not allowed to exceed the counterfactual level  $D_2 - S_2$ . With this restriction in place, the supply of domestically produced fresh market blueberries increased to  $S_2$ , producers get higher price as compared to free trade and in response to the increased price domestic demand is reduced to  $D_2$ . The consumer surplus shrinks by  $(a+b+c+d)$  while producer surplus increases by the area a. The area c which is equal to  $(p_{d1} - p_d) * (D_2 - S_2)$  is the quota rent.

## 4.2 Counterfactual Imports

The methodology used to calculate the counterfactual level of imports in this study is similar to the one employed by USITC (2021a, 2021b) for some months, but differed slightly in certain respects for other months. First, years from 2011 through 2021 were divided into low and high growth years; 2011 to 2016 as low growth years and 2017 through 2021 as high growth years.<sup>17</sup> Then growth rates for each harvesting month/season from 2011 to 2021 was calculated separately. Following, Pillai N, 2019, average growth rate from 2011 to 2021, average growth rate for low growth years, and average growth rate for high growth years was calculated.<sup>18</sup> In cases where the growth rate of a given period exceeded the average growth rate recorded between 2011 and 2021, the growth rate was reduced.<sup>19</sup> The growth rate was reduced by the difference between average growth rate of high growth years and average growth from 2011 to 2021 for all months and seasons except July.<sup>20</sup> The counterfactual level of imports was then calculated using the counterfactual growth rate and previous years' import volume.

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<sup>17</sup> The high growth years and low growth years were determined taking into consideration the dramatic rise in imports of fresh market blueberries from Mexico and Peru during 2017-2021. See Appendix for share of Peru and Mexico in US imports.

<sup>18</sup> See Appendix 5 for the model.

<sup>19</sup> USITC 2021b and USITC 2021c reduced the growth rates which were above the average growth rate by the difference between average growth rate from 2000-2020 and the average growth rate between high growth years.

<sup>20</sup> The deviation from just using the difference between average growth rate and the average growth rate between the high growth years was necessary because the growth rate for high growth years was negative.

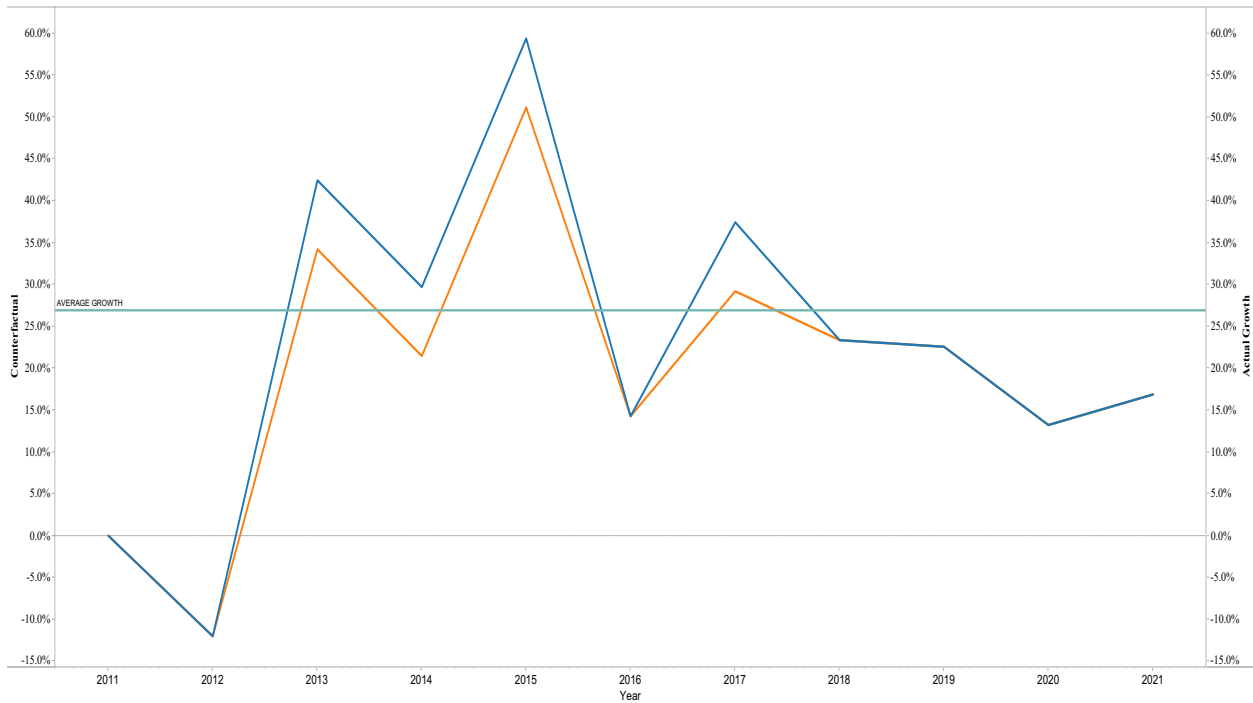


Figure 9: Average growth rate, actual growth rate and counterfactual growth rate for the month of April without adjusting reexports<sup>21</sup>

## 4.3 Data

### 4.3.1 Domestic Supply

The USDA National Agricultural Statistics Service has yearly state-level fresh market blueberry production data in the U.S. from 2011 through 2021. Due to the unavailability of monthly production data, yearly production data was distributed to months during which states carry out most of their harvests.<sup>22</sup> In this study, only the seven most fresh market blueberry producing states are considered rather than all. First, the yearly production (by weight) of these seven states was summed, and then the share of each state in total production for a year was calculated. Yearly

<sup>21</sup> See Appendix 5 for counterfactual growth rates, actual growth rates, average growth rate and counterfactual level of imports for different months and season with and without accounting for reexports.

<sup>22</sup> To garner this information several people (growers, and members of Blueberry Commissions) associated with blueberry production were interviewed.

exports from the U.S. were deducted from the yearly production and based on the share, the export adjusted production (supply to the domestic market by the U.S.) was redistributed to states. Then, the yearly supply of fresh blueberries from each state was redistributed to the months when most of the harvest happen. For example, for Georgia, 10% of the supply was appropriated to April, 50% to May and 40% to June.<sup>23</sup>

Fresh market blueberries under the Harmonized Tariff Schedule are under heading 0810.40.0029.<sup>24</sup> The United States Census bureau has yearly export data of fresh market blueberries through December 22.<sup>25</sup> The yearly export data is segregated into domestic exports and foreign exports. Since, while calculating domestic supply, exports of fresh market blueberries produced in the U.S should be considered, domestic exports data was used.<sup>26</sup>

#### 4.3.2 Foreign Supply

In this study, the top four nations from which the U.S. imports fresh market blueberries are considered -Peru, Mexico, Canada, and Chile. Under HTS 0810.40.0029, the U.S. Census Bureau has monthly import data for each of these countries. For each month, the imports from each of these countries were aggregated to obtain monthly foreign supply. Monthly re-exports data was also garnered from the U.S. Census Bureau.

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<sup>23</sup> See Appendix 7 to know how percentages were allocated in determining monthly supply of fresh blueberries by states and by month.

<sup>24</sup> US Census Bureau, 2023, reports fresh blueberries as 0810.40.0029 Blueberries, Cultivtd(incl Highbush),Fresh Nesoi (kg)

<sup>25</sup> Though trade data for 2022 was available, the model was estimated till 2021 since domestic production data was not available.

<sup>26</sup> US Census Bureau (2023) defines Domestic Exports as, Exports of goods that are grown, produced, or manufactured in the United States and commodities of foreign origin that have been changed in the United States, including changes made in a U.S. Foreign Trade Zone, from the form in which they were imported, or which have been enhanced in value by further processing or manufacturing in the United States

### 4.3.3 Price

The USDA National Agricultural Statistic Service reports the average yearly per pound farm gate price of fresh market blueberries for each producing state. However, monthly farm gate prices for each state were not available. Therefore, for each state, the yearly price received was broadcasted across months. For example, if the average per pound fresh market blueberries' price for Georgia in 2012 was x dollars, then the average price for April 2012, May 2012, and June 2012 was also x dollars.

The U.S. Census Bureau reports the value (Customs Value (\$US)) of fresh market blueberry shipments that entered the U.S. from various countries monthly. By dividing the value by the amount(kg), per kg price was obtained which was converted to per pound price. This price was compared with the farm gate price in the analysis.

The USDA Agricultural Marketing Service has Custom Average Tool (CAT). For the two most common packaging used to transport blueberries, Flats 12 1-pint cups with lids and Flats 12 6-oz cups with lids, monthly terminal market price and shipping point price data of both foreign and domestically produced blueberries are reported here.<sup>27</sup> As far as terminal market is concerned, CAT gives the monthly average price of fresh market blueberries, based on the type of packaging used, country of origin, and the market in which it was sold. For shipping point, CAT reports average monthly price of blueberries based on the type of packaging used and location.<sup>28</sup>

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<sup>27</sup> The USDA AMS provides information on Container New Weights. The list gives conversion factor to convert packages to weight for the most commonly used packages for a commodity. For Flats 12-1 pint cups-11 pounds; Flats 12 6 ounce cups-5 pounds. <https://www.marketnews.usda.gov/mnp/fv-help-20>

<sup>28</sup> According to USDA AMS, 2023, Location is, "District or region where the product originated. This may be a region within a state( example: OXNARD DISTRICT CALIFORNIA), a general area covering two or more states (COLUMBIA BASIN WASHINGTON & UMATILLA BASIN OREGON) or a port of entry for a foreign commodity (example: MEXICO CROSSINGS THROUGH NOGALES, ARIZONA)"

#### 4.4 Data Inputs

To demonstrate model inputs, let's consider April 2013 and terminal market price. According to USDA AMS 2023, in April of 2013, California and Georgia supplied fresh market blueberries packed in Flats 12 6-oz cups with lids. Blueberries grown in Georgia were available in New York and Philadelphia. Blueberries from California were in Chicago, Los Angeles, San Francisco, and Seattle. USDA AMS reported prices of these based on state of origin and the location of the market where it was sold. After using the conversion factor, the prices reported in the terminal market were converted to per pound price. A simple average of all these prices gave average price of blueberries in April 2013 (13.8 thousand dollars per metric ton or 6.28 dollars per pound). This was the base equilibrium price of domestically produced blueberries in April 2013 ( $p_d$ ).

During the same period, Chile and Mexico were sending fresh market blueberries into the United States (USDA AMS 2023 and US Census Bureau 2023).<sup>29</sup> Chilean blueberries were not only available in the cities mentioned above but also in other cities including Columbia, Atlanta, Baltimore, Boston, Detroit, Miami, and St. Louis. Similarly, Mexican blueberries were available in Dallas, LA, Seattle, San Francisco, Detroit, Boston, and Chicago. USDA AMS reports prices of these blueberries too. For example, we can know how much blueberries originated in Chile cost in the terminal market of Atlanta in April 2013. A simple average of all these prices reported gave average price of imported fresh market blueberries in April 2013 (11.3 thousand dollars per metric ton or 5.2 dollars per pound). This was the base equilibrium price of imported blueberries in April 2013 ( $p_s$ ).

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<sup>29</sup> According to the US Census Bureau Peru also sent fresh market blueberries in April 2013. However, the terminal market price data was missing.

In 2013, the seven states in total produced 279.5 million pounds of fresh market blueberries. California and Georgia, the two states actively harvesting in April, produced 46.3 million pounds and 35 million pounds in 2013. The share of California in total production was 16.5 percentage ( $46/279.5$ ) and that of Georgia was 12.5 percent ( $35/279.5$ ). Domestic exports were 40.6 million pounds. Thus, domestic supply in 2013 was 238.9 million pounds ( $279.5-40.6$ ). The domestic supply from California in 2013 was 16.5 percentage of 238.9 million pounds, i.e., 39.6 million pounds and that of Georgia was 12.5 percentage of 238.9 million pounds, i.e., 29.91 million pounds. Based on interviews with growers and members of blueberry council and commissions, California, and Georgia, both harvest 10% of their yearly harvest in April. Therefore, the supply of fresh market blueberries in the U.S. in April 2013 by California was 3.96 million pounds and by Georgia was 3 million pounds. The total supply was 6.9 million pounds or 3153.61 metric tons ( $3.96+3$ ). Of this total supply 43.03 ( $((3/6.9)*100)$ ) percentage was from Georgia and 56.97 ( $((3.96/6.9)*100)$ ) was from California. This total supply of 3153.61 metric tons is the base equilibrium quantity for domestically produced blueberries supplied to the U.S. in April 2013 ( $q_d$ ). The total sales by all the firms of the home country in the domestic industry ( $V_d$ ) is 43.73 million dollars ( $p_d*q_d= 13866.7*3153.61$ ). This value is also the base revenue.

In April 2013, according to the U.S. Census Bureau 2023, U.S. imported 1.13 million kilograms of fresh market blueberries from Mexico, 6 thousand kilograms from Peru, and 719 thousand kilograms from Canada. In total the imports were 1.8 million kilograms ( $1.13\text{ million}+6\text{ thousand}+719\text{ thousand}$ ) or 1.8 thousand metric tons. This is the base equilibrium quantity for imported fresh market blueberries in the U.S. in April 2013 ( $q_s$ ). The total sales by all the firms of the foreign country in the domestic industry ( $V_s$ ) is 21.18 million dollars ( $q_s*p_s= 11.3\text{ thousand}*1.8\text{ thousand}$ ).

If reexported were to be deducted 195 thousand kilos, reexports in April 2013, should be subtracted from imports in April of 2013. So, the base equilibrium quantity of imports becomes 1.6 million kilograms or 1668.31 metric tons (1.8 million – 195 thousand).  $V_s$  now is 18.9 million dollars ( $q_s * p_s = 11.3 \text{ thousand} * 1.6 \text{ thousand}$ ).<sup>30</sup>

The revenue change of 0.72- as shown in Table 2- is then divided to the states harvesting in April- California and Georgia based on their share of supply in April 2013. 43.03% of supply was from Georgia and 56.97% from California. Therefore 43.03% of the revenue change is appropriated to Georgia and 56.97% to California. Georgia would have earned 0.31 million dollars more in revenue in April 2013 and California would have earned 0.41 million dollars more.

Table 2: Data Inputs

<b>Data Inputs</b>	
Elasticity of Substitution	4
Price elasticity of total demand	-1
Domestic price elasticity of supply	1
<b>Base Equilibrium</b>	
Price of domestically produced fresh market blueberries (dollar/metric ton)	13866.7
Price of imported fresh market blueberries (dollar/metric ton)	11363.52
Supply by domestic firms in the home country (metric ton)	3153.61
Supply by foreign countries (metric ton)	1863.68

<sup>30</sup> Terminal market price was used while estimating revenue changes after deducting re-exports.

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Revenue of domestic firms (million dollars)	43.73
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**Change in import policy**

Quota (metric ton)	1755.9
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**Effect on Domestic Industry**

Change in price of domestically produced	0.82%
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blueberries

Change in imports	5.78%
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Revenue change (in million dollars)	0.72
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## 5. RESULTS AND DISCUSSION

### 5.1 Domestic and Imported Fresh Market Blueberry Price Comparison:

#### 5.1.1 Farmgate price and Customs Unit Value:

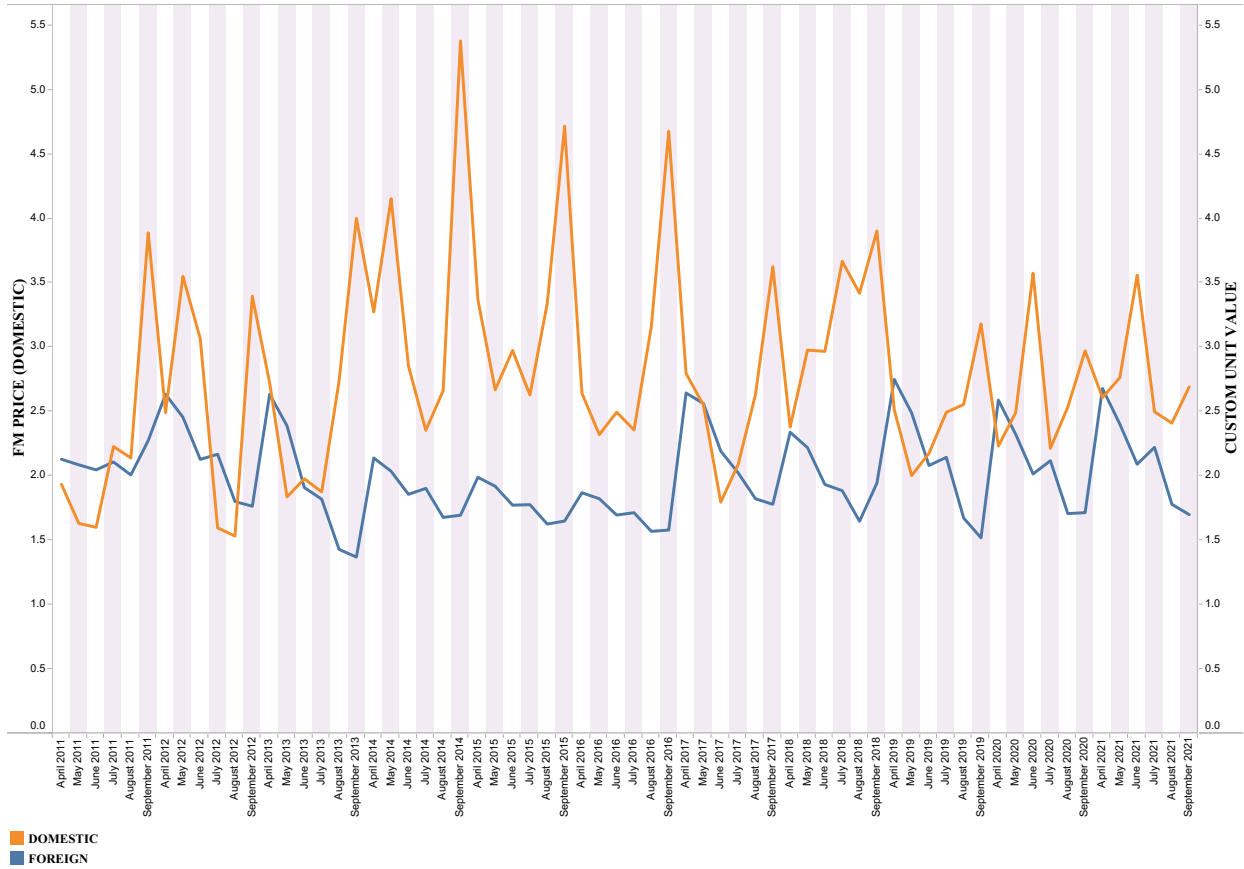


Figure 10: Price comparison of foreign and domestic produced blueberries (April through September from 2011 through 2021) using farmgate and customs unit value price.

The average per pound farmgate price of domestically produced fresh market blueberries was generally higher than imported fresh market blueberry prices. As we move from April to September, the number of years where domestically produced blueberries were higher than imported blueberries increased. For April, on average domestically produced fresh blueberry

prices were higher than foreign produced price from 2013 through 2018. For September, however, domestically produced blueberry prices were higher than imported blueberries on average from 2011 through 2021.

As we move from 2011 to 2021, the initial two years (2011 and 2012) had two to three months where average home-produced blueberries were priced higher than the average price of foreign- produced blueberries. In the later years (2017 to 2021), four to five months had domestically produced blueberries priced higher. In years 2014 through 2016, the average price of domestically produced blueberries was higher for all months.

### 5.1.2 Shipping point price comparison

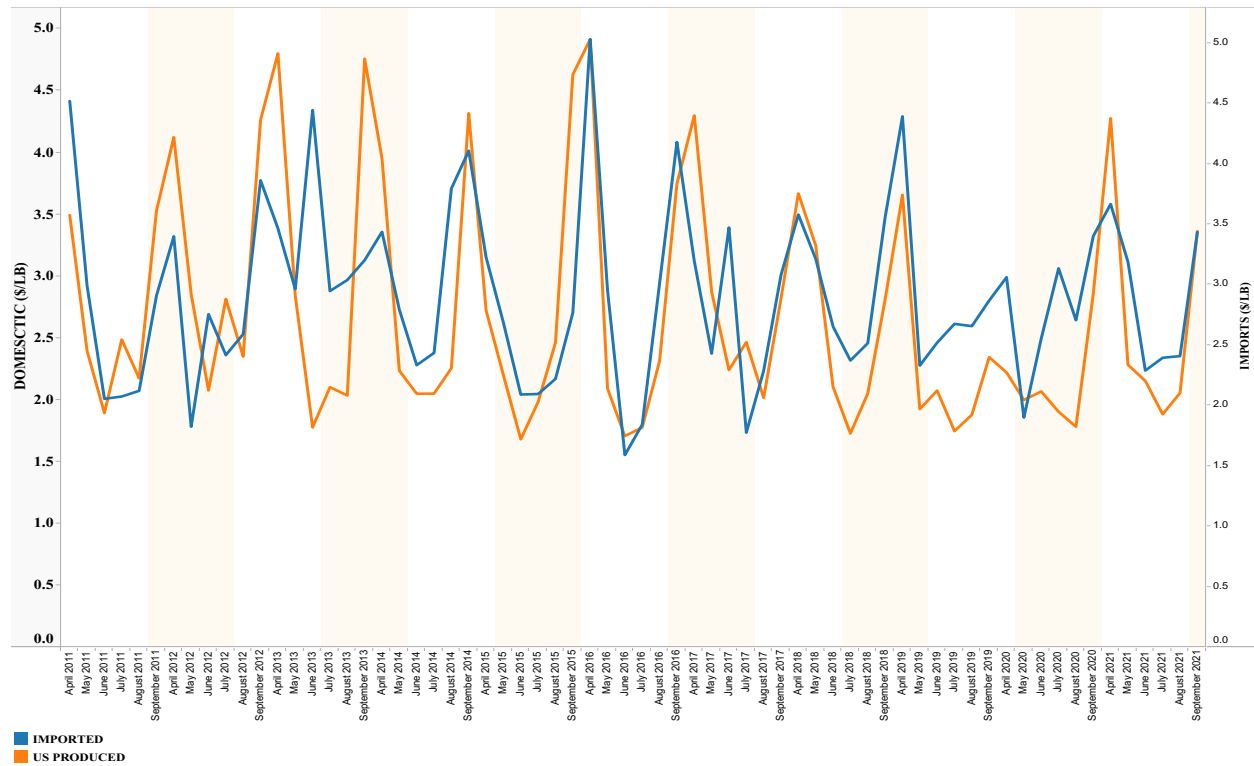


Figure 11: Price comparison of domestic and foreign produced blueberries (April through September from 2011 through 2021) using shipping point price.

According to the USDA AMS 2023, fresh market blueberries from Mexico enter through border crossings located in Arizona, California, and Texas. Chilean fresh market blueberries are imported through ports in Miami, Philadelphia, and Los Angeles, while those from Peru enter the US via ports in Philadelphia, New York, and Southern California. Fresh market blueberries from Canada enter through British Colombia crossings in Northwest Washington.

Data indicates that the average shipping point price of domestically produced fresh market blueberries were higher than imported ones, especially in the months of April, May, and September. However, in recent years (2019-2021), the imported fresh market blueberries have mostly been priced higher on average, with lower prices observed in May 2020, and April 2021.

### 5.1.3 Terminal price comparison

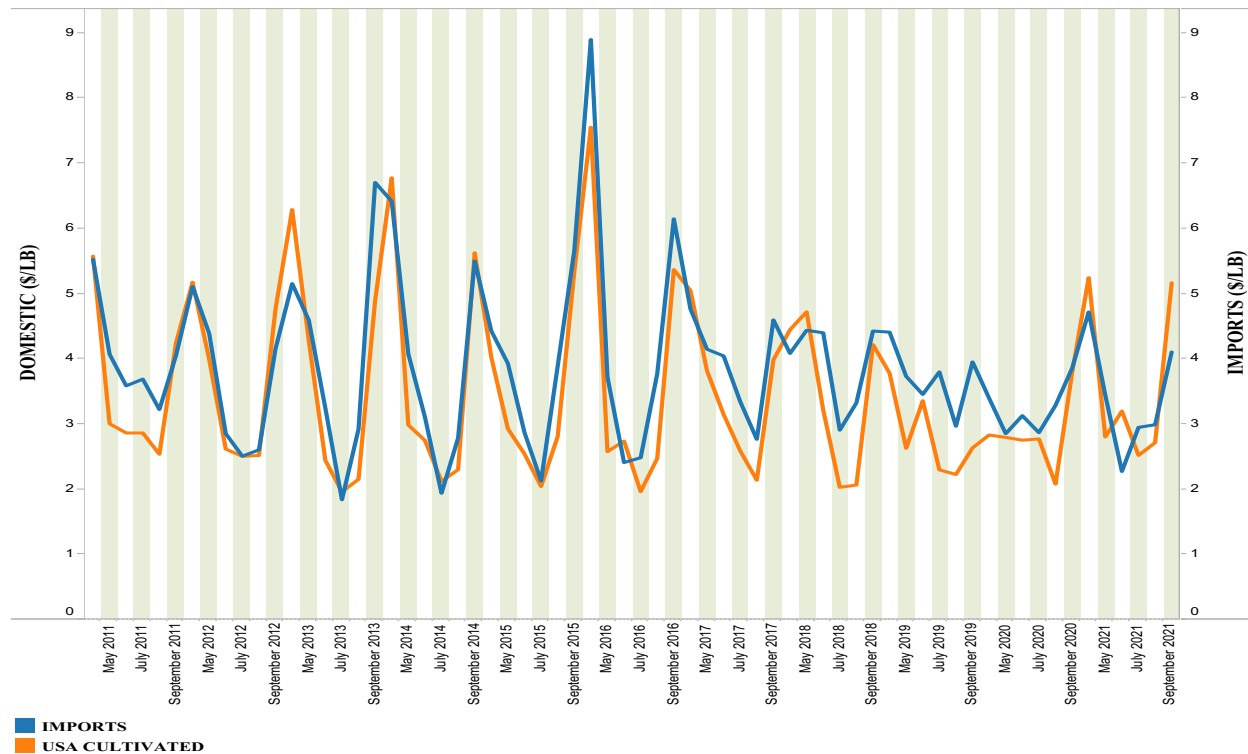


Figure 12: Price comparison of domestic and foreign produced blueberries (April through September from 2011 through 2021) using terminal market price.

The average terminal market price of domestically cultivated blueberries in the US was higher than imported, mostly in the months of April and September. Additionally, higher prices were observed in May 2018, June 2016 and 2021, and July of 2013 and 2014. However, in August from 2011 through 2021, the average terminal market price of US-produced fresh market blueberries was lower than imported blueberries.

## 2.2 Effect of U.S imports of fresh market blueberries on revenue

### 2.2.1 Seasonal Revenue Change

Table 3: Additional revenue for April to June and July to September seasons.

	Revenue Change (In million dollars)	
	April to June Season	July to September Season
2012	0.00	2.33-3.30
2013	0.61-1.24	2.66-3.90
2014	2.08-3.44	7.96-9.31
2015	5.44-8.24	7.29-9.49
2016	5.56-12.30	6.74-9.24
2017	7.47-12.01	10.76-14.38
2018	7.94-12.55	13.55-14.85
2019	7.06-12.20	18.93-24.85
2020	8.6-11.21	17.61-23.95
2021	18.03-22.55	24.39-34.87

When April to June was considered one season, and July to September the other, the states in total in 2021 would have earned anywhere between \$18.03 - \$22.55 million more in the first season and anywhere between \$24.39- \$34.87 million more in the second.

The greater the market penetration of imports, the more pronounced its effect on additional revenue in the hypothetical scenario (USITC ,2021a; USITC, 2021b). The import penetration rate was higher during the July-September season compared to the April-June season. In 2021, on average, the market share of domestically produced fresh market blueberries was 63.3% in the first season compared to 53.3% in the July-September season. Therefore, the reduction of imports in the hypothetical scenario had a more pronounced effect on the market in the July-September season, as depicted by a larger change in revenue. In fact, due to higher import penetration in the July-September season from 2011 through 2022, the effect on revenue is consistently larger.

Another factor that affects the magnitude of the change in revenue is the reduction in the level of imports. A bigger reduction in imports means consumers will shift more to domestically produced varieties, thus having a higher impact on revenue (USITC, 2021a; USITC, 2021b). In 2021, the change in imports in the counterfactual scenario was 19.9% and 20.19% for the April to June and July to September seasons, respectively. It is also important to note that comparing percent change alone does not reveal the quantity of imports reduced. The initial import quantity carries equal importance.

As far as the states are concerned, California would have earned the most in additional revenue (\$6.13-\$7.67 million) in the April to June season of 2021, while Oregon and Washington would have earned the most in the July to September season (\$16.04-\$22.94 million).<sup>31</sup> The amount of revenue change that is appropriated to a state depends on the percentage of domestic

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<sup>31</sup> See Appendix 9 to know revenue change for other states.

supply that came from that state in the given season. Since California supplied more fresh market blueberries than other states in the April to June season of 2021, the revenue change was higher for California in the simulated scenario than for other states. However, in 2019, during the same season, Georgia supplied more and therefore would have earned more revenue (\$2.52-\$4.37 million) compared to California's \$2.12-\$3.58 million.

In both seasons, the change in revenue was generally higher when the terminal market price was considered, as opposed to the shipping point and farm gate prices. Additionally, the change in revenue was typically higher when the shipping point price was used, compared to the farm gate and customs unit value. When comparing the revenue change with and without re-exports, it is important to note that the calculation of average growth rates, identification of above-average growth rates, and removal of above-average growth rates were performed. Since the terminal market price was used when the re-exports were deducted, the revenue change was similar to the scenario where the terminal market price was used without deducting the re-exports. These findings are consistent with the fact that terminal market prices are higher than shipping point prices, and shipping point prices are higher than farm gate or customs unit value due to the additional costs and services involved at each stage of the distribution process.

## 2.2.2 Monthly revenue change

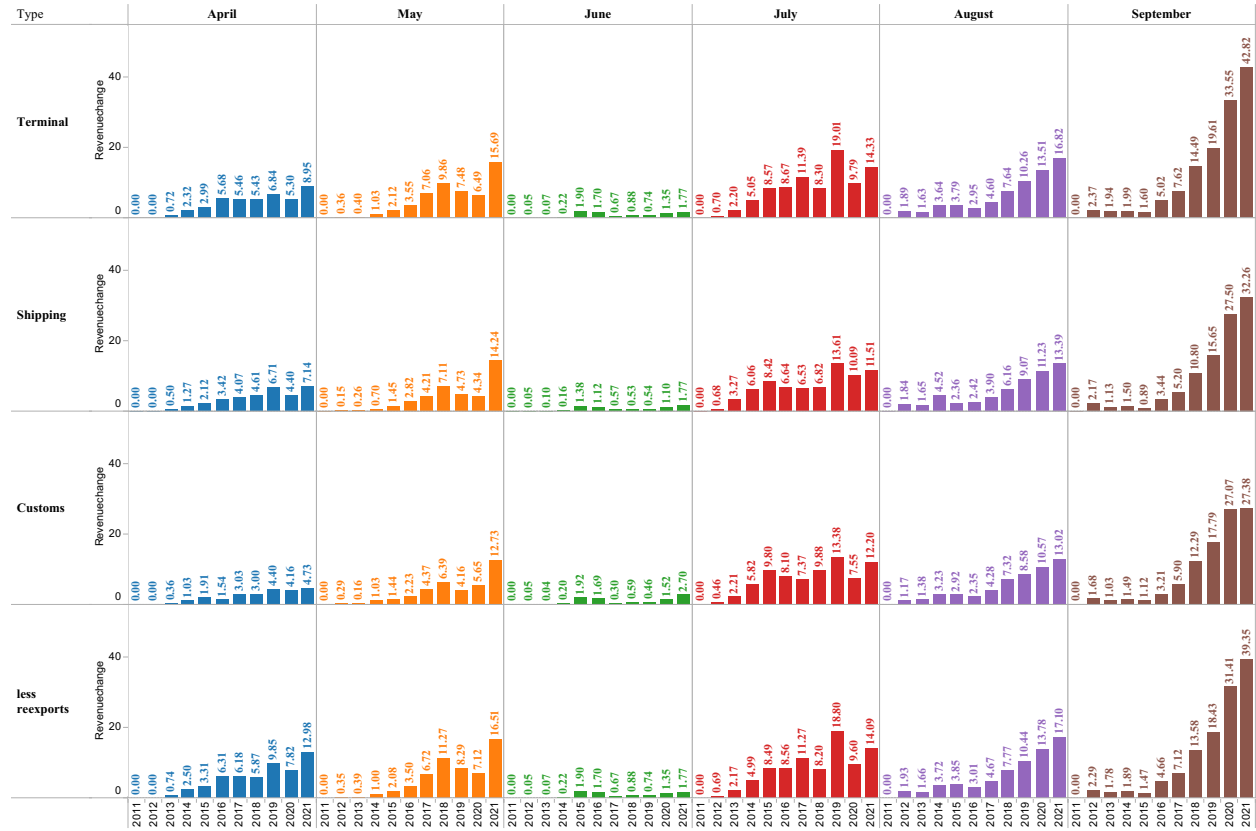


Figure 13: Monthly revenue change (in million dollars) estimates using a range of price data and after adjusting for reexports.

Upon removing the above-average growth rate for each month in which fresh blueberries are produced, the impact of imports became larger than presented above. In September 2021 alone, all seven states would have earned \$27.05-\$42.82 million more revenue in the hypothetical scenario. Since Oregon and Washington are the harvesting states in September, all the revenue is attributed to these states. The most significant gain in revenue in the month of September is again due to higher import penetration. Import penetration is much higher in September than in other months, with the market share of imported fresh market blueberries exceeding 70% since 2018, making September the month with the quickest above-70% import penetration.

Based on import penetration alone, April should have had the second-largest change in revenue. However, results show that revenue change is much higher in recent years for May and August than for April (without considering re-exports). As the counterfactual level of imports deviates further from the actual volume of imports, this effect outweighs the effect of import penetration, leading to larger effects on revenue (USITC ,2021a; USITC, 2021b). For the month of April, the import decreased by 5.78% in 2013, which reached 21.34% by 2021. For August, the import reduced by 5.13% in 2012, which reached 31.41% in 2021. For May, the import decreased from an 8.58% reduction in 2012 to 38.51% in 2021.<sup>32</sup>

### 2.2.3 Annual Revenue Change

Table 4: State-level yearly revenue change (in million dollars) after adding monthly changes.

Year	California	Michigan	Georgia	Oregon And Washington	North Carolina	New Jersey
2012	0.10-0.18	0.47-0.76	0.07-0.14	2.58-3.79	0.05-0.11	0.25-0.39
2013	0.40-0.71	1.26-1.70	0.22-0.47	2.41-3.45	0.05-0.12	0.83-1.20
2014	1.22-1.89	2.97-3.62	0.99-1.76	5.08-5.83	0.21-0.30	1.89-2.32
2015	2.62-3.6	3.43-4.07	1.85-2.75	5.09-6.61	0.73-1.03	2.84-3.50
2016	2.94-6.68	3.22-4.13	1.36-3.31	7.39-10.09	1.12-1.51	1.86-2.44
2017	4.75-8.36	3.5-5.28	2.36-4.17	10.24-15.12	0.93-1.55	1.71-2.76
2018	5.45-9.36	3.22-4.21	3.40-6.18	18.37-23.83	1.54-2.69	1.94-2.69

<sup>32</sup> See Appendix 8 for percentage change in imports in the hypothetical scenario.

2019	4.50-8.98	5.58-7.39	4.36-9.19	28.65-36.16	0.81-1.59	3.19-4.41
2020	5.29-8.40	4.63-5.96	3.95-6.64	38.17-47.74	0.94-1.45	2.38-2.94
2021	9.29-15.27	5.43-6.79	7.83-12.84	44.02-63.26	2.95-3.49	2.94-3.57

After removing above-average growth rates for individual harvesting months in the U.S., Oregon and Washington would have earned the most additional revenue in 2021. This is because these states were the largest fresh market blueberry suppliers to the U.S. market in 2021 and they harvest in August and September, when import penetration is relatively larger. It is important to note that these numbers in Table 4 are the result of estimating revenue change in individual months, distributing the revenue based on supply shares by weight, and adding the revenue of all the months (when a state is actively harvesting) based on the type of price data used and whether re-exports were adjusted. Therefore, all the factors that can affect the magnitude of revenue change, as discussed in previous paragraphs (some will be discussed in later paragraphs), play a role in obtaining these yearly state-level estimates.

While adding monthly state-level revenue estimates based on the type of price data used and whether re-exports were accounted for, the yearly estimates were mostly the largest when re-exports were deducted or when terminal market price was used without deducting the re-exports. On the lower end, the use of customs unit value and farmgate price mostly produced lower revenue changes. Therefore, in Table 3, the higher end of the range mostly stemmed from the use of terminal market price (with or without reexports), and the lower end of the range came when customs unit value and farmgate price were used.

In 2021, on a month-by-month basis, Oregon and Washington would have earned most of the revenue in September.<sup>33</sup> These two states would have earned anywhere between \$27.38-\$42.82 million dollars more revenue in September. Since, according to the model, these were the only states actively harvesting in the month of September, they would take all the revenue earned in the month of September even though each of them supplies only 10% of their yearly supply to the U.S. market in September.

In addition to the factors mentioned above, there are a few other factors that can affect the magnitude of the estimates. The willingness of consumers to shift sourcing after relative change in prices also impacts the magnitude of the estimated revenue changes (USITC, 2021a; USITC, 2021b).<sup>34</sup> If consumers are more willing to shift towards domestically produced varieties after a relative increase in the price of imported blueberries, the effect will be greater. This depends on how easily substitutable foreign-produced and domestically produced fresh blueberries are perceived by consumers. Less substitutability means that consumers' demand will only shift slightly towards domestically produced blueberries after imported fresh blueberry prices increase.<sup>35</sup> The ability of U.S. farmers to increase their supply to the domestic market in response to increased demand also affects how domestic supply will change (USITC, 2021a; USITC, 2021b).<sup>36</sup>

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<sup>33</sup> See Appendix 9 for monthly state-level estimates.

<sup>34</sup> The U.S. price elasticity of demand for blueberries is moderately inelastic, -0.5-1.0 (USITC 2021a). In this study revenue changes were estimated with U.S price elasticity of demand set to -1.

<sup>35</sup> The elasticity of substitution is in the range of 3 to 5 as far as imported and domestically produced blueberries are concerned (USITC, 2021a). In this study, elasticity of substitution was set to 4.

<sup>36</sup> A range of 1 to 4 is suggested by USITC,2021a for domestic supply elasticity with lower end for growers and higher end of the range for freezers. In this study it was set to 1.

## 6. LIMITATIONS AND AVENUES FOR FURTHER STUDY

The model used in the study was developed by the USITC. However, according to USITC 2021a and USITC 2021b, the method of removing above-average growth rates does not identify specific events that caused the above-average growth rates, and this is a limitation of the model. The model only identifies above-average increases and reduces them.

Furthermore, the model estimates revenue changes for each year separately, and it is static. This means that any increased investments in the domestic industry to boost production are not considered (USITC ,2021a; USITC ,2021b).

Monthly export data was not used in this study because different states can supply the international market through the same port. Additionally, state-level monthly production data was not available, so yearly state-level production data was used to estimate monthly supply. The yearly state-level production data was summed, and the yearly exports were deducted. Based on the share of a state in the total production (the sum), yearly domestic supply was estimated. To get monthly estimates, information from interviews with farmers and members of Blueberry Commissions was used to distribute the yearly domestic supply to the months when most of the harvest happens. Seasonal production data was also not available and was estimated based on the same information. However, this method of distribution does not consider the possibility that farmers may shift some harvest to later months or seasons due to weather fluctuations. Moreover, state-level average monthly farm gate price was estimated from the average price received by a state in a year.

## 7. SUMMARY AND CONCLUSION

U.S blueberry producers have expressed concern about the availability of imported blueberries in the domestic market at lower prices and the surge in imports in recent years, which they claim have harmed domestic producers. In response, the United States Trade Representative requested an investigation by the United States International Trade Commission. However, in February 2021, the USITC determined blueberries were not being imported to an extent that would harm domestic producers. Given these events, further analysis with a different approach was deemed necessary.

Unlike the investigation, considering different factors, this study does not treat domestically produced fresh and frozen blueberries as domestic ‘like’ products. Instead, this study maintains that only domestically produced fresh blueberries directly compete with imported fresh blueberries. Furthermore, this study uses the model employed by the USITC in investigations of cucumbers and squash (but not blueberries) to estimate revenue changes in a simulated scenario where above-average growth rates did not occur. In addition, this study uses a range of price data and adjusted import quantities that account for reexports to estimate state-level monthly, yearly, and seasonal revenue changes. The revenue changes were estimated based on the idea that only certain states that face import competition should be considered in a given period. Additionally, the price of domestically produced fresh market blueberries was compared to that of imported blueberries at different stages of distribution from 2011 to 2021 for major harvesting months in the U.S. (April through September).

When comparing the per pound average farm gate price of domestically produced fresh market blueberries with the average customs unit value (per pound) of imported blueberries,

domestic blueberries were generally priced higher than imported ones. When shipping point prices were considered, domestic blueberries were generally priced higher on average in the months of April, May, and September. Terminal market prices showed that on average, fresh blueberries produced domestically are higher mostly in April and September, with lower prices consistently observed in August.

When April to June were considered one season and July to September the other, states would have earned more additional revenue in the latter season, with Oregon and Washington earning the most revenues from removing above-average import growth. When the simulation was carried out on a monthly basis, the revenue changes increased. The most revenue would have been generated in the month of September, followed by April and May. Oregon and Washington earned the most revenue again but of a higher magnitude than seasonal estimates. The use of customs unit value and farm gate prices, mostly generated revenues on the lower end of the range. Shipping point prices generated revenue, mostly, higher than this but mostly lower than the estimates generated by terminal market price use. With reexports adjusted imports as model input, terminal market price was used. Reexports adjusted imports along with the terminal market price use mostly generated revenue changes on the higher end of the range. Terminal market price without accounting for reexports generated revenues close to this, sometimes higher and sometimes lower. The magnitude of the estimates depends on a number of factors (import penetration, import reduction, substitutability, and so on), and thus these numbers should be taken with some caution.

The model and data limitations provide an avenue for further research. The results can be improved by overcoming production, farm gate price, and export data limitations. On the model side, calculating the counterfactual level of imports in synchronization with relevant events that caused above-average growth rates can surmount the limitations.

In light of the recent surge in imports and the discomfort faced by domestic blueberry producers, this study has examined the effects of U.S. imports of fresh blueberries on the domestic industry. Many other fresh fruits and vegetables face a similar situation, and future studies can address them individually while overcoming some of the modeling and data challenges noted above.

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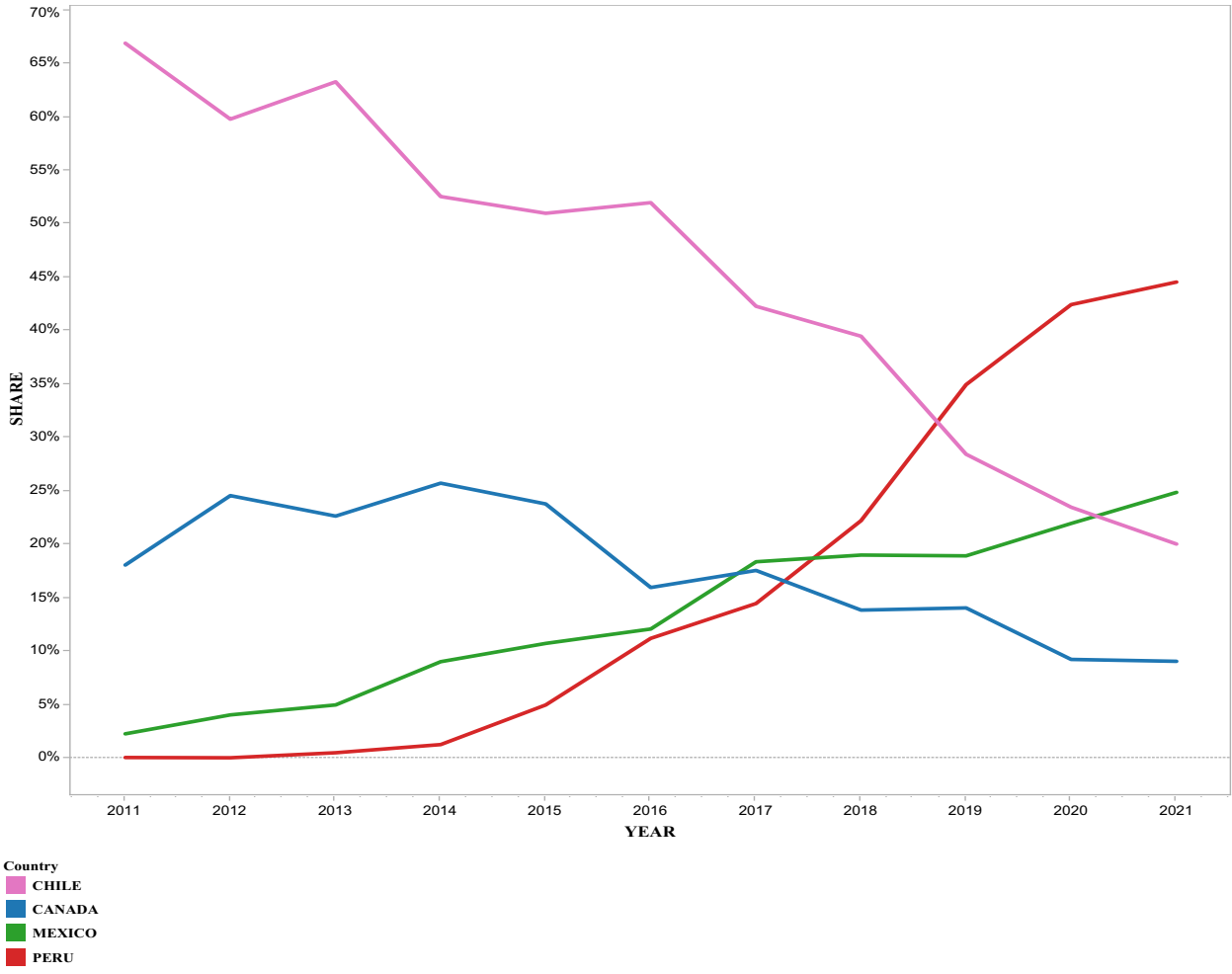
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## 9. APPENDICES

### Appendix 1: Value of fresh market blueberry imports January through December and April through September

Year	Customs Value (\$US)	
	January through December	April through September
2011	301,479,393	77,826,949
2012	340,427,808	100,086,203
2013	381,098,909	111,529,539
2014	434,068,419	125,467,309
2015	551,451,759	161,209,436
2016	700,567,147	165,508,978
2017	734,470,816	196,246,698
2018	926,997,018	213,288,543
2020	961,913,600	263,053,518
2019	1,006,565,489	267,728,610
2022	1,071,941,458	357,257,187

**Appendix 2: Share in Fresh Blueberry Imports in the US of Peru, Chile, Canada and Mexico**



**Appendix 3: Where did the U.S. exported fresh market blueberries to in 2022?**



**Appendix 4: Where did the U.S. reexported fresh market blueberries to in 2022?**



## Appendix 5: Growth rates, counterfactual growth rates and counterfactual level of imports.

### Appendix 5.1 Growth rate estimation:

Following Pillai N, 2019, average annual growth can be estimated using least squares estimation as depicted below.

$$\ln y_t = a + bt,$$

Where

$\ln y_t$  is the logarithmic values of the variable,

$a$  is the intercept,

and  $t$  is the trend.

If  $b^*$  is the least square estimate of  $b$ , the average annual growth rate is given by  $[\exp(b^*) - 1]$

Following Pillai N, 2019, the growth rate of high growth and low growth years can be calculated using least squares estimation as:

$$\ln y_t = a_1 D_1 + a_2 D_2 + b_1 D_1 t + b_2 D_2 t + u_{ti}$$

Where,

$D_j = 1$  in sub-period  $j$ ;

$= 0$ , otherwise.

Appendix 5.2 Approach for growth rate reduction, actual and counterfactual growth rates, and actual and counterfactual level of imports

Table 5: Actual and counterfactual growth rates for the month of April

	With Reexports		Without Reexports	
	Actual	Counterfactual	Actual	Counterfactual
Apr 2011	0.0%	0.0%	0.0%	0.0%

Apr 2012	-12.0%	-12.0%	1.8%	1.8%
Apr 2013	42.4%	34.2%	53.7%	43.8%
Apr 2014	29.7%	21.5%	31.4%	21.4%
Apr 2015	59.4%	51.1%	60.6%	50.7%
Apr 2016	14.3%	14.3%	12.5%	12.5%
Apr 2017	37.4%	29.2%	41.7%	31.7%
Apr 2018	23.4%	23.4%	12.7%	12.7%
Apr 2019	22.6%	22.6%	28.8%	18.8%
Apr 2020	13.2%	13.2%	16.0%	16.0%
Apr 2021	16.9%	16.9%	13.7%	13.7%
Average	27.0%		28.5%	
Reduced by	8.0%		10.0%	

Notes: ‘Reduced by’ denotes the percentage points using which above average growth rates was reduced.

Table 6: Actual and counterfactual level of imports for the month of April

	With Reexports		Without Reexports	
	Actual	Counterfactual	Actual	Counterfactual
Apr 2011	1486.8	1486.8	1066.3	1066.3
Apr 2012	1308.3	1308.3	1085.2	1085.2
Apr 2013	1863.7	1755.9	1668.3	1560.3
Apr 2014	2417.2	2132.7	2191.4	1894.2
Apr 2015	3852.7	3223.6	3519.8	2853.9

Apr 2016	4402.5	3683.6	3961.1	3211.7
Apr 2017	6050.5	4759.1	5610.9	4229.7
Apr 2018	7463.8	5870.7	6323.6	4766.9
Apr 2019	9148.3	7195.6	8141.9	5663.2
Apr 2020	10358.0	8147.1	9447.1	6571.0
Apr 2021	12105.7	9521.8	10739.6	7470.0

Table 7: Actual and counterfactual growth rates for the month of May

	With Reexports		Without Reexports	
	Actual	Counterfactual	Actual	Counterfactual
May 2011	0.0%	0.0%	0.0%	0.0%
May 2012	39.5%	27.6%	43.8%	31.2%
May 2013	5.6%	5.6%	7.0%	7.0%
May 2014	65.1%	53.2%	54.1%	41.6%
May 2015	48.3%	36.4%	50.3%	37.8%
May 2016	38.1%	26.1%	39.7%	27.2%
May 2017	49.1%	37.2%	42.5%	30.0%
May 2018	30.8%	30.8%	32.5%	20.0%
May 2019	-9.9%	-9.9%	-12.8%	-12.8%
May 2020	12.4%	12.4%	11.4%	11.4%
May 2021	95.5%	83.5%	87.3%	74.8%
Average	33.1%		31.4%	
Reduced by	12.0%		12.5%	

Notes: ‘Reduced by’ denotes the percentage points using which above average growth rates was reduced.

Table 8 : Actual and counterfactual level of imports for the month of May

	With Reexports		Without Reexports	
	Actual	Counterfactual	Actual	Counterfactual
May 2011	415.4	415.4	391.4	391.4
May 2012	579.7	529.9	562.7	513.7
May 2013	612.1	559.6	601.8	549.4
May 2014	1010.9	857.1	927.5	778.1
May 2015	1499.5	1168.7	1394.2	1072.2
May 2016	2070.1	1473.5	1948.0	1364.0
May 2017	3087.3	2021.1	2776.8	1773.7
May 2018	4039.1	2644.2	3678.9	2128.0
May 2019	3639.1	2382.3	3208.5	1855.9
May 2020	4089.1	2676.9	3574.5	2067.7
May 2021	7994.7	4913.0	6694.9	3614.0

Table 9 : Actual and counterfactual growth rates for the month of June

	With Reexports		Without Reexports	
	Actual	Counterfactual	Actual	Counterfactual
Jun 2011	0.0%	0.0%	0.0%	0.0%
Jun 2012	91.2%	82.2%	108.2%	98.2%

Jun 2013	24.1%	24.1%	26.1%	26.1%
Jun 2014	34.3%	25.3%	30.3%	20.2%
Jun 2015	826.3%	817.4%	916.2%	906.1%
Jun 2016	5.7%	5.7%	6.5%	6.5%
Jun 2017	-77.4%	-77.4%	-81.3%	-81.3%
Jun 2018	21.3%	21.3%	38.9%	28.8%
Jun 2019	6.0%	6.0%	8.2%	8.2%
Jun 2020	35.6%	26.6%	26.2%	26.2%
Jun 2021	37.5%	28.5%	36.8%	26.7%
Average	26.8%		27.1%	
Reduced by	9.0%		10.1%	

Notes: ‘Reduced by’ denotes the percentage points using which above average growth rates was reduced.

Table 10 : Actual and counterfactual level of imports for the month of June

	With Reexports		Without Reexports	
	Actual	Counterfactual	Actual	Counterfactual
Jun 2011	119.8	415.4	100.5	100.5
Jun 2012	229.0	507.7	209.3	199.2
Jun 2013	284.2	536.1	264.0	251.2
Jun 2014	381.7	792.5	343.9	301.9
Jun 2015	3535.8	1038.3	3494.3	3037.8
Jun 2016	3736.6	1253.5	3720.4	3234.4

Jun 2017	844.6	1652.2	694.0	603.4
Jun 2018	1024.3	2161.6	964.0	777.3
Jun 2019	1086.0	1947.5	1043.4	841.4
Jun 2020	1472.3	2188.3	1316.6	1061.6
Jun 2021	2023.9	3899.4	1801.3	1345.5

Table 11: Actual and counterfactual growth rates for the month of July

	With Reexports		Without Reexports	
	Actual	Counterfactual	Actual	Counterfactual
Jul 2011	0.0%	0.0%	0.0%	0.0%
Jul 2012	167.1%	158.2%	167.7%	158.8%
Jul 2013	91.8%	82.8%	90.9%	82.0%
Jul 2014	10.0%	1.0%	10.1%	1.1%
Jul 2015	11.8%	2.8%	12.2%	3.3%
Jul 2016	-15.2%	-15.2%	-15.4%	-15.4%
Jul 2017	-3.6%	-3.6%	-3.4%	-3.4%
Jul 2018	-16.3%	-16.3%	-16.4%	-16.4%
Jul 2019	56.1%	47.1%	56.0%	47.1%
Jul 2020	-41.3%	-41.3%	-41.8%	-41.8%
Jul 2021	20.7%	11.7%	21.0%	12.1%
Average	9.0%		9.0%	
Reduced by	9.0%		9.0%	

Notes: ‘Reduced by’ denotes the percentage points using which above average growth rates was reduced.

Table 12 : Actual and counterfactual level of imports for the month of July

	With Reexports		Without Reexports	
	Actual	Counterfactual	Actual	Counterfactual
Jul 2011	2100.1	2100.1	2091.7	2091.7
Jul 2012	5610.3	5421.4	5599.2	5412.5
Jul 2013	10762.1	9912.4	10690.2	9850.7
Jul 2014	11838.3	10012.3	11764.7	9961.4
Jul 2015	13236.0	10294.1	13205.8	10292.6
Jul 2016	11227.2	8731.7	11168.6	8704.8
Jul 2017	10827.3	8420.7	10790.0	8409.7
Jul 2018	9062.1	7047.9	9024.1	7033.3
Jul 2019	14143.5	10366.1	14080.6	10346.6
Jul 2020	8305.2	6087.1	8197.2	6023.3
Jul 2021	10021.7	6797.8	9920.5	6752.0

Table 13 : Actual and counterfactual growth rates for the month of August

	With Reexports		Without Reexports	
	Actual	Counterfactual	Actual	Counterfactual
Aug 2011	0.0%	0.0%	0.0%	0.0%
Aug 2012	19.7%	13.5%	19.7%	13.4%
Aug 2013	-26.2%	-26.2%	-26.6%	-26.6%

Aug 2014	18.9%	12.8%	19.8%	13.5%
Aug 2015	-26.5%	-26.5%	-27.0%	-27.0%
Aug 2016	-26.6%	-26.6%	-26.1%	-26.1%
Aug 2017	65.8%	59.6%	64.2%	57.9%
Aug 2018	7.8%	1.7%	7.8%	1.5%
Aug 2019	11.8%	5.7%	12.1%	5.8%
Aug 2020	2.8%	-3.3%	3.2%	-3.1%
Aug 2021	10.5%	4.3%	10.0%	3.7%
Average	1.8%		1.8%	
Reduced by	6.1%		6.3%	

Notes: ‘Reduced by’ denotes the percentage points using which above average growth rates was reduced.

Table 14 : Actual and counterfactual level of imports for the month of August

	With Reexports		Without Reexports	
	Actual	Counterfactual	Actual	Counterfactual
Aug 2011	9913.7	9913.7	9848.7	9848.7
Aug 2012	11864.3	11256.1	11789.8	11168.7
Aug 2013	8750.3	8301.7	8649.9	8194.2
Aug 2014	10405.1	9362.3	10365.4	9302.5
Aug 2015	7652.1	6885.2	7565.0	6789.3
Aug 2016	5616.9	5054.0	5592.0	5018.5
Aug 2017	9310.7	8067.4	9183.5	7925.3

Aug 2018	10039.5	8203.9	9902.3	8045.8
Aug 2019	11224.2	8668.7	11104.6	8515.2
Aug 2020	11539.2	8380.0	11462.7	8252.8
Aug 2021	12749.1	8744.5	12611.2	8559.2

Table 15 : Actual and counterfactual growth rates for the month of September

	With Reexports		Without Reexports	
	Actual	Counterfactual	Actual	Counterfactual
Sep 2011	0.0%	0.0%	0.0%	0.0%
Sep 2012	55.5%	33.3%	55.5%	34.0%
Sep 2013	-53.3%	-53.3%	-56.9%	-56.9%
Sep 2014	14.4%	14.4%	20.9%	20.9%
Sep 2015	-23.8%	-23.8%	-27.5%	-27.5%
Sep 2016	74.6%	52.5%	83.3%	61.8%
Sep 2017	32.0%	9.9%	29.8%	8.3%
Sep 2018	77.0%	54.9%	77.2%	55.8%
Sep 2019	60.1%	38.0%	60.1%	38.7%
Sep 2020	41.7%	19.6%	40.4%	18.9%
Sep 2021	6.3%	6.3%	3.4%	3.4%
Average	23.0%		22.5%	
Reduced by	22.1%		21.5%	

Notes: ‘Reduced by’ denotes the percentage points using which above average growth rates was reduced.

Table 16 : Actual and counterfactual level of imports for the month of September

	With Reexports		Without Reexports	
	Actual	Counterfactual	Actual	Counterfactual
Sep 2011	2587.1	2587.1	9848.7	2580.9
Sep 2012	4022.1	3449.8	11789.8	3458.4
Sep 2013	1877.0	1609.9	8649.9	1489.4
Sep 2014	2148.1	1842.4	10365.4	1801.3
Sep 2015	1635.8	1403.1	7565.0	1306.7
Sep 2016	2856.3	2139.5	5592.0	2114.8
Sep 2017	3770.9	2351.3	9183.5	2290.2
Sep 2018	6673.7	3641.2	9902.3	3567.8
Sep 2019	10683.1	5023.3	11104.6	4947.3
Sep 2020	15142.7	6009.0	11462.7	5883.3
Sep 2021	12749.1	6390.0	12611.2	6083.1

Table 17 : Actual and counterfactual growth rates for April to June Season

	With Reexports		Without Reexports	
	Actual	Counterfactual	Actual	Counterfactual
2011	0.0%	0.0%	0.0%	0.0%
2012	4.7%	4.7%	19.2%	19.2%
2013	30.4%	22.2%	36.4%	26.9%
2014	38.0%	29.9%	36.6%	27.1%
2015	133.3%	125.1%	142.8%	133.3%

2016	14.9%	14.9%	14.5%	14.5%
2017	-2.2%	-2.2%	-5.7%	-5.7%
2018	25.5%	25.5%	20.8%	20.8%
2019	10.7%	10.7%	13.0%	13.0%
2020	14.7%	14.7%	15.7%	15.7%
2021	39.0%	30.8%	34.2%	24.7%
Average	28.3%		28.9%	
Reduced by	8.2%		9.5%	

Notes: ‘Reduced by’ denotes the percentage points using which above average growth rates was reduced.

Table 18 : Actual and counterfactual level of imports for April to June season

	With Reexports		Without Reexports	
	Actual	Counterfactual	Actual	Counterfactual
2011	2022.0	2022.0	1558.3	1558.3
2012	2117.0	2117.0	1857.2	1857.2
2013	2760.0	2587.1	2534.1	2357.7
2014	3809.7	3359.7	3462.8	2997.7
2015	8887.9	7563.7	8408.3	6994.0
2016	10209.3	8688.1	9629.4	8009.7
2017	9982.5	8495.2	9081.7	7554.2
2018	12527.2	10660.7	10966.4	9121.9
2019	13873.4	11806.3	12393.8	10309.1

2020	15919.5	13547.6	14338.2	11926.5
2021	22124.3	17721.4	19235.7	14867.1

Table 19 : Actual and counterfactual growth rates for July to September season

	With Reexports		Without Reexports	
	Actual	Counterfactual	Actual	Counterfactual
2011	0.0%	0.0%	0.0%	0.0%
2012	47.2%	41.7%	47.4%	42.2%
2013	-0.5%	-0.5%	-1.6%	-1.6%
2014	14.0%	8.5%	15.0%	9.8%
2015	-7.7%	-7.7%	-8.0%	-8.0%
2016	-12.5%	-12.5%	-12.3%	-12.3%
2017	21.4%	15.8%	20.7%	15.5%
2018	7.8%	7.8%	7.4%	7.4%
2019	39.9%	34.3%	39.9%	34.8%
2020	-3.0%	-3.0%	-3.9%	-3.9%
2021	11.1%	5.6%	9.9%	4.7%
Average	8.1%		7.8%	
Reduced by	5.5%		5.1%	

Notes: ‘Reduced by’ denotes the percentage points using which above average growth rates was reduced.

Table 20 : Actual and counterfactual level of imports for July-September season

	With Reexports		Without Reexports	
	Actual	Counterfactual	Actual	Counterfactual
2011	14601.0	14601.0	14521.3	14521.3
2012	21496.7	20690.7	21401.5	20656.2
2013	21389.4	20587.4	21068.2	20334.6
2014	24391.5	22340.5	24219.9	22333.0
2015	22523.9	20629.9	22286.9	20550.5
2016	19700.4	18043.8	19539.6	18017.2
2017	23908.9	20902.3	23579.6	20817.8
2018	25775.4	22534.1	25318.0	22352.7
2019	36050.8	30273.5	35420.3	30124.6
2020	34987.0	29380.2	34028.4	28940.8
2021	38873.6	31022.0	37388.3	30313.1

**Appendix 6: Share of seven states in production and import share of Peru, Chile, Canada and Mexico**

Year	Share of seven states in production by weight (%)	Import Share of Peru, Chile, Canada and Mexico by weight(%)
2011	89.8	87.3
2012	91.2	88.4
2013	92.9	88.5
2014	94.1	90.5
2015	92.5	91.2
2016	97.4	91.4
2017	92.3	92.7
2018	93.6	94.5
2019	93.3	96.3
2020	95.5	97.1
2021	94.1	98.5
2011	89.8	87.3

**Appendix 7: Percentages used for distributing yearly state-level domestic supply to major harvesting months**

States	April	May	June	July	August	September
Washington	0%	0%	10%	40%	40%	10%
Oregon	0%	0%	10%	40%	40%	10%
Michigan	0%	0%	5%	50%	45%	0%
New Jersey	0%	0%	40%	50%	10%	0%
North						
Carolina	0%	40%	60%	0%	0%	0%
Georgia	10%	50%	40%	0%	0%	0%

## Appendix 8: Percentage change in quantity of imports

Table 21 : Percentage change in the simulated scenario of quantity of fresh blueberries imported in April and May

Change in Import Quantity (%)					
	With	Without		With	Without
	Reexports	reexports		Reexports	reexports
Apr 2011	0	0	May 2011	0	0
Apr 2012	0	0	May 2012	-8.58	-8.7
Apr 2013	-5.78	-6.47	May 2013	-8.58	-8.7
Apr 2014	-11.77	-13.56	May 2014	-15.21	-16.11
Apr 2015	-16.33	-18.92	May 2015	-22.06	-23.09
Apr 2016	-16.33	-18.92	May 2016	-28.82	-29.98
Apr 2017	-21.34	-24.62	May 2017	-34.54	-36.12
Apr 2018	-21.34	-24.62	May 2018	-34.54	-42.16
Apr 2019	-21.34	-30.44	May 2019	-34.54	-42.16
Apr 2020	-21.34	-30.44	May 2020	-34.54	-42.16
Apr 2021	-21.34	-30.44	May 2021	-38.55	-46.02

Table 22 : Percentage change in the simulated scenario of quantity of fresh blueberries imported in June and July

Change in Import Quantity (%)					
	With	Without		With	Without
	Reexports	reexports		Reexports	reexports
Jun 2011	0.0	0.0	Jul 2011	0.0	0.0
Jun 2012	-4.7	-4.7	Jul 2012	-3.4	-3.3
Jun 2013	-4.7	-4.7	Jul 2013	-7.9	-7.9
Jun 2014	-11.0	-11.0	Jul 2014	-15.4	-15.3
Jun 2015	-11.9	-11.9	Jul 2015	-22.2	-22.1
Jun 2016	-11.9	-11.9	Jul 2016	-22.2	-22.1
Jun 2017	-11.9	-11.9	Jul 2017	-22.2	-22.1
Jun 2018	-11.9	-11.9	Jul 2018	-22.2	-22.1
Jun 2019	-11.9	-11.9	Jul 2019	-26.7	-26.5
Jun 2020	-17.7	-17.7	Jul 2020	-26.7	-26.5
Jun 2021	-23.1	-23.1	Jul 2021	-32.2	-31.9

Table 23 : Percentage change in the simulated scenario of quantity of fresh blueberries imported in August and September

Change in Import Quantity (%)					
	With	Without		With	Without
	Reexports	reexports		Reexports	reexports
Aug 2011	0.0	0.0	Sep 2011	0.0	0.0
Aug 2012	-5.1	-5.3	Sep 2012	-14.2	-13.8
Aug 2013	-5.1	-5.3	Sep 2013	-14.2	-13.8
Aug 2014	-10.0	-10.3	Sep 2014	-14.2	-13.8
Aug 2015	-10.0	-10.3	Sep 2015	-14.2	-13.8
Aug 2016	-10.0	-10.3	Sep 2016	-25.1	-23.9
Aug 2017	-13.4	-13.7	Sep 2017	-37.6	-36.5
Aug 2018	-18.3	-18.7	Sep 2018	-45.4	-44.2
Aug 2019	-22.8	-23.3	Sep 2019	-53.0	-51.7
Aug 2020	-27.4	-28.0	Sep 2020	-60.3	-59.1
Aug 2021	-31.4	-32.1	Sep 2021	-60.3	-59.1

Table 24 : Percentage change in the simulated scenario of quantity of fresh blueberries imported in April to June and July to September season

Change in Import Quantity (%)					
April to June Season	With Reexports	Without reexports	July to September season	With Reexports	Without reexports
2011	0.0	0.0	2011	0.0	0.0
2012	0.0	0.0	2012	-3.7	-3.5
2013	-6.3	-7.0	2013	-3.7	-3.5
2014	-11.8	-13.4	2014	-8.4	-7.8
2015	-14.9	-16.8	2015	-8.4	-7.8
2016	-14.9	-16.8	2016	-8.4	-7.8
2017	-14.9	-16.8	2017	-12.6	-11.7
2018	-14.9	-16.8	2018	-12.6	-11.7
2019	-14.9	-16.8	2019	-16.0	-15.0
2020	-14.9	-16.8	2020	-16.0	-15.0
2021	-19.9	-22.7	2021	-20.2	-18.9

**Appendix 9: Total revenue change and monthly and seasonal state level revenue changes**

**(In million Dollars)**

Table 25 : Revenue change for April to June season when terminal market price was used.

<b>TERMINAL MARKET</b>							
	<b>Total</b>						
<b>Year</b>	<b>Change</b>	<b>CA</b>	<b>GA</b>	<b>NC</b>	<b>NJ</b>	<b>OW</b>	<b>MI</b>
2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	1.21	0.37	0.31	0.28	0.18	0.06	0.02
2014	3.31	0.9	1.05	0.76	0.4	0.14	0.05
2015	7.65	2.34	2.25	1.84	0.82	0.30	0.10
2016	11.43	3.97	2.23	3.01	1.29	0.69	0.24
2017	9.66	3.78	2.05	1.71	1.16	0.73	0.21
2018	11.92	4.25	2.89	2.39	1.3	0.93	0.17
2019	11.89	3.58	4.26	1.99	1.07	0.85	0.16
2020	10.83	3.82	3.31	1.74	1.02	0.79	0.14
2021	22.12	7.52	6.69	3.94	1.87	1.84	0.26

Table 26 : Revenue change for April to June season when shipping point price was used.

<b>SHIPPING POINT PRICE</b>							
	<b>Total</b>						
<b>Year</b>	<b>Change</b>	<b>CA</b>	<b>GA</b>	<b>NC</b>	<b>NJ</b>	<b>OW</b>	<b>MI</b>
2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	1.01	0.3	0.26	0.23	0.15	0.05	0.02
2014	2.08	0.57	0.66	0.48	0.25	0.09	0.03
2015	5.44	1.66	1.6	1.31	0.59	0.21	0.07
2016	7.33	2.55	1.43	1.93	0.83	0.44	0.15
2017	6.86	2.68	1.46	1.22	0.82	0.52	0.15
2018	8.71	3.1	2.11	1.74	0.95	0.68	0.12
2019	9.46	2.85	3.38	1.58	0.85	0.67	0.13
2020	8.6	3.04	2.63	1.38	0.81	0.62	0.11
2021	19.01	6.46	5.75	3.38	1.61	1.58	0.22

Table 27: Revenue change for April to June season when customs value and farmgate price were used.

<b>CUSTOM VALUE AND FARMGATE PRICE</b>							
	<b>Total</b>						
<b>Year</b>	<b>Change</b>	<b>CA</b>	<b>GA</b>	<b>NC</b>	<b>NJ</b>	<b>OW</b>	<b>MI</b>
2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.61	0.18	0.15	0.14	0.09	0.03	0.01
2014	2.45	0.67	0.78	0.57	0.3	0.1	0.04
2015	5.97	1.82	1.76	1.43	0.64	0.23	0.08
2016	5.56	1.93	1.08	1.46	0.63	0.34	0.12
2017	5.39	2.11	1.15	0.96	0.65	0.41	0.12

2018	7.47	2.66	1.81	1.5	0.81	0.58	0.1
2019	7.06	2.12	2.52	1.18	0.63	0.5	0.09
2020	9.5	3.35	2.91	1.53	0.9	0.69	0.12
2021	18.03	6.13	5.45	3.21	1.52	1.5	0.21

Table 28 : Revenue change for April to June season when terminal market price was used and reexports were subtracted from imports.

<b>IMPORTS LESS REEXPORTS</b>							
<b>Total</b>							
<b>Year</b>	<b>Change</b>	<b>CA</b>	<b>GA</b>	<b>NC</b>	<b>NJ</b>	<b>OW</b>	<b>MI</b>
2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	1.24	0.37	0.31	0.29	0.18	0.06	0.02
2014	3.44	0.94	1.1	0.79	0.42	0.14	0.05
2015	8.24	2.52	2.43	1.98	0.89	0.32	0.11
2016	12.3	4.28	2.4	3.24	1.39	0.74	0.26
2017	10.06	3.94	2.14	1.79	1.21	0.76	0.22
2018	12.01	4.28	2.91	2.41	1.31	0.93	0.17
2019	12.2	3.67	4.37	2.04	1.09	0.87	0.16
2020	11.21	3.96	3.43	1.8	1.06	0.81	0.15
2021	22.55	7.67	6.82	4.01	1.91	1.87	0.27

Table 29 : Revenue change for July to September season when terminal market price was used.

<b>TERMINAL MARKET PRICE</b>					
<b>Year</b>	<b>Total</b>				
	<b>Change</b>	<b>CA</b>	<b>NJ</b>	<b>OW</b>	<b>MI</b>
2011	0.00	0.00	0.00	0.00	0.00
2012	3.30	0.11	0.67	1.70	0.82
2013	3.91	0.13	0.84	1.63	1.31
2014	9.31	0.32	1.96	4.02	3.00
2015	9.49	0.40	1.91	4.18	3.01
2016	9.24	0.31	1.37	4.38	3.18
2017	14.38	0.47	1.95	7.38	4.57
2018	14.85	0.50	2.08	8.88	3.39
2019	24.85	0.78	3.15	15.00	5.92
2020	23.95	0.87	3.13	14.45	5.49
2021	34.87	1.16	3.89	22.94	6.88

Table 30 : Revenue change for July to September season when shipping point price was used.

<b>SHIPPING POINT PRICE</b>					
<b>Year</b>	<b>Total</b>				
	<b>Change</b>	<b>CA</b>	<b>NJ</b>	<b>OW</b>	<b>MI</b>
2011	0.00	0.00	0.00	0.00	0.00
2012	3.27	0.11	0.67	1.69	0.81
2013	3.90	0.13	0.84	1.63	1.31

2014	9.01	0.31	1.90	3.89	2.90
2015	9.23	0.39	1.85	4.06	2.93
2016	8.81	0.30	1.30	4.18	3.03
2017	13.84	0.45	1.88	7.10	4.40
2018	14.01	0.47	1.96	8.38	3.20
2019	23.52	0.74	2.98	14.19	5.61
2020	22.24	0.81	2.91	13.42	5.10
2021	31.93	1.06	3.56	21.01	6.31

Table 31: Revenue change for July to September season when custom value and farmgate price was used.

<b>CUSTOM VALUE AND FARMGATE PRICE</b>					
<b>Year</b>	<b>Total</b>				
	<b>Change</b>	<b>CA</b>	<b>NJ</b>	<b>OW</b>	<b>MI</b>
2011	0.00	0.00	0.00	0.00	0.00
2012	2.23	0.07	0.46	1.15	0.55
2013	2.66	0.09	0.57	1.11	0.89
2014	7.96	0.28	1.68	3.44	2.57
2015	7.29	0.31	1.46	3.21	2.31
2016	6.74	0.23	1.00	3.20	2.32
2017	10.76	0.35	1.46	5.52	3.42
2018	13.55	0.46	1.90	8.10	3.09
2019	18.93	0.60	2.40	11.42	4.51

2020	17.61	0.64	2.30	10.63	4.04
2021	24.39	0.81	2.72	16.04	4.81

Table 32 : Revenue change for July to September season when terminal market price was used and reexports were subtracted from imports

<b>IMPORTS LESS REEXPORTS</b>					
<b>Year</b>	<b>Total</b>				
	<b>Change</b>	<b>CA</b>	<b>NJ</b>	<b>OW</b>	<b>MI</b>
2011	0.00	0.00	0.00	0.00	0.00
2012	3.05	0.10	0.62	1.57	0.76
2013	3.59	0.12	0.77	1.50	1.20
2014	8.56	0.30	1.80	3.70	2.76
2015	8.71	0.37	1.75	3.83	2.76
2016	8.48	0.29	1.25	4.02	2.92
2017	13.21	0.43	1.79	6.78	4.20
2018	13.60	0.46	1.90	8.13	3.10
2019	22.79	0.72	2.89	13.75	5.43
2020	21.79	0.79	2.85	13.15	5.00
2021	31.54	1.05	3.52	20.75	6.23

Table 33 : Revenue change for April when terminal market price was used.

<b>TERMINAL MARKET</b>			
<b>Month</b>	<b>Total Change</b>	<b>CA</b>	<b>GA</b>
Apr 2011	0.00	0.00	0.00
Apr 2012	0.00	0.00	0.00
Apr 2013	0.72	0.41	0.31
Apr 2014	2.32	1.13	1.19
Apr 2015	2.99	1.60	1.39
Apr 2016	5.68	3.77	1.91
Apr 2017	5.46	3.67	1.79
Apr 2018	5.43	3.37	2.06
Apr 2019	6.84	3.31	3.54
Apr 2020	5.30	2.98	2.32
Apr 2021	8.95	4.97	3.98

Table 34 : Revenue change for April when shipping point price was used.

<b>SHIPPING POINT</b>			
<b>Month</b>	<b>Total Change</b>	<b>CA</b>	<b>GA</b>
Apr 2011	0.00	0.00	0.00
Apr 2012	0.00	0.00	0.00
Apr 2013	0.50	0.28	0.21
Apr 2014	1.27	0.62	0.65
Apr 2015	2.12	1.14	0.99

Apr 2016	3.42	2.27	1.15
Apr 2017	4.07	2.73	1.34
Apr 2018	4.61	2.86	1.75
Apr 2019	6.71	3.24	3.47
Apr 2020	4.40	2.47	1.93
Apr 2021	7.14	3.97	3.18

Table 35: Revenue change for April when customs value and farmgate prices were used.

<b>CUSTOM VALUE AND FARMGATE PRICE</b>			
<b>Month</b>	<b>Total Change</b>	<b>CA</b>	<b>GA</b>
Apr 2011	0.00	0.00	0.00
Apr 2012	0.00	0.00	0.00
Apr 2013	0.36	0.20	0.15
Apr 2014	1.03	0.50	0.53
Apr 2015	1.91	1.02	0.89
Apr 2016	1.54	1.02	0.52
Apr 2017	3.03	2.04	1.00
Apr 2018	3.00	1.86	1.14
Apr 2019	4.40	2.13	2.28
Apr 2020	4.16	2.34	1.82
Apr 2021	4.73	2.63	2.10

Table 36: Revenue change for April when terminal market price was used and reexports were subtracted from imports.

<b>IMPORTS LESS REEXPORTS</b>			
<b>Month</b>	<b>Total Change</b>	<b>CA</b>	<b>GA</b>
Apr 2011	0.00	0.00	0.00
Apr 2012	0.00	0.00	0.00
Apr 2013	0.74	0.42	0.32
Apr 2014	2.50	1.22	1.28
Apr 2015	3.31	1.77	1.54
Apr 2016	6.31	4.19	2.12
Apr 2017	6.18	4.15	2.03
Apr 2018	5.87	3.64	2.23
Apr 2019	9.85	4.76	5.09
Apr 2020	7.82	4.39	3.43
Apr 2021	12.98	7.21	5.77

Table 37 : Revenue change for May when terminal market price was used.

<b>TERMINAL MARKET</b>				
<b>Month</b>	<b>Total Change</b>	<b>CA</b>	<b>GA</b>	<b>NC</b>
May 2011	0.00	0.00	0.00	0.00
May 2012	0.36	0.13	0.13	0.10
May 2013	0.40	0.15	0.14	0.10

May 2014	1.03	0.33	0.44	0.25
May 2015	2.12	0.76	0.82	0.54
May 2016	3.55	1.54	0.97	1.05
May 2017	7.06	3.50	2.14	1.43
May 2018	9.86	4.34	3.32	2.20
May 2019	7.48	2.64	3.52	1.32
May 2020	6.49	2.72	2.65	1.12
May 2021	15.69	6.35	6.35	2.99

Table 38: Revenue change for May when shipping point price was used.

<b>SHIPPING POINT</b>				
<b>Month</b>	<b>Total Change</b>	<b>CA</b>	<b>GA</b>	<b>NC</b>
May 2011	0.00	0.00	0.00	0.00
May 2012	0.15	0.05	0.06	0.04
May 2013	0.26	0.10	0.09	0.07
May 2014	0.70	0.23	0.30	0.17
May 2015	1.45	0.52	0.57	0.37
May 2016	2.82	1.22	0.77	0.83
May 2017	4.21	2.09	1.28	0.85
May 2018	7.11	3.13	2.40	1.58
May 2019	4.73	1.67	2.23	0.83
May 2020	4.34	1.82	1.78	0.75
May 2021	14.24	5.76	5.77	2.71

Table 39 : Revenue change for May when customs value and farmgate price were used.

<b>CUSTOM VALUE AND FARMGATE PRICE</b>				
<b>Month</b>	<b>Total Change</b>	<b>CA</b>	<b>GA</b>	<b>NC</b>
May 2011	0.00	0.00	0.00	0.00
May 2012	0.29	0.1	0.11	0.08
May 2013	0.16	0.06	0.06	0.04
May 2014	1.03	0.33	0.44	0.25
May 2015	1.44	0.52	0.56	0.36
May 2016	2.23	0.97	0.61	0.66
May 2017	4.37	2.17	1.32	0.88
May 2018	6.39	2.81	2.15	1.42
May 2019	4.16	1.47	1.96	0.73
May 2020	5.65	2.37	2.31	0.97
May 2021	12.73	5.15	5.15	2.43

Table 40 : Revenue change for May when terminal market price was used and reexports were subtracted from imports.

<b>IMPORT LESS EXPORTS</b>				
<b>Month</b>	<b>Total Change</b>	<b>CA</b>	<b>GA</b>	<b>NC</b>
May 2011	0.00	0.00	0.00	0.00
May 2012	0.35	0.13	0.13	0.09
May 2013	0.39	0.15	0.14	0.10

May 2014	1.00	0.32	0.43	0.25
May 2015	2.08	0.74	0.81	0.53
May 2016	3.50	1.51	0.96	1.03
May 2017	6.72	3.33	2.04	1.36
May 2018	11.27	4.96	3.80	2.51
May 2019	8.29	2.92	3.91	1.46
May 2020	7.12	2.98	2.91	1.22
May 2021	16.51	6.68	6.69	3.15

Table 41: Revenue change for June when terminal market price was used.

<b>TERMINAL MARKET</b>							
<b>Total</b>							
<b>Month</b>	<b>Change</b>	<b>CA</b>	<b>GA</b>	<b>NC</b>	<b>NJ</b>	<b>OW</b>	<b>MI</b>
Jun 2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Jun 2012	0.05	0.01	0.01	0.01	0.01	0.00	0.00
Jun 2013	0.07	0.02	0.01	0.02	0.02	0.01	0.00
Jun 2014	0.22	0.05	0.05	0.05	0.05	0.02	0.01
Jun 2015	1.90	0.46	0.40	0.49	0.37	0.13	0.05
Jun 2016	1.70	0.45	0.23	0.46	0.33	0.18	0.06
Jun 2017	0.67	0.20	0.10	0.12	0.14	0.09	0.03
Jun 2018	0.88	0.24	0.15	0.18	0.17	0.12	0.02
Jun 2019	0.74	0.18	0.19	0.13	0.12	0.10	0.02
Jun 2020	1.35	0.38	0.30	0.23	0.23	0.18	0.03

Jun 2021	1.77	0.48	0.38	0.34	0.27	0.26	0.04
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Table 42: Revenue change for June when shipping point price was used

<b>SHIPPING POINT PRICE</b>							
<b>Total</b>							
<b>Month</b>	<b>Change</b>	<b>CA</b>	<b>GA</b>	<b>NC</b>	<b>NJ</b>	<b>OW</b>	<b>MI</b>
Jun 2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Jun 2012	0.05	0.01	0.01	0.01	0.01	0.00	0.00
Jun 2013	0.10	0.02	0.02	0.02	0.02	0.01	0.00
Jun 2014	0.16	0.04	0.04	0.04	0.04	0.01	0.00
Jun 2015	1.38	0.34	0.29	0.36	0.27	0.10	0.03
Jun 2016	1.12	0.29	0.15	0.30	0.22	0.12	0.04
Jun 2017	0.57	0.17	0.08	0.10	0.12	0.07	0.02
Jun 2018	0.53	0.15	0.09	0.11	0.10	0.07	0.01
Jun 2019	0.54	0.13	0.14	0.10	0.09	0.07	0.01
Jun 2020	1.10	0.31	0.24	0.19	0.19	0.14	0.03
Jun 2021	1.77	0.48	0.38	0.34	0.27	0.26	0.04

Table 43 : Revenue change for June when custom value and farmgate price were used.

<b>CUSTOM VALUE AND FARMGATE PRICE</b>							
<b>Total</b>							
<b>Month</b>	<b>Change</b>	<b>CA</b>	<b>GA</b>	<b>NC</b>	<b>NJ</b>	<b>OW</b>	<b>MI</b>
Jun 2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Jun 2012	0.05	0.01	0.01	0.01	0.01	0.01	0.00
Jun 2013	0.04	0.01	0.01	0.01	0.01	0.00	0.00
Jun 2014	0.20	0.04	0.05	0.05	0.04	0.01	0.01
Jun 2015	1.92	0.47	0.40	0.49	0.37	0.14	0.05
Jun 2016	1.69	0.45	0.23	0.46	0.33	0.17	0.06
Jun 2017	0.30	0.09	0.04	0.05	0.06	0.04	0.01
Jun 2018	0.59	0.16	0.10	0.12	0.11	0.08	0.01
Jun 2019	0.46	0.11	0.12	0.08	0.08	0.06	0.01
Jun 2020	1.52	0.43	0.33	0.26	0.26	0.20	0.04
Jun 2021	2.70	0.73	0.58	0.52	0.41	0.40	0.06

Table 44 : Revenue change for June when terminal market price was used and imports were subtracted from reexports.

<b>IMPORTS LESS REEXPORTS</b>							
<b>Total</b>							
<b>Month</b>	<b>Change</b>	<b>CA</b>	<b>GA</b>	<b>NC</b>	<b>NJ</b>	<b>OW</b>	<b>MI</b>
Jun 2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Jun 2012	0.05	0.01	0.01	0.01	0.01	0.00	0.00
Jun 2013	0.07	0.02	0.01	0.02	0.02	0.01	0.00
Jun 2014	0.22	0.05	0.05	0.05	0.05	0.02	0.01
Jun 2015	1.90	0.46	0.40	0.49	0.37	0.13	0.05
Jun 2016	1.70	0.45	0.23	0.46	0.33	0.18	0.06
Jun 2017	0.67	0.20	0.10	0.12	0.14	0.09	0.03

Jun 2018	0.88	0.24	0.15	0.18	0.17	0.12	0.02
Jun 2019	0.74	0.18	0.19	0.13	0.12	0.10	0.02
Jun 2020	1.35	0.38	0.30	0.23	0.23	0.18	0.03
Jun 2021	1.77	0.48	0.38	0.34	0.27	0.26	0.04

Table 45: Revenue change for July when terminal market price was used.

<b>TERMINAL MARKET</b>					
<b>Month</b>	<b>Total Change</b>	<b>CA</b>	<b>NJ</b>	<b>OR and</b>	
				<b>WA</b>	<b>MI</b>
Jul 2011	0.00	0.00	0.00	0.00	0.00
Jul 2012	0.70	0.04	0.21	0.28	0.16
Jul 2013	2.20	0.13	0.68	0.71	0.68
Jul 2014	5.05	0.31	1.55	1.69	1.50
Jul 2015	8.57	0.63	2.51	2.93	2.50
Jul 2016	8.67	0.53	1.95	3.33	2.86
Jul 2017	11.39	0.69	2.38	4.80	3.52
Jul 2018	8.30	0.52	1.80	4.11	1.86
Jul 2019	19.01	1.13	3.78	9.61	4.49
Jul 2020	9.79	0.66	2.00	4.92	2.21
Jul 2021	14.33	0.91	2.55	8.02	2.85

Table 46: Revenue change for July when shipping point price was used.

<b>SHIPPING POINT PRICE</b>					
<b>Month</b>	<b>Total Change</b>	<b>CA</b>	<b>NJ</b>	<b>OR and</b>	
				<b>WA</b>	<b>MI</b>
Jul 2011	0.00	0.00	0.00	0.00	0.00
Jul 2012	0.68	0.04	0.21	0.28	0.16
Jul 2013	3.27	0.19	1.02	1.06	1.01
Jul 2014	6.06	0.37	1.86	2.03	1.80
Jul 2015	8.42	0.62	2.46	2.88	2.46
Jul 2016	6.64	0.41	1.49	2.55	2.19
Jul 2017	6.53	0.40	1.37	2.75	2.02
Jul 2018	6.82	0.43	1.48	3.38	1.53
Jul 2019	13.61	0.81	2.71	6.88	3.22
Jul 2020	10.09	0.69	2.06	5.07	2.28
Jul 2021	11.51	0.73	2.05	6.44	2.29

Table 47: Revenue change for July when custom value and farmgate price were used.

<b>CUSTOM VALUE AND FARMGATE PRICE</b>					
<b>Month</b>	<b>Total Change</b>	<b>CA</b>	<b>NJ</b>	<b>OR and</b>	
				<b>WA</b>	<b>MI</b>
Jul 2011	0.00	0.00	0.00	0.00	0.00
Jul 2012	0.46	0.03	0.14	0.19	0.11
Jul 2013	2.21	0.13	0.69	0.71	0.68

Jul 2014	5.82	0.35	1.79	1.95	1.73
Jul 2015	9.80	0.72	2.87	3.35	2.86
Jul 2016	8.10	0.50	1.82	3.11	2.68
Jul 2017	7.37	0.45	1.54	3.10	2.28
Jul 2018	9.88	0.62	2.15	4.90	2.21
Jul 2019	13.38	0.79	2.66	6.76	3.16
Jul 2020	7.55	0.51	1.54	3.79	1.71
Jul 2021	12.20	0.78	2.17	6.83	2.43

Table 48 : Revenue change for July when terminal market price was used and reexports were subtracting from imports.

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**IMPORTS LESS REEXPORTS**

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<b>Month</b>	<b>Total Change</b>	<b>CA</b>	<b>NJ</b>	<b>OR and</b>	
				<b>WA</b>	<b>MI</b>
Jul 2011	0.00	0.00	0.00	0.00	0.00
Jul 2012	0.69	0.04	0.21	0.28	0.16
Jul 2013	2.17	0.12	0.68	0.70	0.67
Jul 2014	4.99	0.30	1.53	1.67	1.48
Jul 2015	8.49	0.63	2.48	2.90	2.48
Jul 2016	8.56	0.53	1.92	3.29	2.83
Jul 2017	11.27	0.68	2.36	4.75	3.48
Jul 2018	8.20	0.52	1.78	4.06	1.84
Jul 2019	18.80	1.12	3.74	9.50	4.44

Jul 2020	9.60	0.65	1.96	4.82	2.17
Jul 2021	14.09	0.90	2.51	7.88	2.80

Table 49: Revenue change for August when terminal market price was used.

<b>TERMINAL MARKET</b>				
<b>Month</b>	<b>Total Change</b>	<b>NJ</b>	<b>OW</b>	<b>MI</b>
Aug 2011	0.00	0.00	0.00	0.00
Aug 2012	1.89	0.17	1.14	0.58
Aug 2013	1.63	0.15	0.79	0.68
Aug 2014	3.64	0.34	1.84	1.46
Aug 2015	3.79	0.33	1.95	1.50
Aug 2016	2.95	0.18	1.56	1.21
Aug 2017	4.60	0.26	2.61	1.73
Aug 2018	7.64	0.45	5.11	2.08
Aug 2019	10.26	0.54	6.84	2.88
Aug 2020	13.51	0.74	9.09	3.68
Aug 2021	16.82	0.77	12.16	3.89

Table 50 : Revenue change for August when shipping point price was used.

<b>SHIPPING POINT PRICE</b>				
<b>Month</b>	<b>Total Change</b>	<b>NJ</b>	<b>OW</b>	<b>MI</b>
Aug 2011	0.00	0.00	0.00	0.00
Aug 2012	1.84	0.16	1.11	0.57

Aug 2013	1.65	0.16	0.80	0.69
Aug 2014	4.52	0.42	2.29	1.82
Aug 2015	2.36	0.21	1.22	0.94
Aug 2016	2.42	0.15	1.28	0.99
Aug 2017	3.90	0.22	2.22	1.46
Aug 2018	6.16	0.36	4.12	1.68
Aug 2019	9.07	0.48	6.05	2.55
Aug 2020	11.23	0.61	7.55	3.06
Aug 2021	13.39	0.62	9.68	3.10

Table 51: Revenue change for August when custom value and farm gate price were used.

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**CUSTOM VALUE AND FARMGATE PRICE**

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<b>Month</b>	<b>Total Change</b>	<b>NJ</b>	<b>OW</b>	<b>MI</b>
Aug 2011	0.00	0.00	0.00	0.00
Aug 2012	1.17	0.10	0.70	0.36
Aug 2013	1.38	0.13	0.67	0.58
Aug 2014	3.23	0.30	1.63	1.30
Aug 2015	2.92	0.26	1.51	1.16
Aug 2016	2.35	0.15	1.24	0.96
Aug 2017	4.28	0.24	2.43	1.61
Aug 2018	7.32	0.43	4.90	1.99
Aug 2019	8.58	0.45	5.72	2.41
Aug 2020	10.57	0.58	7.11	2.88

Aug 2021	13.02	0.60	9.41	3.01
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Table 52: Revenue change for August when terminal market price was used and reexports were subtracted from imports.

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**IMPORTS LESS REEXPORTS**

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<b>Month</b>	<b>Total Change</b>	<b>NJ</b>	<b>OW</b>	<b>MI</b>
Aug 2011	0.00	0.00	0.00	0.00
Aug 2012	1.93	0.17	1.16	0.60
Aug 2013	1.66	0.16	0.81	0.69
Aug 2014	3.72	0.34	1.88	1.50
Aug 2015	3.85	0.34	1.98	1.52
Aug 2016	3.01	0.19	1.59	1.23
Aug 2017	4.67	0.26	2.66	1.75
Aug 2018	7.77	0.46	5.20	2.11
Aug 2019	10.44	0.55	6.96	2.93
Aug 2020	13.78	0.75	9.27	3.76
Aug 2021	17.10	0.79	12.36	3.95

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Table 53: Revenue change for September.

<b>Revenue Change for Oregon and Washington</b>				
	<b>Terminal</b>	<b>Shipping Point</b>	<b>Custom Value</b>	<b>Less Reexports</b>
	<b>Market Price</b>	<b>Price</b>	<b>and Farmgate</b>	
<b>Month</b>			<b>Price</b>	
Sep 2011	0.00	0.00	0.00	0.00
Sep 2012	2.37	2.17	1.68	2.29
Sep 2013	1.94	1.13	1.03	1.78
Sep 2014	1.99	1.50	1.49	1.89
Sep 2015	1.60	0.89	1.12	1.47
Sep 2016	5.02	3.44	3.21	4.66
Sep 2017	7.62	5.20	5.90	7.12
Sep 2018	14.49	10.80	12.29	13.58
Sep 2019	19.61	15.65	17.79	18.43
Sep 2020	33.55	27.50	27.07	31.41
Sep 2021	42.82	32.26	27.38	39.35