Case Study

Market Power in the U.S. Peanut Industry

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Abstract
This case study is motivated by recent developments in the U.S. peanut industry involving allegations of an illegal exercise of buyer market power by the three largest peanut buyers (peanut shellers) in the country. They purchased raw peanuts directly from peanut growers. Peanut growers filed a class action antitrust lawsuit alleging that these buyers engaged in a price-fixing conspiracy aiming to suppress and stabilize prices of peanuts paid to peanut growers beginning in 2014. The case study introduces economic, business, and legal issues related to the alleged peanut price-fixing cartel. The case study presents economic models that help explain conduct and performance of the peanut industry in the analyzed setting, and it includes basic market and price analysis. The intended audiences are undergraduate and graduate students, as well as extension and outreach communities. A teaching note summarizes student learning objectives, teaching strategies, and student background knowledge. The teaching note also includes multiple-choice questions, as well as suggested answers and guidance to analytical, discussion, and multiple-choice questions.

1 Introduction

The U.S. peanut industry is a highly concentrated industry on the peanut purchasing (buying) side. While there are numerous peanut farmers growing and selling peanuts, there are only three large buyers (peanut shellers) who purchase raw peanuts directly from peanut growers. These three peanut shellers control approximately 80 to 90 percent of the market. The peanut shellers are oligopsonists, who theoretically can exercise buyer market power by lowering peanut prices they pay to peanut growers.

In May 2020, peanut growers (plaintiffs) filed a class action antitrust lawsuit against the three largest peanut shellers in the United States: Birdsong Corporation (Birdsong), Golden Peanut Company, LLC (Golden Peanut), and Olam Peanut Shelling Company, Inc. (Olam) (defendants). In their complaint, peanut growers alleged that these peanut shellers engaged in an input price-fixing conspiracy (cartel) aiming to decrease and stabilize prices paid for Runner peanuts beginning in 2014, violating Section 1 of the Sherman Act (Bloch 2020; "In Re Peanut Farmers Antitrust Litigation" 2020). The peanut growers claimed that because of this price-fixing conspiracy, they received lower prices for peanuts and were underpaid. The peanut shellers settled this lawsuit with peanut growers for a total amount equal to $102.75 million (Bunge 2021; "In Re Peanut Farmers Antitrust Litigation" webpage 2022).

The objective of the case study is to explain recent developments in the U.S. peanut industry involving allegations of illegal exercise of buyer market power by the three largest peanut shellers in the country, as well as related economic, business, and legal issues. The case study focuses on applications of economic models that may explain the buyer market power of the three largest peanut shellers in the analyzed industry setting, as well as a basic empirical market, price, and profitability analysis utilizing publicly available data from the U.S. Department of Agriculture.

2 U.S. Peanut Industry

This section discusses peanut production, varieties, and uses; the industry structure; marketing arrangements used by peanut growers and peanut shellers; and government programs affecting the peanut industry.

2.1 Peanut Production, Varieties, and Uses

Table 1 summarizes peanut area planted, production, prices, value of production, and the number of peanut farms for the leading peanut-producing states in the United States for 2020 (U.S. Department of Agriculture, National Agricultural Statistics Service 2022a, 2022b). Peanuts are planted in the spring (April/May) and harvested in the fall (September/October). The Runner, Spanish, Virginia, and Valencia are the four peanut varieties grown in the United States (National Peanut Board 2022). The Runner variety is the largest share of the U.S. peanut crop: 80 percent (Schnepf 2016). Runner peanuts are used to manufacture peanut butter because their kernel size is suitable for quality roasting. Runner peanuts are grown in Alabama, Florida, Georgia, Oklahoma, South Carolina, and Texas.

The shares of Virginia, Spanish, and Valencia varieties in the total U.S. peanut crop are 15 percent, 4 percent, and 1 percent, respectively (Schnepf 2016). Virginia peanuts are sold as snack peanuts and in-shell peanuts because they have large kernels. Virginia peanuts are grown in North Carolina, South Carolina, Texas, and Virginia. Spanish peanuts are used to produce peanut butter, snack peanuts, and confections. Their kernels are small and round with red skins. Spanish peanuts are grown in Oklahoma and Texas. Valencia peanuts are used to manufacture all-natural peanut butter, and they are also sold as in-shell peanuts. Valencia peanuts are grown in New Mexico.

Peanuts may be consumed in fresh form, but typically are consumed as processed products. The latter include peanut butter, roasted peanuts (snacks), peanut oil, and peanut flour. Peanuts are also used to produce biodiesel (Agricultural Marketing Resource Center 2022). Figure 1 depicts the quantities of peanuts allocated to different demand uses (disappearance) for the period from 2002 to 2020. The peanuts used as food represent the largest share of all peanuts available in the market, followed by exported peanuts.[1] Figure 2 depicts the quantities of peanuts allocated to different categories of food uses and peanut consumption (use) per capita during the period from 2002 to 2020. Peanut butter is the primary food use for peanuts, followed by snack peanuts and peanut candy.

2.2 Government Programs Affecting the U.S. Peanut Industry

Beginning in the 1930s and through 2002, federal government programs directly affected peanut industry production and marketing. In particular, peanut marketing quotas (a form of supply management) effectively regulated the quantity of peanuts produced each year (Jurenas 2002). The peanut marketing quota system was a form of price support program, which included two loan rates and limited the quantity of peanuts produced for domestic market for food uses, which were eligible for the higher level of the two loan rates. Peanuts produced in excess of the marketing quota had to be exported or diverted to lower value uses and were eligible for a lower loan rate.

In 2002, the peanut industry was deregulated through implementation of a marketing quota buyout program (Dohlman and Livezey 2005; Dohlman, Foreman, and Da Pra 2009). Peanut growers became eligible for Marketing Assistance Loans (MALs) that were previously only available to growers of selected field crops (corn, cotton, soybeans, wheat, etc.; Congressional Research Service 2019).

[1] The peanut supply each year includes peanut stock at the beginning of the year, peanut production, and peanut import. The import has a very small share in the total peanut supply. Figure A1 presented in the Appendix depicts the peanut supply sources in the 2002–2021 period.

Table 1: The U.S. Peanut Industry: Acres Planted, Production, Prices, Value of Production, and Number of Farms, 2020

State	Acres Planted	Production	Price	Value of production	Number of farms[2]
	Thousand	Million pounds	$ per pound	$ million	
U.S. Total	*1,662.5 (100.0)*	*6,158 (100.0)*	*0.21*	*1,294 (100.0)*	*6,379 (100.0)*
Georgia	810 (48.7)[1]	3,317 (53.9)	0.20	673 (52.0)	2,838 (44.5)
Texas	190 (11.4)	485 (7.9)	0.26	125 (9.7)	576 (9.0)
Alabama	185 (11.1)	622 (10.1)	0.21	131 (10.1)	667 (10.5)
Florida	175 (10.5)	564 (9.2)	0.20	115 (8.9)	661 (10.4)
North Carolina	107 (6.4)	410 (6.6)	0.22	90 (7.0)	614 (9.6)
South Carolina	84 (5.1)	296 (4.8)	0.21	63 (4.9)	477 (7.5)
Arkansas	39 (2.3)	182 (3.0)	0.19	35 (2.7)	77 (1.2)
Virginia	28 (1.7)	112 (1.8)	0.22	25 (1.9)	189 (3.0)
Mississippi	23 (1.4)	97 (1.6)	0.19	19 (1.5)	113 (1.8)
Oklahoma	15 (0.9)	59 (1.0)	0.22	13 (1.0)	115 (1.8)
New Mexico	6.5 (0.4)	15 (0.2)	0.29	4 (0.3)	29 (0.5)

Source: U.S. Department of Agriculture, National Agricultural Statistics Service (2022a, 2022b)
[1] The individual state's shares in the U.S. total are in the parentheses.
[2] The number of farms is for 2017 (U.S. Department of Agriculture, National Agricultural Statistics Service 2022b).

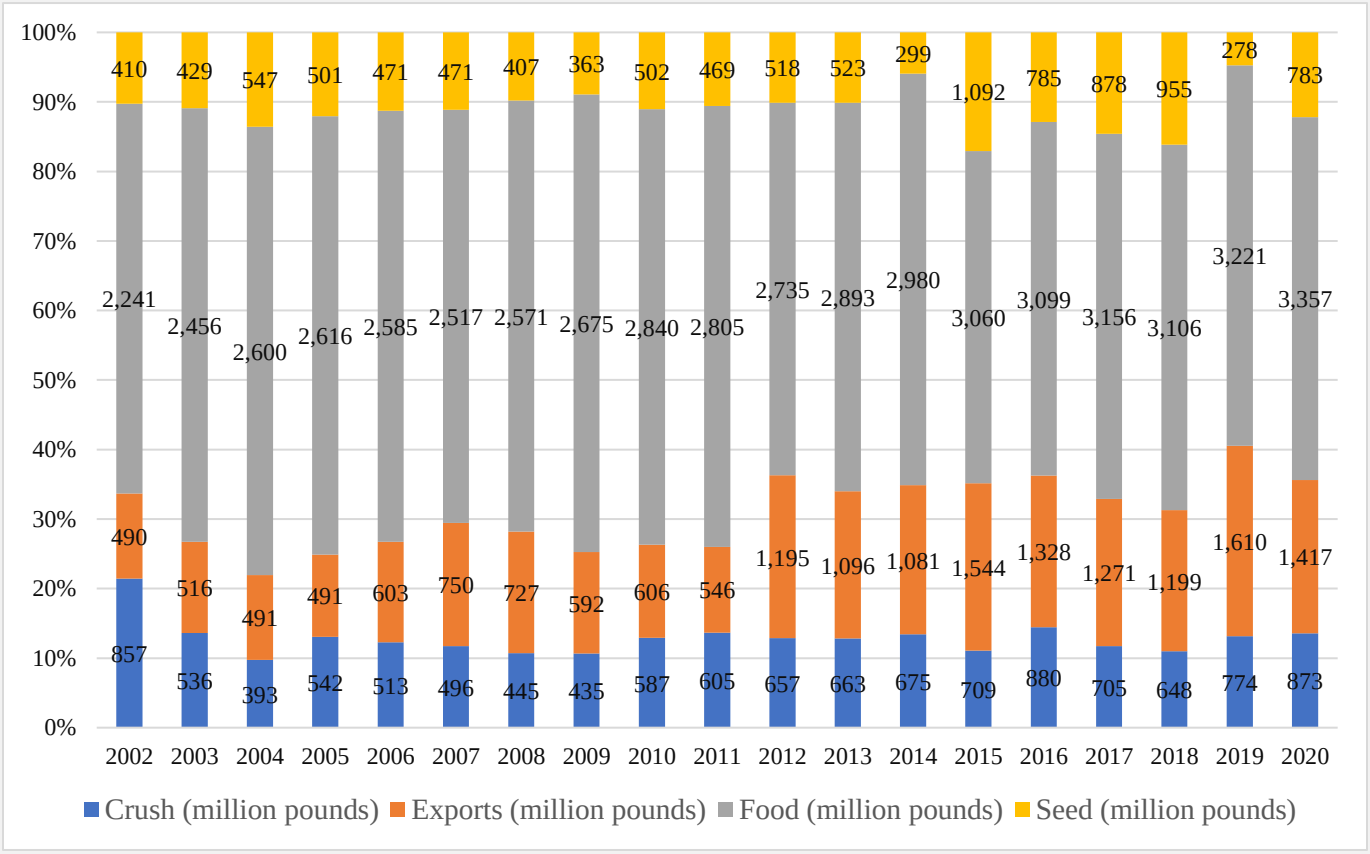

Figure 1: The U.S. Peanut Industry: Demand (Disappearance), 2002–2020

Data Source: U.S. Department of Agriculture, Economic Research Service (2022a)
Note: The seed category also includes loss, shrinkage, and residual uses (farm use and local sales).

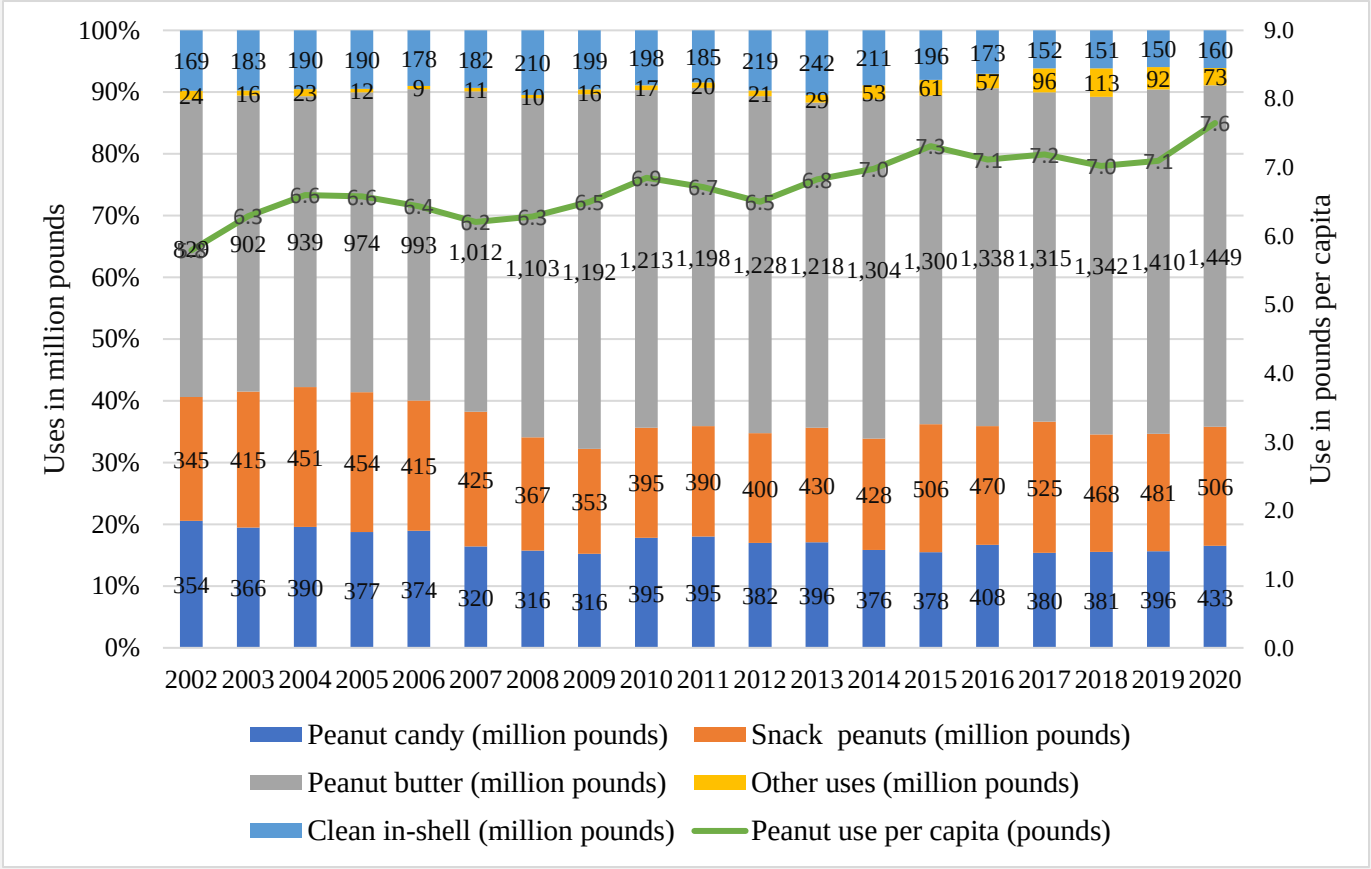

Figure 2: The U.S. Peanut Industry: Food Demand (Uses) and Food Use per Capita, 2002–2020

Data Source: U.S. Department of Agriculture, Economic Research Service (2022a)

The MAL program provides interim financing in the form of a government loan to producers of agricultural commodities covered by the program for up to nine months following the harvest, when commodity prices are typically the lowest (Schnepf 2016; U.S. Department of Agriculture, Farm Service Agency 2016; Congressional Research Service 2019). This program serves as a safety net for agricultural producers because MAL rates act as price floors, practically ensuring that agricultural producers receive a minimum price equal to the MAL rate. Since 2002, the MAL rate for peanuts has been $355 per ton or 17.75 cents per pound of peanuts. The total loan proceeds received by agricultural producers under the MAL program at the time of enrollment (after the harvest) are approximately equal to the statutory established loan rate for a particular commodity times this commodity's quantity placed under the loan.

MALs are nonrecourse loans. Agricultural producers can either repay the loan principal and interest or forfeit their agricultural commodities to the Commodity Credit Corporation (CCC). In the latter case, the U.S. Department of Agriculture takes the ownership of forfeited commodities. When peanut growers have their peanuts under MALs, if market prices are high (above the MAL rate), then these peanut growers can sell peanuts in the market and repay the MAL to the government. If peanut prices remain low (below the MAL rate), peanut growers should keep the MAL proceeds and allow the U.S. Department of Agriculture to take ownership of their harvested peanuts. The loan repayment rates are calculated by the U.S. Department of Agriculture and, in the case of peanuts, are announced on a weekly basis. The National Posted Price for Peanuts (NPP) is used to determine the loan repayment rates for peanuts (U.S. Department of Agriculture, Farm Service Agency 2022).

The 2014 Farm Bill introduced two new programs for agricultural producers eligible for MAL benefits, including peanut growers: Price Loss Coverage (PLC) and Agriculture Risk Coverage (ARC),

which provide an additional layer of income protection for these agricultural producers. Agricultural producers are periodically given options to select one of these programs for each commodity. Almost all peanut growers (99.7 percent) have selected PLC, because it provides more benefits in terms of payments and risk protection, when compared to ARC (Schnepf 2016). PLC payments are made on "peanut base acres," which represent historical peanut planting area on each farm. The 2014 Farm Bill also introduced "generic base acres" and allowed PLC payments to be made on these acres in proportion to the area of peanuts planted in each particular year (Schnepf 2016).[2]

The established limit for aggregate government payments under MAL, PLC, or ARC programs made to all covered commodities, except for peanuts, is $125,000 per person per year (Schnepf 2016). Because of the marketing quota buyout program implemented in 2002, there is a separate payment limit for farmers growing peanuts, which is also $125,000 per person per year. Therefore, growers who grow peanuts and other covered crops may potentially be eligible for $250,000 per person per year.

2.3 Peanut Shellers[3]

The peanut shelling stage of the peanut supply chain is highly concentrated. Currently there are three large peanut shellers who purchase most raw peanuts from peanut growers. Birdsong and Golden Peanut are the two largest peanut shellers, with a combined market share[4] of peanut handling equal to approximately 70 to 80 percent (Adjemian et al. 2016; "In Re Peanut Farmers Antitrust Litigation" 2020).[5] Olam is the third largest peanut sheller, with market share equal to at least 10 percent. Approximately one dozen of smaller peanut shellers comprise the remaining market share. Cooperatives of peanut growers represent some of these smaller peanut shellers.

Peanut shellers purchase raw peanuts directly from peanut growers. Peanut shellers clean, shell, and sort peanuts to sell them to food manufacturers (American Peanut Council 2022). Peanut shellers procure raw peanuts through buying points located in peanut growing regions. Raw peanuts are delivered to buying points first, and then they are delivered to the shelling plants owned and operated by peanut shellers. The buying points are either owned by peanut shellers or independently owned. The buying points do not have any pricing power, and they do not take the ownership of peanuts. The buying points facilitate transactions and convey pricing information on behalf of peanut shellers to peanut growers.

Birdsong operates six shelling plants in Georgia, Texas, and Virginia. Birdsong also operates 85 buying points in the southeast and southwest regions of the United States. Golden Peanut operates shelling plants in Georgia, Texas, and internationally. Golden Peanut operates more than 100 buying points. Golden Peanut is owned by Archer Daniels Midland Company (ADM), one of the largest food and feed processors in the world. Olam operates shelling plants in Alabama and Georgia. Olam operates approximately two dozen buying points. Olam is owned by Olam International Limited (OIL), which is a large agribusiness company operating in 60 countries.

Several mergers and acquisitions involving peanut shellers took place in the last decade. To enter the U.S. peanut shelling market, OIL purchased McCleskey Mills in December 2014, then the third largest peanut sheller in the country having a 12 percent market share. In 2015, Golden Peanut acquired Clint Williams Company (known as Texoma Peanut Company) after it filed for bankruptcy. This bankruptcy threatened to adversely affect peanut growers in Arkansas, Mississippi, Oklahoma, and Texas. In June

[2] The "generic base acres" are former cotton base acres. Under the 2014 Farm Bill, cotton is not eligible for PLC or ARC payments (Schnepf 2016).

[3] The information presented in this section is primarily from "In Re Peanut Farmers Antitrust Litigation" (2020), a complaint filed by peanut growers in the court.

[4] The combined market share of N largest firms in the industry is the N-firm concentration ratio, which is a commonly used measure of market concentration (Besanko et al. 2006). CR4 (N = 4) is the most frequently used measure. It is considered that if CR4 exceeds 75 percent, an industry is conducive to collusion, and if CR4 is smaller than 40 percent, an industry is not likely to present competition concerns (Hovenkamp 2005).

[5] There were 92 peanut shelling companies in the United States in 1970 ("In Re Peanut Farmers Antitrust Litigation" 2020).

2016, OIL purchased Brooks Peanut Company, then the sixth largest peanut sheller in the country. In December 2018, McCleskey Mills and Brooks Peanut Company were merged. The merged company was renamed as Olam Peanut Shelling Company.

2.4 Option Contracts

Since 2002, after the industry deregulation, the primary marketing options for peanut growers have been MALs provided by the government and option contracts with peanut shellers (Rural Advancement Foundation International-USA 2007; Hollis 2014). Option contracts generally fall in the category of marketing contracts used by agricultural producers to sell agricultural commodities to their buyers (MacDonald and Korb 2011; Prager et al. 2020).[6]

For peanut growers, an option contract is an output forward pricing method, which helps manage market and price risks (Paul, Heifner, and Helmuth 1976; Bolotova 2022). Before or during the peanut production season, peanut growers sign option contracts to lock in the peanut price and quantity specified in the contract. Peanut growers own peanuts that they produce during the production season. Due to the design of option contracts, peanut growers must be enrolled in the U.S. Department of Agriculture MAL program.

For peanut shellers, an option contract is an input forward pricing method, which allows them to ensure a steady supply of the needed quantity of peanuts that have desirable quality characteristics. Under option contracts, peanut shellers have the exclusive right (option) to purchase peanuts out of the MALs of peanut growers signing these option contracts. For peanut shellers, option contracts are not an obligation to purchase peanuts.

The peanut pricing system included in option contracts has two main components: MAL repayment rate (which is announced by the government) and option premium (Nadolnyak, Revoredo, and Fletcher 2005; Rural Advancement Foundation International-USA 2007; Adjemian et al. 2016). If a peanut sheller (buyer) decides to not exercise the option contract, a peanut grower (seller) keeps the option premium. If the peanut sheller exercises the option contract, the sheller buys peanuts out of the MAL of the peanut grower at the current loan repayment rate. The sheller makes this payment (repays the loan on a grower's behalf) to the government. The peanut grower receives the option premium from the peanut sheller and the MAL proceeds originally received from the government, when the grower signed up for the program.

Since 2002, after the industry deregulation, the national average MAL rate has been $355 per ton of peanuts or $0.1775 per pound of peanuts (Schnepf 2016; U.S. Department of Agriculture, Farm Service Agency 2016; Congressional Research Service 2019). The MAL rate varies depending on peanut variety (Runner, Valencia, Virginia, or Spanish) and segregation (Segregation 1, 2, or 3); the latter reflects the overall quality of peanuts (U.S. Department of Agriculture, Farm Service Agency 2020). Most peanuts are graded as Segregation 1 (highest quality). In addition, the MAL rate for Segregation 1 is adjusted for premiums and discounts for the presence and/or absence of various peanut quality characteristics (U.S. Department of Agriculture, Farm Service Agency 2019).

The option premiums set by peanut shellers in option contracts vary depending on peanut variety, whether peanuts are irrigated or non-irrigated, quantity of peanuts, quality of peanuts (Segregation 1, 2, or 3), and additional requirements for specific peanut quality characteristics affecting quality of processed peanut products (Revoredo-Giha, Nadolnyak, and Fletcher 2005; Rural Advancement Foundation International-USA 2007). The overall industry conditions affecting peanut shellers' decisions on the amount of option premiums to offer each year include peanut stock already available from the previous year, expected peanut production, and expected prices of competing crops that peanut growers may decide to plant, such as corn, cotton, and soybeans (Adjemian et al. 2016).

[6] The peanut industry's option contracts are distinguished from options on futures contracts traded at organized exchanges, such as Chicago Mercantile Exchange (CME). Futures markets (futures contracts and options on futures) do not exist for peanuts.

3 Alleged Input (Peanut) Price-Fixing Cartel of Peanut Shellers[7]

In May 2020, peanut growers filed a class action antitrust lawsuit against Birdsong, Golden Peanut, and Olam alleging that these peanut shellers conspired and colluded to decrease and stabilize prices paid for Runner peanuts beginning in 2014. The plaintiffs argued that the following peanut industry conditions and conduct of the defendants indicated a presence of the peanut price-fixing cartel of the three largest peanut shellers in the country ("In Re Peanut Farmers Antitrust Litigation" 2020).

1). The peanut shelling stage of the peanut supply chain is highly concentrated and therefore susceptible to effective collusion. First, there are three large peanut shellers who control up to 90 percent of peanut shelling. Consequently, peanut growers do not have sufficient marketing options. Second, unlike in the case of many other agricultural markets, there is no spot market for peanuts, which would serve as an alternative marketing strategy to option contracts offered by peanut shellers. This situation further limits marketing options for peanut growers.

Third, unlike in the case of many other agricultural markets, there is no futures market for peanuts. Futures markets serve important risk management and price discovery functions. Futures markets provide critical price information that agricultural producers use to make planting, production, and pricing decisions. Consequently, the peanut industry is characterized as a thin market, which lacks market and price transparency and makes it difficult for peanut growers to make informed production and pricing decisions.[8]

2). Prior to 2014 (the period prior to the alleged price-fixing conspiracy), peanut prices fluctuated, reflecting changes in peanut market conditions. For example, between 2011 and 2013, adverse weather conditions affecting the peanut industry made it challenging for peanut shellers to manage risks, plan input (peanut) procurement, and plan their peanut shelling activities. This situation created incentives for peanut shellers to engage in a price-fixing conspiracy to suppress and stabilize Runner peanut prices paid to peanut growers.

3). After 2014 (the period of the alleged price-fixing conspiracy), peanut prices remained low and unchanged. The peanut prices did not fluctuate in response to changes in peanut production costs, supply, demand, and weather conditions. The artificially low and stable peanut prices reflected effective collusion among peanut shellers. For example, in 2018, Hurricane Michael (Category 5) affected peanut crops in Alabama, Florida, and Georgia, leading to significant peanut supply disruptions, which was expected to cause peanut prices to fluctuate. Contrary to these expectations, peanut prices remained flat.

4). During the period of alleged price-fixing conspiracy (2014–2019), peanut shellers over-reported peanut inventory quantities to the U.S. Department of Agriculture to create a false impression of a peanut oversupply to use this situation to offer artificially low Runner peanut prices to peanut growers. In addition, peanut shellers under-reported peanut prices to the U.S. Department of Agriculture to further suppress and stabilize Runner peanut prices.[9]

[7] The information presented in this section is primarily from "In Re Peanut Farmers Antitrust Litigation" (2020), a complaint filed by peanut growers in the court.

[8] A market is referred to as a thin market, if the proportion of spot market sales is small as compared to the proportion of sales attributed to alternative marketing agreements (for example, marketing contracts), or if the spot market does not exist (Adjemian et al. 2016; Adjemian, Saitone, and Sexton 2016).

[9] U.S. Department of Agriculture, National Agricultural Statistics Service, administers voluntary surveys of peanut shellers to collect information on peanut stocks and prices used to develop weekly "Peanut Prices" reports and monthly "Peanut Stocks and Processing" reports (U.S. Department of Agriculture, National Agricultural Statistics Service 2022c, 2022d). These survey-

5). During the period of alleged price-fixing conspiracy (2014–2019), peanut shellers offered practically identical option contracts for purchasing peanuts from peanut growers. These contracts were offered on the same day or within a few days and often after one of the industry meetings sponsored by these peanut shellers. Peanut growers have extremely limited negotiating power about the terms and conditions included in these contracts. The peanut prices set in option contracts are determined by peanut shellers.

6). Peanut shellers attended various industry meetings on a regular basis, where they had opportunities to discuss and exchange private market and price information to facilitate and enforce their price-fixing conspiracy. Peanut shellers exchanged private price information using phone calls.

4 Theoretical Frameworks

This section presents a graphical analysis of alternative economic models that may explain buyer market power of peanut shellers and its effects on raw peanut prices that peanut shellers pay to peanut growers. First, buyer market power of peanut shellers is explained using a classic economic model of the profit-maximizing behavior of oligopsonists forming an *input* price-fixing cartel. Second, buyer market power of peanut shellers is explained from the perspective of peanut growers, who face peanut oversupply (overproduction) and consequently receive lower raw peanut prices.

4.1 The Peanut Industry as a Classic Oligopsony

Based on the number of buyers (peanut shellers) operating in the U.S. peanut industry, the industry is a classic oligopsony—market structure with a relatively small number of large buyers. To understand oligopsony market power, this market structure is evaluated relative to a perfectly competitive industry.

Figure 3 is a graphical representation of an economic model explaining the profit-maximizing behavior of a perfectly competitive industry and industries with buyer market power (oligopsony and monopsony). The inverse demand curve (labeled as P) is a graphical representation of the inverse (price-dependent) demand function for shelled peanuts that peanut shellers face. The marginal cost curve (labeled as MC) is a graphical representation of the marginal cost function of peanut shellers (the same as the inverse supply curve for raw peanuts). The marginal cost for peanut shellers is the cost of raw peanuts in this model. Raw peanuts are the *input* for peanut shellers. Peanut growers are sellers (suppliers) of this input. Peanut shellers make decisions on the *input* quantity to purchase. The *input* price that peanut shellers pay is a function of the *input* quantity they purchase.[10] From the perspective of peanut shellers, price-quantity combinations depicted in Figure 3 are *input* prices and *input* quantities.

To maximize its profit, an oligopsony (the three largest peanut shellers) purchases the *input* quantity (Qo), which is smaller than the *input* quantity purchased by a perfectly competitive industry represented by many buyers (Qc). The *input* price an oligopsony pays (Po) is lower than the *input* price a perfectly competitive industry pays (Pc), and oligopsony's profit is higher than the profit of a perfectly competitive industry by Pc - Po in $ per unit or (Pc - Po) * Qo in total $. The oligopsony's profit increases due to the decrease in input costs.[11]

based peanut prices are also used to determine the National Posted Price (NPP) for Peanuts announced on a weekly basis. The NPPs are used to determine MAL repayment rates and various types of government payments made to peanut growers.

[10] In this subsection, given that raw peanuts are the input, raw peanut price and quantity are related within the inverse supply framework. A decrease (increase) in input quantity causes input price to decrease (increase).

[11] In this case study, "profit" refers to *economic* profit, which is different from *accounting* profit. Accounting profit is equal to revenue minus costs associated with generating that revenue. Economic profit is equal to revenue minus costs associated with generating that revenue and minus opportunity cost. Opportunity cost is the forgone benefit of using capital in an alternative business venue. A simple example is earning interest on the money deposited in a savings account in a bank.

Assume that oligopsonists form an *input* price-fixing cartel. Theoretically, they aim to act as a single buyer in the industry (i.e., a monopsonist). To maximize their *joint* profit, oligopsonists decrease the *input* quantity they purchase (Qo) possibly to the *input* quantity purchased by monopsony (Qm).[12] As a result, the oligopsony price (Po) would decrease to possibly approach the monopsony price (Pm). Due to the cartel, the profit of the oligopsonists acting as a single buyer further increases by Po - Pm in $ per unit or by (Po - Pm) * Qm in total $, which is a cartel underpayment to the sellers of input. The monopsony's profit increases due to the decrease in input costs.

The cartel underpayment to sellers of the input expressed in total $ is the shaded rectangle in Figure 3. The cartel underpayment is the basis for damages that peanut growers aimed to recover during antitrust litigation. In summary, the buyer cartel's effects on sellers of the cartelized product are a decrease in the product quantity purchased from these sellers, a decrease in the product price paid to the sellers, and a deadweight loss. The latter is the "DWL" triangle in Figure 3. Because of DWL, there are sellers who do not sell their product due to lower prices.

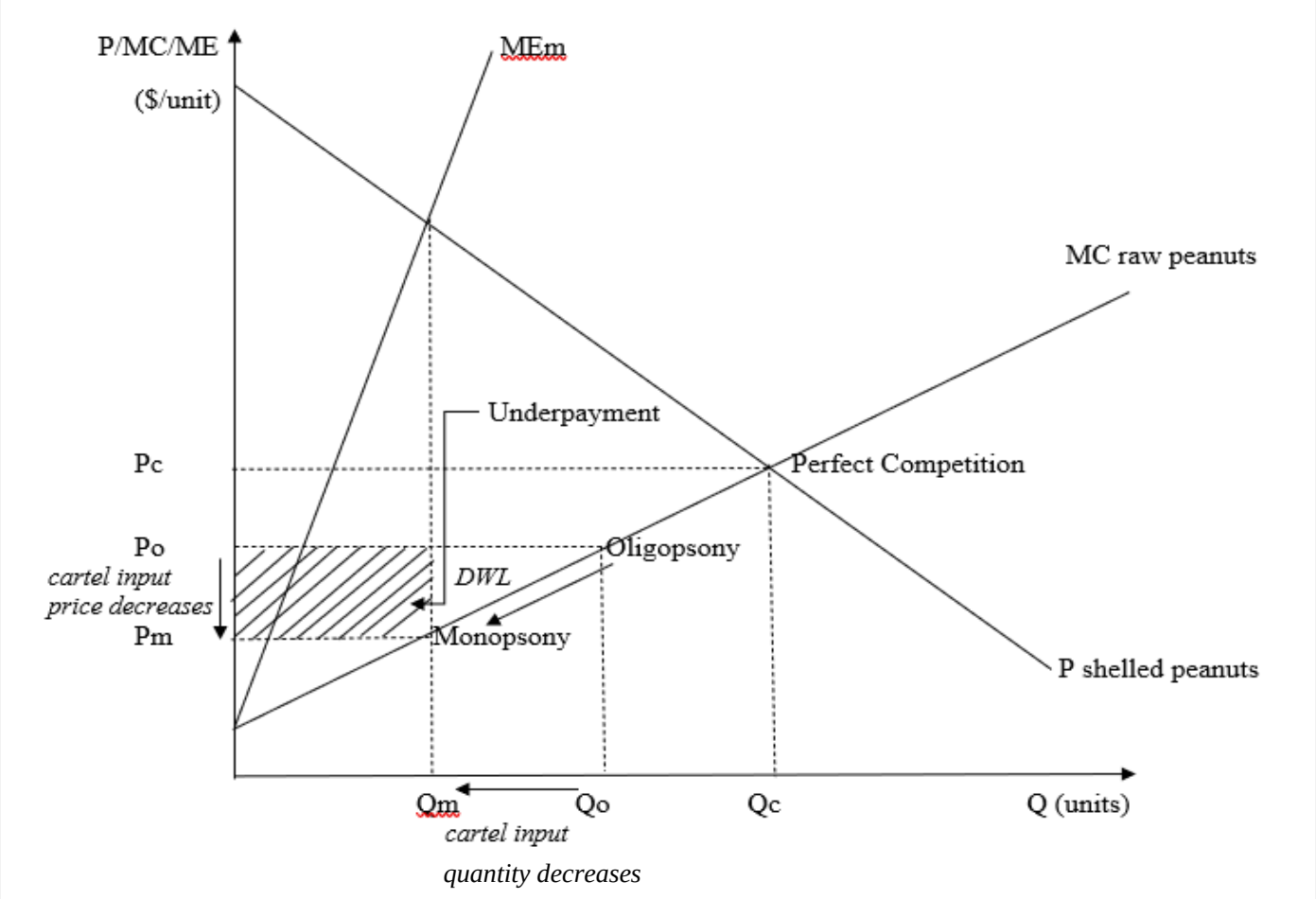

Figure 3: The U.S. Peanut Industry as a Classic Oligopsony: The Effects of Buyer Market Power of Peanut Shellers on Raw Peanut Quantities and Prices

Note: Raw peanuts are the input for peanut shellers.

[12] Monopsony maximizes its profit when it purchases the input quantity, which is at the intersection of Marginal Expenditures (MEm) and demand (P) curves on the graph. Given a linear supply (marginal cost) curve, MEm curve is twice as steep as the supply curve, and both curves have the same Y-axis intercept. Economic models of oligopsony and monopsony are explained in standard textbooks used in economics and agricultural economics programs (Besanko and Braeutigam 2002; Norwood and Lusk 2008).

4.2 The Peanut Industry Faces Peanut Oversupply

Based on the number of sellers (peanut growers) operating in the U.S. peanut industry, this industry has a perfectly competitive market structure. There are many peanut growers in the industry. The size of each farm is small as compared to the overall industry size. Peanut growers are price-takers, who individually cannot influence market prices. As in many agricultural industries, the peanut industry may periodically face agricultural oversupply due to the effects of agricultural production and price cycles (Kohls and Uhl 2002; Bolotova 2019).

Figure 4 depicts two scenarios for the peanut industry. The first one is a perfectly competitive industry scenario. The second one is a peanut oversupply scenario. The inverse demand curve (labeled as P) is a graphical representation of the inverse demand function for raw peanuts that peanut growers face. The marginal cost curve (labeled as MC) is a graphical representation of the marginal cost function of peanut growers. Raw peanuts are the *output* for peanut growers. Peanut shellers are buyers of this output. Peanut growers make decisions on the *output* quantity to produce. The *output* price they receive is a function of the *output* quantity they produce and sell.[13] Using the perspective of peanut growers, price-quantity combinations depicted in Figure 4 are *output* prices and *output* quantities.

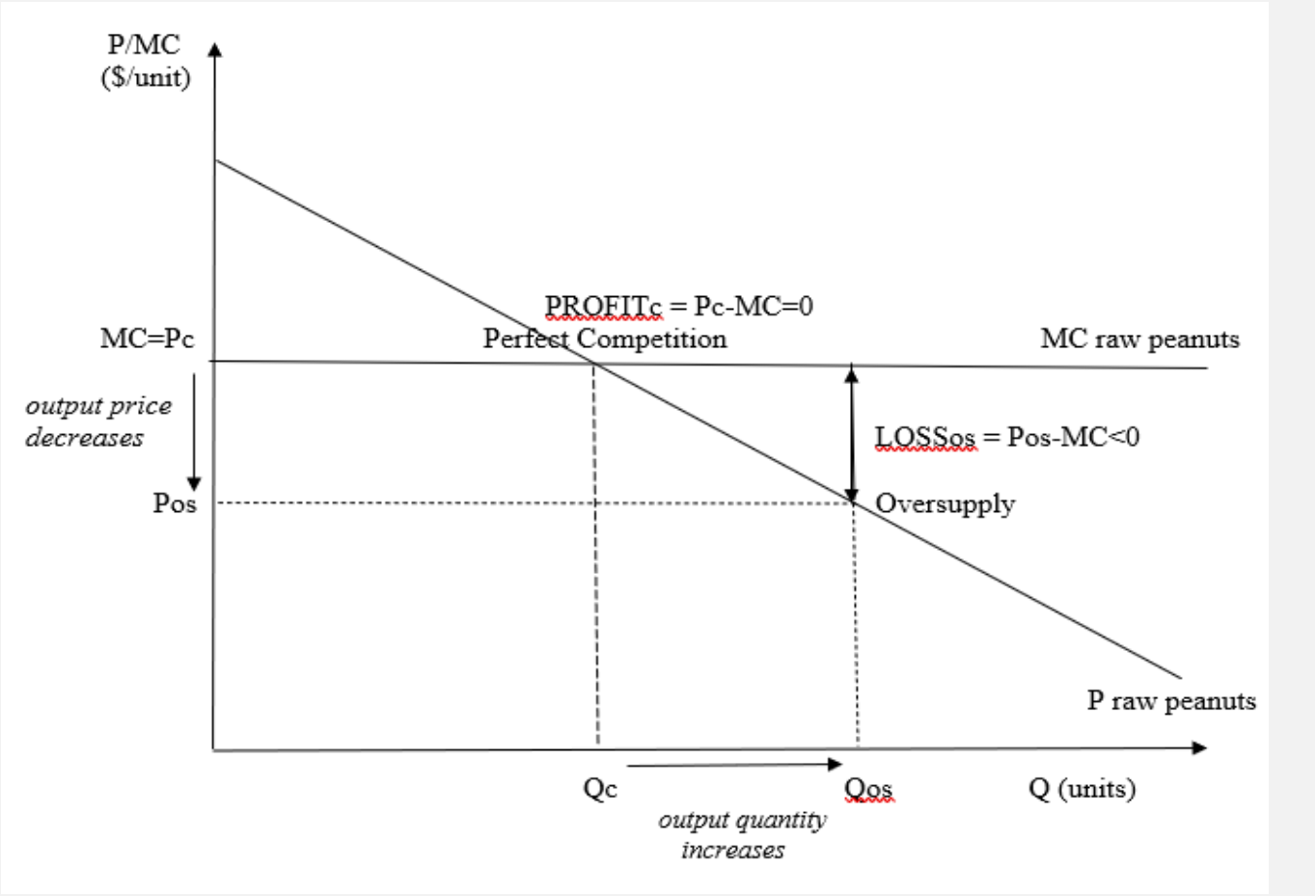

Figure 4: The U.S. Peanut Industry in Two Market Scenarios: Perfect Competition and Peanut Oversupply: The Oversupply Effect on Raw Peanut Quantity and Price

Note: Raw peanuts are the output for peanut growers.

[13] In this subsection, given that raw peanuts are the output, raw peanut price and quantity are related within the inverse demand framework. A decrease (increase) in output quantity causes output price to increase (decrease).

In a perfectly competitive industry scenario, peanut growers produce the *output* quantity (Qc) at which the *output* price (Pc) is equal to marginal cost (MC). The industry marginal profit (price-cost margin) is zero in this scenario (PROFITc = Pc – MC = 0). In a peanut oversupply scenario, peanut growers produce the *output* quantity (Qos), which is larger than the *output* quantity in a perfectly competitive industry scenario (Qc). The *output* price that peanut growers receive (Pos) is lower than the *output* price in a perfectly competitive industry scenario (Pc), and the industry marginal profit (price-cost margin) is negative (LOSSos = Pos – MC < 0). Peanut growers incur losses.

There are several reasons the peanut industry can periodically face peanut oversupply. First, the industry deregulation in 2002 (due to the marketing quota buyout program) led to an increase in peanut production (Dohlman and Livezey 2005; Dohlman, Foreman, and Da Pra 2009), which may have contributed to lower peanut prices received by peanut growers.

Second, agricultural production and price cycles periodically may lead to the years when agricultural industries experience oversupply (Kohls and Uhl 2002; Bolotova 2019). For example, in response to higher peanut prices received in the previous year, peanut growers would increase peanut area planted in the current year, which would increase total peanut quantity produced at harvest, and consequently decrease peanut prices and profit during the following marketing season (Bolotova 2019). Figure 5 depicts the relationship among the peanut production and price variables during the peanut production and marketing seasons. Third, the PLC program introduced in the 2014 Farm Bill may have increased incentives for peanut growers to increase peanut area planted, and consequently peanut production, to increase the amount of government payments they receive.

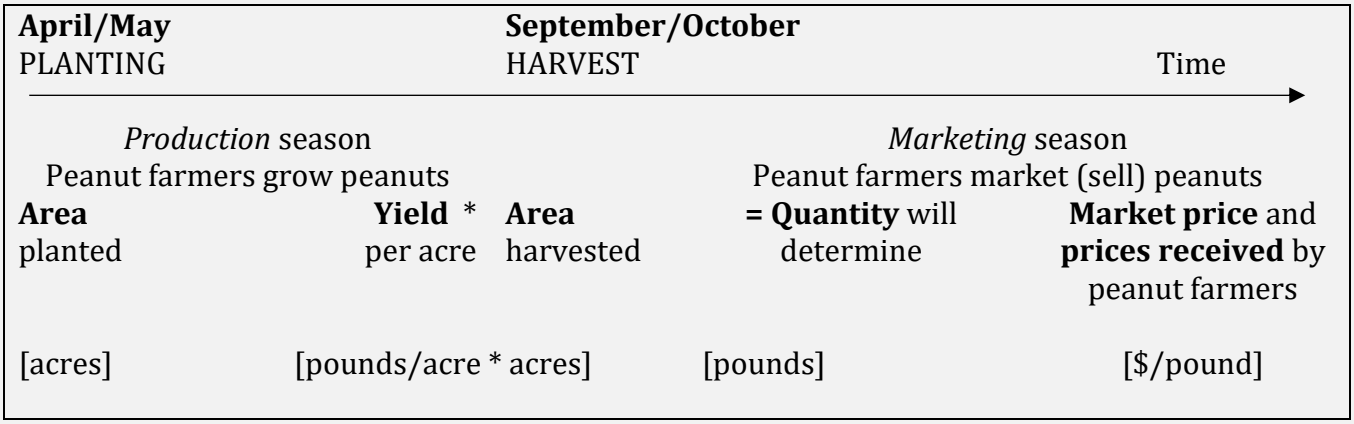

Figure 5: Peanut Production and Marketing Seasons: Peanut Quantity Produced and Price

In the oversupply scenario, peanut shellers as buyers of raw peanuts face the increased quantity of peanuts available in the market and consequently pay lower peanut prices. The peanut price peanut shellers pay is a function of the peanut quantity available in the market (raw peanut price and quantity are related within the inverse demand framework). The peanut shellers might exercise their buyer market power in the oversupply scenario by capitalizing on already decreasing peanut prices due to a peanut oversupply.

The alleged input price-fixing cartel of the peanut shellers might have further depressed peanut prices, while taking advantage of peanut production and price cycles. As it is stated in the complaint filed by peanut growers in the court, the three largest peanut shellers did perceive their market environment as the one with peanut oversupply ("In Re Peanut Farmers Antitrust Litigation" 2020). This is the reason they allegedly over-reported peanut inventory (they "increased" peanut quantity) and under-reported peanut prices (they "decreased" peanut prices) to the U.S. Department of Agriculture. Peanut growers

alleged that by doing this, peanut shellers created a false impression of peanut oversupply to offer artificially low prices to peanut growers.

5 Antitrust Issues

Section 1 of the Sherman Act (1890) prohibits contracts, combinations, and conspiracies in restraint of trade in interstate commerce. Price-fixing agreements (cartels or conspiracies) among competitors (firms selling or purchasing the same or similar products) are examples of the restraints of trade that are most damaging to the market. Price-fixing agreements aim to increase, decrease, or fix (stabilize) product prices, and can be verbal, written, or inferred from the conduct of firms (Federal Trade Commission 2022). The market effects of a typical *input* price-fixing cartel are a decrease in the product quantity purchased by the cartel members (buyers of the product), a decrease in the product price paid to the sellers of this product, a welfare transfer from the sellers to the buyers (underpayment), and a deadweight loss, due to which there are also sellers, who do not sell the product because of lower prices (Figure 3).

For violations of the Sherman Act, plaintiffs are entitled to recover treble damages under the Clayton Act (Hovenkamp 2005). The underpayment is the basis for damages in the *input* price-fixing cartel cases. The underpayment is the difference between the product (peanut) price actually received by sellers (peanut growers) and the product (peanut) price they would have received absent the cartel times the product (peanut) quantity sold. Plaintiffs (peanut growers) were entitled to recover three times the underpayment.

The peanut shellers settled the lawsuit with peanut growers at the end of 2020 and beginning of 2021. The monetary settlements included $7.75 million paid by Olam, $45 million paid by Golden Peanut, and $50 million paid by Birdsong ("In Re Peanut Farmers Antitrust Litigation" webpage 2022). While they agreed to pay monetary damages, the peanut shellers did not admit to any wrongdoing in their settlement agreements with peanut growers ("In Re Peanut Farmers Antitrust Litigation, Notice of Class Certification" 2022).

6 Discussion and Analytical Questions

The teaching note provides answers to all questions, additional guidance to selected questions, and multiple-choice questions that can be included in in-class assignments, quizzes, and exams.

1. Discuss the U.S. peanut industry: peanuts as a product (varieties, production regions, and uses), peanut growers, and peanut shellers. In addition to a relevant information presented in the case study, use data presented in Table 1 and data depicted in Figures 1 and 2 to develop your discussion.

2. Discuss government programs that currently affect the U.S. peanut industry.

3. Explain option contracts used by peanut shellers and peanut growers. In particular, explain the peanut pricing system included in these contracts.

4. Discuss the peanut industry conditions and conduct of the three largest peanut shellers that may have indicated a presence of the peanut price-fixing cartel.

5. Using a graphical analysis, explain conduct and performance of the peanut industry (changes in raw peanut quantities, prices, and industry profit) in the situations described in Questions 5.1–5.3. In the case of each question, draw and label relevant curves and depict relevant input (peanut) price-quantity combinations to complete the graphical analysis.

5.1. Assume that peanut shellers (buyers of raw peanuts) behave as a classic oligopsony forming an *input* price-fixing cartel. First, explain changes in raw peanut quantity, price, and industry profit in the oligopsony scenario, relative to a perfectly competitive industry scenario. Second, explain changes in raw peanut quantity, price, and industry profit in the monopsony scenario (i.e., *input* price-fixing cartel of peanut shellers), as compared to the oligopsony scenario.

5.2. Assume that in the original scenario the three largest peanut shellers act as a single monopsonist by operating an *input* (peanut) price-fixing cartel. Peanut growers discover the existence of this cartel and file an antitrust lawsuit against these peanut shellers. Assume that during the antitrust litigation period (the new scenario), the three largest peanut shellers stop coordinating (colluding) on peanut price (i.e., the price-fixing cartel collapses). Determine the type of market structure of the peanut industry in the period of antitrust litigation. Explain changes in raw peanut quantity, price, and industry profit in the antitrust litigation period, as compared to the original scenario of the price-fixing cartel.

5.3. Assume that in the original scenario the three largest peanut shellers act as a classic oligopsony. Assume that in the new scenario peanut growers organize several cooperatives that would be involved in peanut shelling. These cooperatives are competitors to the three largest peanut shellers. With the new entry of several cooperatives of peanut growers, the number of peanut shellers increases and the peanut shelling stage of the peanut supply chain becomes more competitive (less concentrated). Determine the type of market structure of the peanut industry in the new scenario. Explain changes in raw peanut quantity, price, and industry profit in the new scenario with the entry of cooperatives of peanut growers, as compared to the original scenario.

6. Using a graphical analysis, explain conduct and performance of the peanut industry (changes in raw peanut quantity, price, and industry profit) in the following situation. Assume that peanut growers (sellers of raw peanuts) face peanut oversupply. Explain changes in raw peanut quantity, price, and industry profit in the oversupply scenario, relative to a perfectly competitive industry scenario. Draw and label relevant curves and depict relevant *output* price-quantity combinations to complete the graphical analysis.

7. Perform an analytical analysis of the peanut price-quantity relationships and industry profitability for the two market scenarios depicted in Figure 4: a perfectly competitive industry scenario and a peanut oversupply scenario. To complete this analysis, use the following assumptions. The peanut inverse demand function is $P = 0.29 - 0.01Q$ (P is in $ per pound, and Q is in billion pounds), and the marginal cost of producing peanuts is $0.25 per pound. Marginal cost is the same in the two scenarios. Assume that the U.S. peanut industry produces the following total peanut quantity in these two market scenarios: 4 billion pounds and 7 billion pounds.

7.1. Using the peanut inverse demand equation, marginal cost, and quantities, calculate the following economic measures to complete a profitability analysis of the peanut industry. For each market scenario, calculate peanut price in $ per pound, total costs in $, total revenue in $, total profit in $, and price-cost margin (profit) measured in $ per pound and as a percentage of the peanut price (Lerner Index of market power). Classify each scenario as a peanut oversupply scenario or a perfectly competitive industry scenario.

7.2. Discuss the results of your analysis. First, draw a figure similar to Figure 4 of the case study to show the two analyzed market scenarios: show relevant curves, price-quantity combinations, and price-cost margins. Second, explain the patterns of peanut price-quantity relationships and industry profitability in the two scenarios. In which scenario(s) are peanut growers better off? In which scenario(s) are peanut growers worse off? In which scenario(s) are peanut buyers better off? In which scenario(s) are peanut buyers worse off? Explain your reasoning.

8. Evaluate the U.S. peanut industry dynamics in the period of 2008–2019 by analyzing data presented in Table A1, Figure A2, and Figure A3 included in the Appendix. Table A1 summarizes yearly data and descriptive statistics (averages and coefficients of variation) for peanut area, yield per acre, production, price, and value of production for the pre-cartel period (2008–2013) and the cartel period (2014–2019; U.S. Department of Agriculture, National Agricultural Statistics Service 2022a).[14] Calculate changes in averages and coefficients of variation in the cartel period, relative to the pre-cartel period, for the economic variables reported in Table A1 and record them in this table. Describe the results of your analysis. Are changes in peanut production and price in the cartel period, relative to the pre-cartel period, consistent with a classis oligopsony scenario or a peanut oversupply scenario? Explain your reasoning.

9. Evaluate profitability of the U.S. peanut industry and peanut growers in the period of 2008–2019 by analyzing data presented in Table A2 and Figure A4 included in the Appendix. Table A2 summarizes yearly data and descriptive statistics (averages) for the peanut industry's value of production, operating costs, total costs, and profit (U.S. Department of Agriculture, Economic Research Service 2022b). Calculate changes in averages in the cartel period, relative to the pre-cartel period, for the economic variables reported in Table A2 and record them in this table. Describe the results of your analysis. Are patterns of the peanut industry profitability consistent with a perfectly competitive industry scenario or a peanut oversupply scenario in the two analyzed periods? Explain your reasoning.

10. Familiarize yourself with the U.S. Department of Agriculture data sources used to collect economic variables presented in Tables A1 and A2 included in the Appendix. The teaching note provides additional guidance and weblinks to data sources.

10.1. Use the U.S. Department of Agriculture National Agricultural Statistics Service *Quick Stats* database to download peanut area planted and harvested, yield, production, price, and value of production presented in Table A1.

10.2. Use the U.S. Department of Agriculture Economic Research Service *Commodity Costs and Returns* portal to download costs and returns data for peanuts presented in Table A2.

11. Discuss legal (antitrust) issues related to the conduct of peanut shellers described in this case study. Explain the outcomes of the Peanut Farmers Antitrust Litigation.

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[14] The Notice of Class Certification states the period of alleged cartel as January 2014 to December 2019 ("In Re Peanut Farmers Antitrust Litigation, Notice of Class Certification" 2022). Therefore, in the empirical analysis presented in the case study, the cartel period is 2014–2019. The pre-cartel period is 2008–2013. The length of the pre-cartel period is chosen such that it is equal to the length of the cartel period (6 years).

Appendix

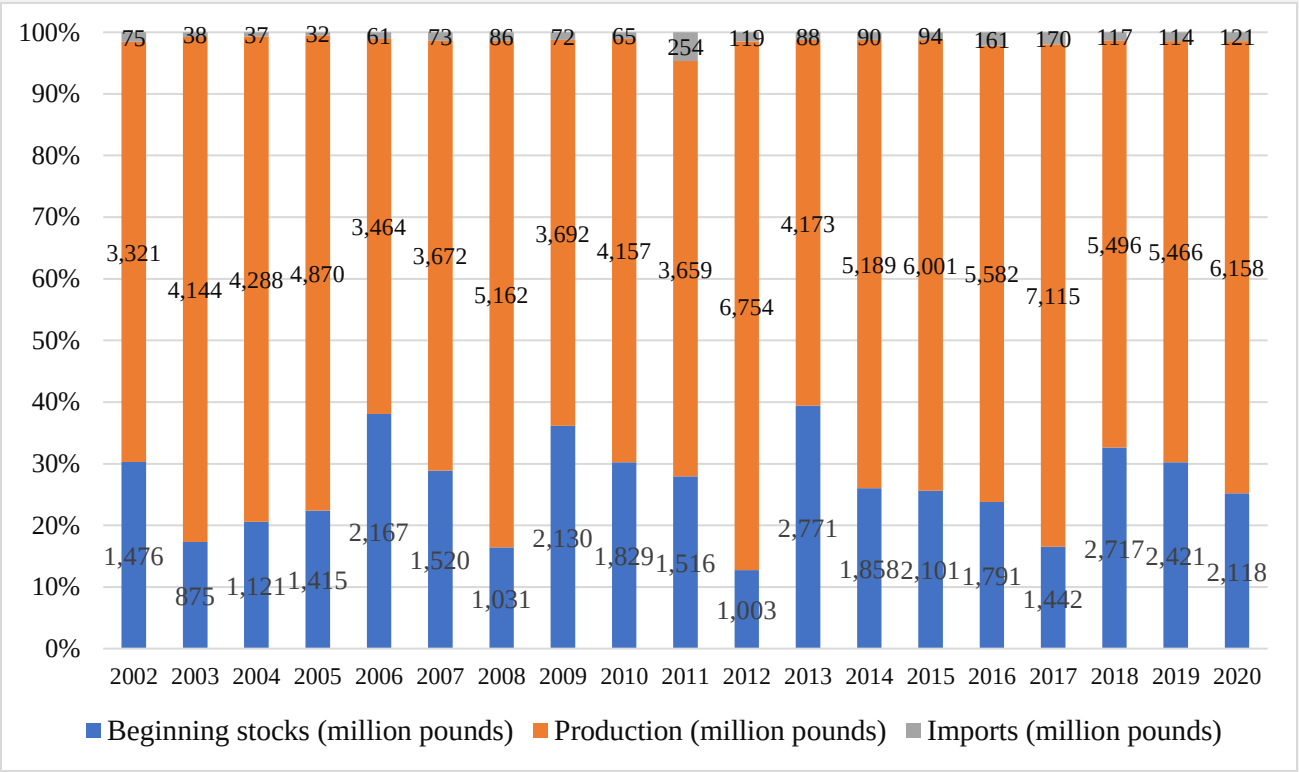

Figure A1: The U.S. Peanut Industry: Supply, 2002–2020

Data Source: U.S. Department of Agriculture, Economic Research Service (2022a)

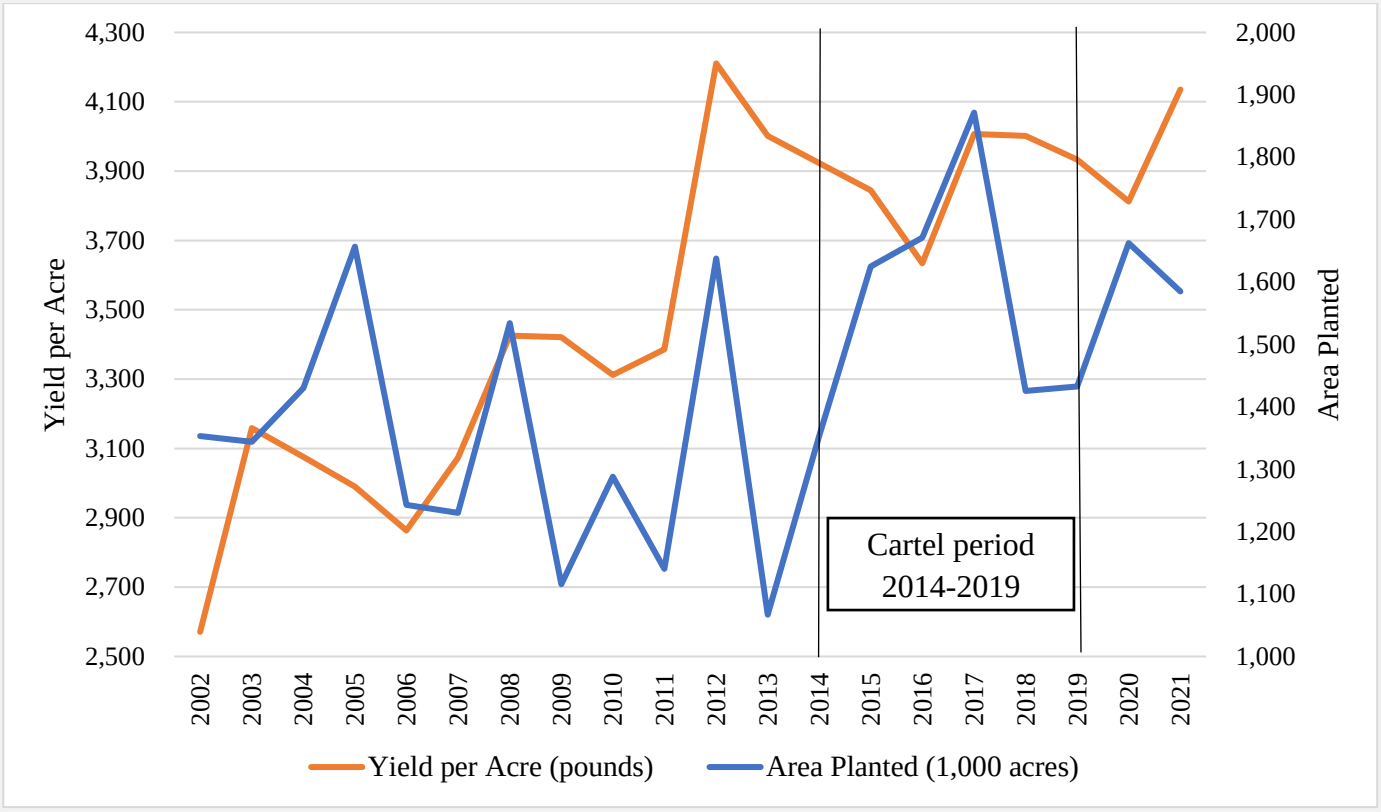

Figure A2: The U.S. Peanut Industry: Area Planted and Yield per Acre, 2002–2021

Data Source: U.S. Department of Agriculture, Economic Research Service (2022a)

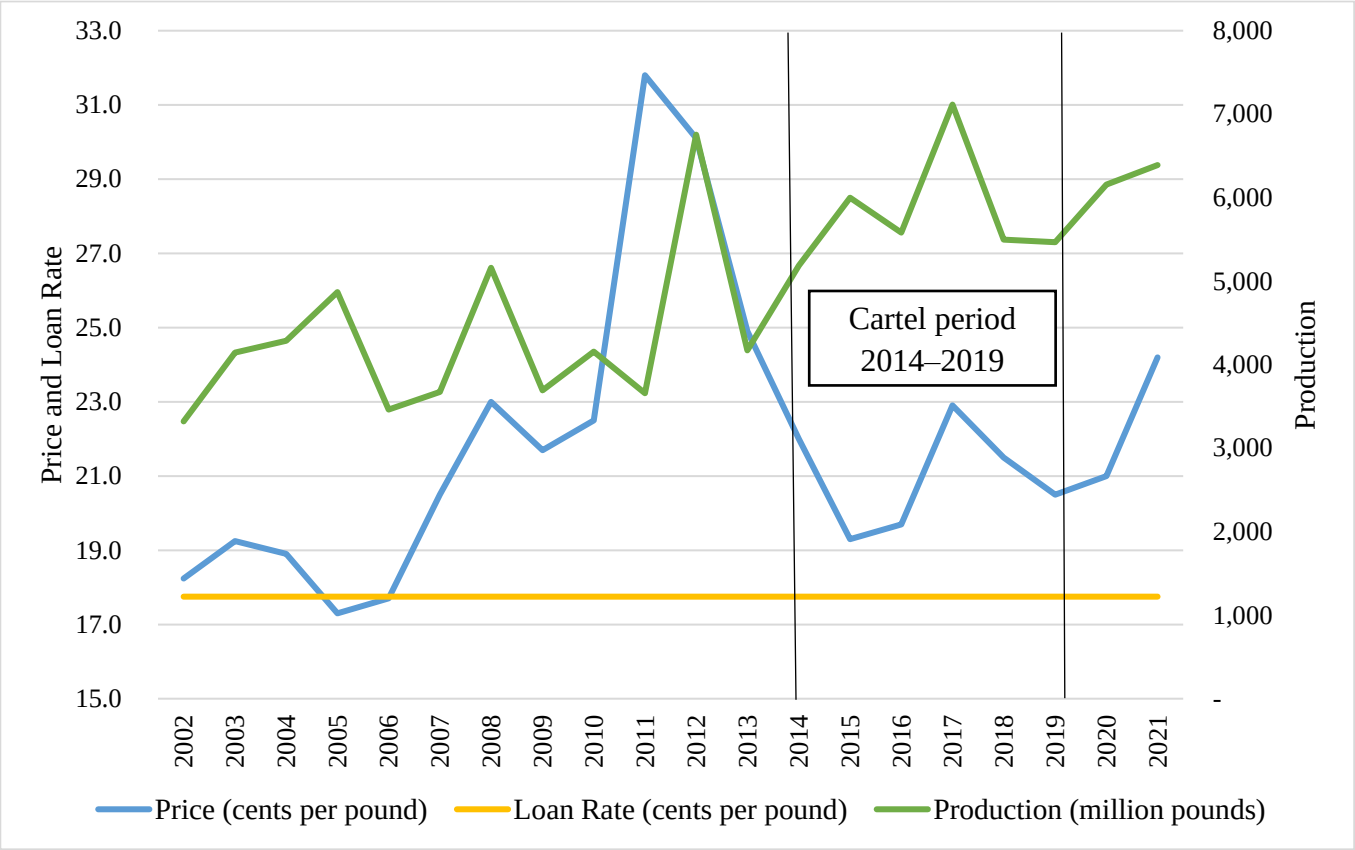

Figure A3: The U.S. Peanut Industry: Production, Prices, and Marketing Assistance Loan Rate, 2002–2021

Data Source: U.S. Department of Agriculture, Economic Research Service (2022a)

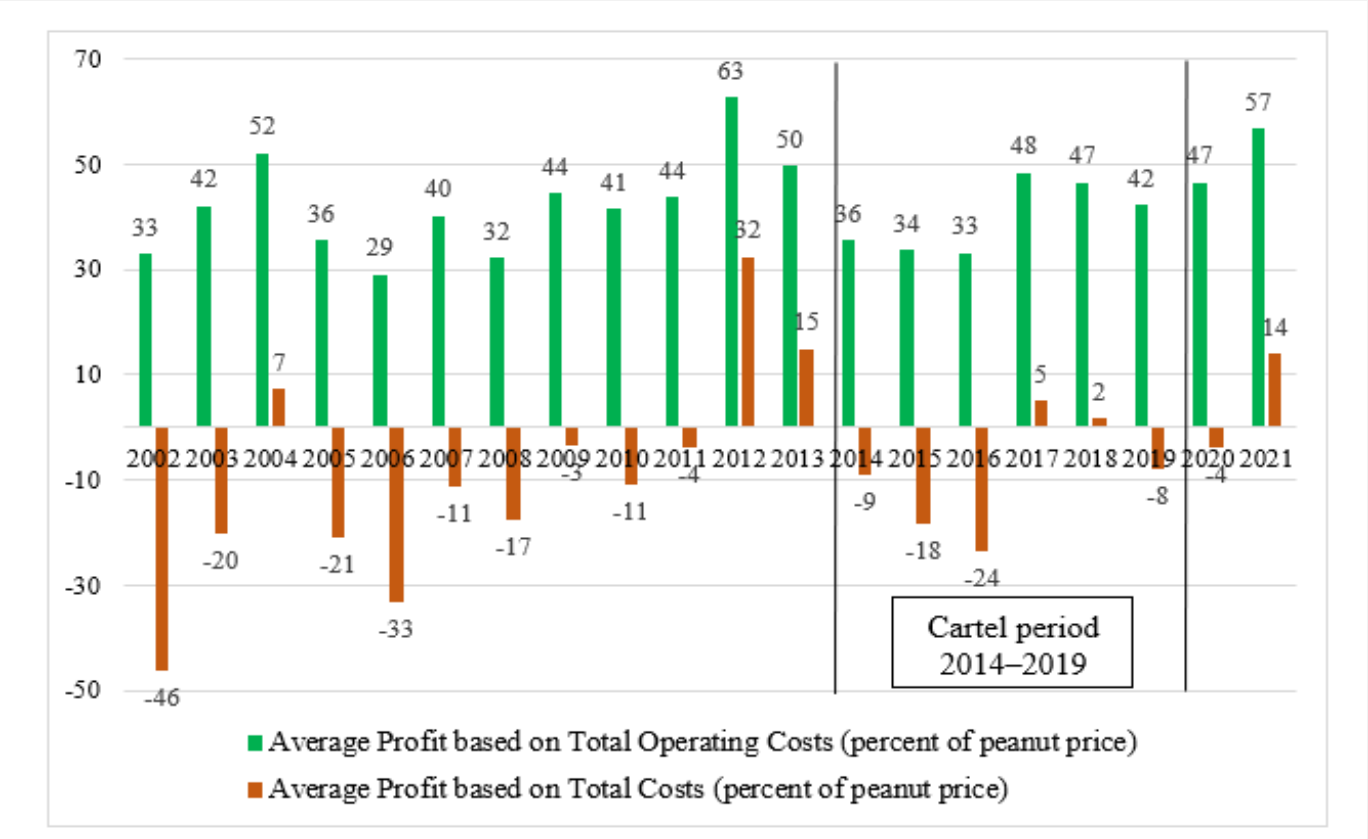

Figure A4: The U.S. Peanut Industry Profitability, 2002–2021

Data Source: U.S. Department of Agriculture, Economic Research Service (2022b)
Note: The profit measures depicted in this figure are calculated by the author using data presented in Table A2.

Table A1: The U.S. Peanut Industry: Area Planted, Area Harvested, Yield per Acre, Production, Prices, and Value of Production, 2008–2019

Year	Area planted	Area harvested	Yield per acre	Production	Price	Value of production
	Million acres	Million acres	Pounds	Billion pounds	$ per pound	$ billion
Pre-cartel period: 2008–2013						
2008	1.534	1.507	3,426	5.162	0.230	1.194
2009	1.116	1.079	3,421	3.692	0.217	0.793
2010	1.288	1.255	3,312	4.157	0.225	0.939
2011	1.141	1.081	3,386	3.659	0.318	1.169
2012	1.638	1.604	4,211	6.754	0.301	2.026
2013	1.067	1.043	4,001	4.173	0.249	1.055
Average	**1.297**	**1.261**	**3,626**	**4.599**	**0.257**	**1.196**
CV	**0.18**	**0.19**	**0.10**	**0.26**	**0.17**	**0.36**
Cartel period: 2014–2019						
2014	1.354	1.323	3,923	5.189	0.220	1.158
2015	1.625	1.561	3,845	6.001	0.193	1.161
2016	1.671	1.536	3,634	5.582	0.197	1.088
2017	1.872	1.776	4,007	7.115	0.229	1.634
2018	1.426	1.374	4,001	5.496	0.215	1.176
2019	1.433	1.390	3,934	5.466	0.205	1.131
Average	**1.563**	**1.493**	**3,891**	**5.808**	**0.210**	**1.225**
CV	**0.12**	**0.11**	**0.04**	**0.12**	**0.07**	**0.17**
Change in cartel period, relative to pre-cartel period						
Average (units)	____	____	____	____	____	____
Average (percent)	____	____	____	____	____	____
CV	____	____	____	____	____	____
CV (percent)	____	____	____	____	____	____

Data Source: U.S. Department of Agriculture, Economic Research Service (2022a)
Note 1: Production is determined by area harvested and yield per acre (Figure 5). Value of production is determined by production and price.
Note 2: The area harvested may be smaller than the area planted due to crop failure (because of weather, insects, and diseases), lack of labor, low market prices, or other factors (U.S. Department of Agriculture, Economic Research Service 2019).

Table A2: The U.S. Peanut Industry: Value of Production, Costs, and Profitability, 2008–2019

Year	Value of production	Operating costs (OC)	Total costs (TC)	Total profit based on OC	Total profit based on TC	Yield	Average profit based on OC	Average profit based on TC
	$ per acre					pounds per acre	$ per pound	
Pre-cartel period: 2008–2013								
2008	748.17	516.80	874.00	231.37	-125.83	3,602	0.06	-0.03
2009	814.89	462.05	842.58	352.84	-27.69	3,606	0.10	-0.01
2010	764.50	458.74	845.27	305.76	-80.77	3,512	0.09	-0.02
2011	917.80	526.14	950.51	391.66	-32.71	3,202	0.12	-0.01
2012	1,451.49	559.66	991.01	891.83	460.48	4,177	0.21	0.11
2013	1,102.26	564.34	940.70	537.92	161.56	4,164	0.13	0.04
Average	**966.52**	**514.62**	**907.35**	**451.90**	**59.17**	**3,711**	**0.12**	**0.01**
Cartel period: 2014–2019								
2014	867.12	564.01	944.69	303.11	-77.57	4,046	0.07	-0.02
2015	762.70	510.21	899.80	252.49	-137.10	3,930	0.06	-0.03
2016	713.74	482.07	878.62	231.67	-164.88	3,499	0.07	-0.05
2017	934.49	489.52	887.68	444.97	46.81	3,993	0.11	0.01
2018	917.44	498.60	902.99	418.84	14.45	4,085	0.10	0.00
2019	864.43	505.38	932.82	359.05	-68.39	4,035	0.09	-0.02
Average	**843.32**	**508.30**	**907.77**	**335.02**	**-64.45**	**3,931**	**0.08**	**-0.02**
Change in cartel period, relative to pre-cartel period								
Average (units)	_____	_____	_____	_____	_____	_____	___	___
Average (percent)	_____	_____	_____	_____	_____	_____	___	___

Data Source for costs, value of production, and yield: U.S. Department of Agriculture, Economic Research Service (2022b). The profit measures are calculated by the author.

Note: Total profit is the value of production less a relevant cost measure. Average profit is total profit divided by yield per acre. Total operating costs include costs associated with purchasing variable inputs, such as seeds, fertilizers, agricultural chemicals, repairs, drying, etc. Total costs include total operating costs and allocated overhead. The allocated overhead includes costs associated with purchasing or renting fixed inputs (machinery, equipment, and land), costs of labor, taxes and insurance, etc.

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