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Something's Fishy: A Lesson on Market Structure and Collusion in the Canned Tuna Market

This lesson uses a real-world example of price-fixing with a product that almost all students are familiar with to demonstrate the effects of market concentration and collusion. From 2006 to 2016, all three major canned tuna producers agreed to raise prices while hiding the price increase by decreasing the size of the containers. In this lesson, two suppliers sell packets of Swedish fish. Two rounds of play – one that is competitive and one in which the tuna sellers are allowed to collude – provide a powerful demonstration of the effects of high market concentration.

Tom Flesher[†]

† Suffolk County Community College

1. Introduction

This paper describes an activity designed to teach students about market power. It leverages a real-world situation – collusion and price-fixing in the market for canned tuna – to help students understand issues related to market power, duopoly, and antitrust. Using a good that almost all students will be familiar with and a compelling story about the behavior of corporations, this activity helps students understand how market power and collusion can affect consumers.

Buyers purchase using play money in $1 denominations. Sellers sell packets of Swedish Fish, representing tuna. One round is played with the sellers competing. After a debrief, the sellers are allowed to collude, and the second round is played. Students can observe market dynamics and discuss how market power and collusion impact the consumer experience.

2. Literature Review

There is a wealth of information on the use of active learning in the economics classroom. While "chalk and talk" is still the predominant method (see, e.g., Asarta et al., 2021; Becker & Watts, 2001), instructors are developing alternative methods to help students retain information. Activities are often designed to mimic real-world events. For example, Christoffersen (2002) introduced a first-day activity in which students allocate a candy bar, and Simkins (1999) asked students to simulate Federal Open Market Committee meetings or electronic trading markets. More stylized activities are successful in the classroom. Economists, for example, have demonstrated a fondness for using paper airplanes as the basis of active learning (see, e.g., Trudeau, 2025; Geerling, Mateer, & O'Roark, 2019). Training students to think like economists is one key feature of the active learning process (Sankaran et al., 2016). Simulations, such as the activity described in this article, are a popular method facilitate active and collaborative learning in the economics classroom (Schmidt, 2003).

Active learning is less common in law and economics courses, although its use has been studied (e.g., Carlson and Skaggs, 2000). Although market structure and antitrust laws touch on legal topics, they are appropriate for inclusion in a Principles of Microeconomics or one-semester survey course.

3. Factual Background and Economic Issues

Thai Union, which owns the tuna brand Chicken of the Sea, announced in late 2014 that it had agreed to purchase Bumble Bee Seafoods, another major producer of tuna. Over the next year, Thai Union abandoned the merger, and the US Department of Justice filed criminal charges citing a "conspiracy to fix, raise, and maintain the prices" of canned tuna. Although StarKist, the third major producer, was not a party to the merger, both StarKist and Bumble Bee admitted to a price-fixing conspiracy. The CEO of Bumble Bee pleaded not guilty and was found guilty at trial, serving prison time and paying a fine of $100,000. Five other executives made plea deals (Kim et al., 2022).

In addition to the criminal charges filed by the Department of Justice, the tuna suppliers were sued under various federal and state antitrust laws by three classes of plaintiffs: direct purchasers (such as grocery stores), indirect purchasers of bulk tuna products (such as hospitals and restaurants), and individual end purchasers (households) (Olean Wholesale Grocery Coop. v. Bumble Bee Foods, 2022). Plaintiffs alleged that the tuna producers coordinated price increases and smaller can sizes, agreed to limit the frequency of promotional sales, and agreed not to offer products branded as FAD-free. A fish-aggregating device, or FAD, attracts schools of tuna but increases bycatch. A FAD-free product would be considered safer by consumers, so

one producer offering such a product would increase the pressure on the other producers to sell this costlier product (Kim et al., 2022).

This price-fixing agreement flags numerous issues relevant to a Principles of Microeconomics course. Since tuna is a commodity good, all brands of tuna can be treated as perfect substitutes for each other. Consequently, if there are many sellers, the tuna market would be perfectly competitive. However, the market is concentrated in three major producers, with a Herfindahl-Hirschman Index (HHI) ranging from 2601 to 2955 between 2006 and 2016. The market is therefore an oligopoly and is amenable to collusion.[1]

4. The Activity

For simplicity, this activity uses two, rather than three, types of purchasers: hospitals (representing indirect purchasers) and consumers (representing individual end purchasers). This provides sufficient variation to demonstrate the elasticity effects incorporated into the lesson without becoming overly complicated. Direct purchasers (i.e., retailers) are not included in this lesson because to include them meaningfully, the activity would need to allow the direct purchasers to resell to the households. This would add complication and potential for confusion that are not justified given the limited additional learning.

This lesson was designed for a class of about 30 to 50 students. For a larger classroom, use a subset of students or increase the number of each type of player proportionally. The appendix includes character sheets explaining each type of player, including tuna sellers, hospitals, and consumers. Prepare two tuna seller sheets, three to five hospital sheets, and enough consumer sheets to ensure everyone in the class can participate. Bring a large quantity of small, uniform prizes – this lesson canonically uses small packets of Swedish Fish candy because of their passing resemblance to tuna and low price. Since there are incentives for Hospital players to make more than one purchase, bring an abundance of Swedish fish, at least three packs for each student in class.

The provided sheets are designed to assist with keeping track of the activity and with providing participation credit. In the class for which this lesson was designed, activities are scored on a 20-point scale, with most students expected to score the full 20 or very close to it. Given that, this activity is designed to allow each player to score up to 20 points (and in some cases more). This is to reward participation, which is essential for the market to function in a way that mimics the real world. While not all instructors provide participation points, this activity works best when there is an incentive linked directly to sales and purchases; instructors are, of course, encouraged to adjust the activity to fit their class.

A. Goals of the Lesson

This lesson addresses several learning standards, including the idea of scarcity, markets, and competition. These concepts appear in the learning standards of several states as well as the core learning objectives of most courses in Principles of Microeconomics. Beyond addressing learning standards, the lesson allows students to step into the role of producer; this is valuable because many students' experience is almost entirely on the demand side of purchasing. It is also valuable to have students act as sellers so that students do not feel as though the instructor is "rigging" the game to teach a particular lesson. Allowing students to act as sellers helps all students in the class understand that price-fixing and profit-seeking can

[1] For an in-depth analysis of the legal issues in this case, including a source for a potentially fruitful discussion about the confusion caused by regression models used in litigation, see Flesher, Variable Standards: How Many Uninjured Class Members Are Acceptable?, Touro Law Review, 40, 287-313.

be a rational choice, rather than simply being driven by "corporate greed." Even students who act as buyers can observe that their classmates are acting in their rational self-interest. Finally, students appreciate the snacks.

B. Gameplay and Players

The lesson involves buyers using play money to purchase Swedish Fish from sellers. Buyers negotiate a price for each packet of fish they purchase. In the lesson as designed, students receive credit based on their success as buyers or sellers. Sellers have an incentive to charge higher prices, while buyers have an incentive to negotiate lower prices. These incentives are explained on the character sheets included in the appendix. Buyers can observe other sales to get an idea of current prices and inform their decisions.

The game has two rounds. In each round, households and hospitals can purchase tuna from the tuna sellers. The supply of tuna is unlimited, so there are no production decisions to be made by the tuna sellers.

Students remain in their roles for both rounds. Select two students to be tuna sellers – ideally, choose students who are in very different places in the classroom, such as at the front left and front right corners, so that no explicit collusion can occur before the first round of sales. Since students may attempt to collude anyway, it is useful to assign these students their roles last. Select three students to play the role of hospitals. Since there is no strategic interaction between hospitals, you can randomly select them. The remaining students play as households.

I. Tuna Sellers

Students playing as tuna sellers begin the game with a supply of Swedish Fish. Tell them they will be selling to their classmates. They can take as many as they need, and this is not a strategic decision – they should have the supplies to sell as many fish as they are able, so provide additional fish as needed. Under the 20-point structure described above, tuna sellers will receive one point for each dollar they earn through sales; this mimics the profit-seeking behavior of firms in the real world. It encourages tuna sellers to maximize profit by optimizing the quantity, price, and distribution of sales to both hospital players and household players. Tuna sellers may earn fewer points than they had hoped in the first round due to competition, but will likely earn significantly more points in the second round, given the opportunity for increasing prices after collusion.

II. Hospitals

Students playing the role of hospitals begin each round with $10 in play money and earn ten points for participating, five points for the first purchase they make in each round, and a bonus point for each additional purchase they make. This set of incentives is designed to model the behavior of institutional purchasers, who do not resell the goods they purchase. Hospitals, for example, must feed patients. The number of points a hospital player can earn is limited by the price charged by the tuna seller players, so there is an incentive to negotiate with sellers to optimize costs. Regardless of the price charged, hospital players are likely to earn the full 20 points as long as they participate fully in the activity.

III. Households

Students playing as households begin each round with $5 in play money and earn ten points for participating, five points for the first purchase they make in each round, and a bonus point for each dollar returned to the instructor. This models the budget constraint and savings

decisions made by individuals, who must save money to pay other household expenses. Again, regardless of the price charged, students playing as households are likely to earn the full 20 points as long as they participate fully in the activity.

C. Gameplay: Round One

Before class, prepare copies of the sheets provided in the appendix – print two tuna sellers, three hospitals, and enough households for the balance of the class. Also, print a copy of the debrief worksheet for each student. This activity also requires a large supply of Swedish Fish or other small prizes (about three prizes per student) and play money in $1 denominations. Each buyer begins, depending on role, with either $5 or $10 in play money.

Distribute character sheets to each student according to the role assigned. Give the students about five minutes to make transactions, but do not adhere too tightly to the time limit. Encourage students to price-check with both sellers to ensure they get the best deal. However, discourage tuna sellers from engaging in extended negotiations with individual buyers: if negotiations seem to be protracted, remind buyers that they can check with the other seller for a better deal. Throughout, remind students to keep track of their transactions so they can receive credit. After about five minutes, confirm that students have made the transactions they want and then close the market.

D. Tuna Sellers

Students playing as tuna sellers begin the game with a supply of Swedish Fish. Tell them they will be selling to their classmates. They can take as many as they need, and this is not a strategic decision – they should have the supplies to sell as many fish as they are able, so provide additional fish as needed. Under the 20-point structure described above, tuna sellers will receive one point for each dollar they earn through sales; this mimics the profit-seeking behavior of firms in the real world. It encourages tuna sellers to maximize profit by optimizing the quantity, price, and distribution of sales to both hospital players and household players. Tuna sellers may earn fewer points than they hope in the first round due to competition, but will likely earn significantly more points in the second round due to increased prices following the opportunity for collusion.

E. Hospitals

Students playing the role of hospitals begin each round with $10 in play money and earn ten points for participating, five points for the first purchase they make in each round, and a bonus point for each additional purchase they make. This set of incentives is designed to model the behavior of institutional purchasers, who do not resell the goods they purchase. Hospitals, for example, must feed patients. The number of points a hospital player can earn is limited by the price charged by the tuna seller players, so there is an incentive to negotiate with sellers to optimize costs. Regardless of the price charged, hospital players are likely to earn the full 20 points as long as they participate fully in the activity.

F. Households

Students playing as households begin each round with $5 in play money and earn ten points for participating, five points for the first purchase they make in each round, and a bonus point for each dollar returned to the instructor. This models the budget constraint and savings decisions made by individuals, who must save money in order to pay other household expenses. Again, regardless of the price charged, students playing as households are likely to earn the full 20 points as long as they participate fully in the activity.

G. Interlude

Between rounds, ask students to share the prices they paid in each role. Make a note of this. Generally, expect prices to be close to $1 or $2. Using play money will limit the granularity of prices. Due to the limited time available for sales and the imbalance in negotiation skills, you may find some students pay higher prices than others, but in general, prices will be fairly low because there is an alternative seller available. If applicable, ask about tacit collusion – did the sellers attempt to communicate at all? Did they charge wildly varying prices? Did players flock to one seller who offered better prices until the other seller realized that they could follow the first player's lead, for example?

After a short debrief, call the two tuna sellers to the front of the classroom and ask if they would like to discuss their prices. Offer to send them into the hallway, or another semiprivate space, for a few moments to agree on the price they will charge. They will likely settle on a higher price. While it is useful to have the tuna sellers negotiate their agreement in front of the class, students have sometimes been reluctant to do so. Offering to let them discuss privately encourages collusion and models the real situation on which this game is based: the price-fixing agreement in the canned tuna market was illegal and made secretly. After round two, ask the sellers to describe their agreement.

H. Gameplay: Round Two

When the tuna sellers finish their discussion, ask them to take their seats and reopen the market. Give students about five minutes to make transactions. Allow the market to clear. Feel free to encourage the students to negotiate, but expect prices to remain relatively high until the very end of the negotiation period. At that point, a few holdouts are likely to get low prices, if the class is large enough. During the debrief, students may liken this to clearance sales.

There are two possibilities. Initially, the tuna sellers adhere to their initial agreement, acting as a duopoly and likely charging a price of $5. (A price higher than $5 means that households would be unable to afford any purchases, and the large number of students relative to the small number of tuna sellers means that the lack of alternatives for buyers will drive the price toward the $5 cap.) In this case, you can review the duopolists' behavior – they are optimizing their profit by acting like a monopoly. Elicit that they have zero marginal cost because Swedish Fish are freely provided by the instructor. However, they control the price because they have market power.

Households have an incentive to save money, so they face a fairly elastic demand curve compared to hospitals. In this game, households have an incentive to save money but not to make multiple purchases, so their decision about which seller to purchase from will be driven largely by price.

Unlike households, hospitals' goal is to maximize the quantity purchased. However, the strong incentives on the part of the tuna sellers – one point per dollar returned – encourage them to push the price upward.

Alternatively, the sellers may make an agreement and break it when sales begin. In this case, the price is likely to fall toward the $1 minimum. If this happens, ask the students during the debrief step why the collusion was ineffective.

Regardless of which outcome occurs, ask the sellers to describe their agreement during the debrief step described below.

V. Debrief and Takeaways

The debrief activity asks students to review the determinants of elasticity as well and apply this knowledge to the game. Although elasticity is not the key learning objective of this lesson, reviewing it during the lesson provides the benefits of a spiral curriculum and spaced repetition (e.g., Gibbs, 2014). It also helps the students recall key material in courses with comprehensive final exams.

The debrief will emphasize whether either type of buyer paid a higher price and, if so, who. Generally, both buyers will pay $5 in the second round, but hospitals will pay a higher price in the first round due to their relatively less elastic demand.

Although it may seem obvious, ask students to recognize that the collusion before round two benefits the sellers of goods, at least initially. This is an opportunity to question the students who played tuna sellers: why did they raise their prices (if they did)? Why did they cooperate? Or, alternatively, why did one of them defect?

VI. Practice

The use of the closing activity will depend on whether the class has learned, or will learn, Nash equilibrium in simultaneous-move games. In the course for which this activity was designed, closing activities are used as exit tickets and as a way to introduce new material before it is taught formally. With this activity, the goal is to introduce students to payoff matrices and the concept of Nash equilibrium.

Briefly introduce the payoff matrix by identifying the firms' choices ("Charge $5" and "Charge $1") as simplified versions of possible strategies: the choice to cooperate and charge a higher, monopoly price or to defect and charge a lower, competitive price. If appropriate, introduce the concept of dominant strategies: given the incentives as listed, charging a low price is always the best response, regardless of the opponent's decision. Ask students to observe that if the firms can work together by agreeing to charge a high price, they can both make a higher profit than in the equilibrium outcome; that this is a higher total profit than the equilibrium outcome; and that there is, nonetheless, still an incentive to defect. At this point, the instructor can explain or review the general concept of the Prisoner's Dilemma or introduce the idea of repeated games. Students should observe that the real-world scenario on which this lesson was based was a repeated game and that the cooperative monopoly outcome was sustained, likely due to the mutual trust of the producers.

VII. Conclusion

This activity allows students to move around the classroom and negotiate while also demonstrating market principles. The activity reinforces students' understanding of market power and gives an example of collusion in the real world using a good that almost all of them are familiar with. It can be run in a single class period during a unit on market structure or even as a pop-up lesson late in the semester.

While the activity was designed for a course that uses scored participation, and the incentives are aligned with earning points toward a final grade, providing students with small prizes (Swedish Fish in this lesson) can be incentive enough for instructors who grade differently. Regardless of the incentives used, the act of participating in a market facilitates students' understanding of market power.

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LESSON PLAN FOR "SOMETHING'S FISHY"

OBJECTIVE: Students will be able to explain the likely effects of market concentration with and without collusion.

MATERIALS: A large quantity of individual packs of Swedish Fish candy (about three per student); play money in $1 denominations ($5 for households and $10 for hospitals).

DO NOW: As students enter the room, ask each one to write on an index card whether they eat canned tuna and the name of a brand of canned tuna they consume.

INTRODUCTION: (5 minutes) Make any announcements; collect index cards and go over the students' answers in discussion. Note that there are three major brands of canned tuna: Starkist, Chicken of the Sea, and Bumble Bee.

DIRECT INSTRUCTION: (10 minutes) Maintain a brisk pace, as this lesson connects several topics: the price-elasticity of demand, pass-through, strategic interaction, and market structure. Review the four determinants of elasticity (number of substitutes, necessity vs. luxury, budget share, and time horizon). Ask the students for the conditions for perfect competition (commodity goods, many buyers and sellers, and free entry). Discuss the tuna market. Students should reach the conclusion that the tuna market is an oligopoly due to a limited number of sellers (probably due to the high fixed cost of entering the market).

EXPLAIN THE ACTIVITY: (5 minutes) Explain that the students will be taking the roles of households, hospitals, and tuna sellers. Distribute the character sheets and materials. Answer any questions the students might have.

ROUND ONE: (15 minutes) Instruct households to spend up to $5 and hospitals to spend up to $10 this round. Open the market and allow students to visit both sellers to find the best price.

INTERLUDE: (5 minutes) Discuss the results – what price was paid? Did it vary between households and hospitals?

ROUND TWO: (15 minutes) After allowing the tuna sellers to collude, reopen the market. The price is likely to rise, but keep an eye on the sellers and the prices they are charging to highlight any interesting examples of market behavior.

DEBRIEF: (10 minutes) Distribute the Debrief handout. Give the students a few minutes to think about the questions and answer them.

PRACTICE: (15 minutes) Distribute the Nash Equilibrium handout. Depending on students' level of prior engagement with this material, either give them a few minutes to complete it or work through it as a class. This handout can be used to review the Nash equilibrium or to introduce the concept. If the main activity runs longer than expected, this activity can be shortened or cut.

NAME:_____

YOU are a # CONSUMER

When I say so, come get # 5 $1 BILLS

Your Rewards:

- **10 points just for participating**
- **5 points if you make a purchase in round 1**
- **5 points if you make a purchase in round 2**
- **1 bonus point for every dollar you return to me (up to 5)**

_____ Price Paid in round 1 (if no purchase, write 0)

_____ Price Paid in round 2 (if no purchase, write 0)

I am returning $_____

NAME:_____

YOU are a # HOSPITAL

When I say so, come get # 10 $1 BILLS

Your Rewards:

- **10 points just for participating**
- **5 points if you make a purchase in round 1**
- **5 points if you make a purchase in round 2**
- **1 bonus point for every purchase you make beyond the first in each round**

I made _____ purchases in round 1

I made _____ purchases in round 2

I am returning $_____

NAME:_____

YOU SELL TUNA

When I say so, come get TUNA

(The tuna looks like Swedish Fish.)

You can get more later.

Your Rewards:

- **1 point for every dollar you return to me (no limit), as long as you tally your sales**
- **That's it, that's the reward**

I am returning $_____

Round	Price Charged to Consumers	Sales to Consumers	Price Charged to Hospitals	Sales to Hospitals
1				
2				

NAME:_____

Tuna lesson debrief

Remind me, what are the four factors that determine elasticity?

- **#1:**
- **#2:**
- **#3:**
- **#4:**

Whose demand was more elastic (consumers or hospitals)? Why?

Who paid a higher price (consumers or hospitals)? Why?

Who benefited from the collusion before round 2?

NAME:_____

		Firm A: Charge $5	Firm A: Charge $1
Firm B: Charge $5		100 / 100	150 / 25
Firm B: Charge $1		25 / 150	50 / 50

If Firm A charges $5, what is Firm B's best response? Why?

If Firm A charges $1, what is Firm B's best response? Why?

(Since Firm B has the same payoffs as Firm A, their decisions will be the same.)

What is the outcome that will be achieved if both firms play their best responses to each other? (This is called the *Nash equilibrium*.)

What is the outcome where total profit is the highest? Is it the same?