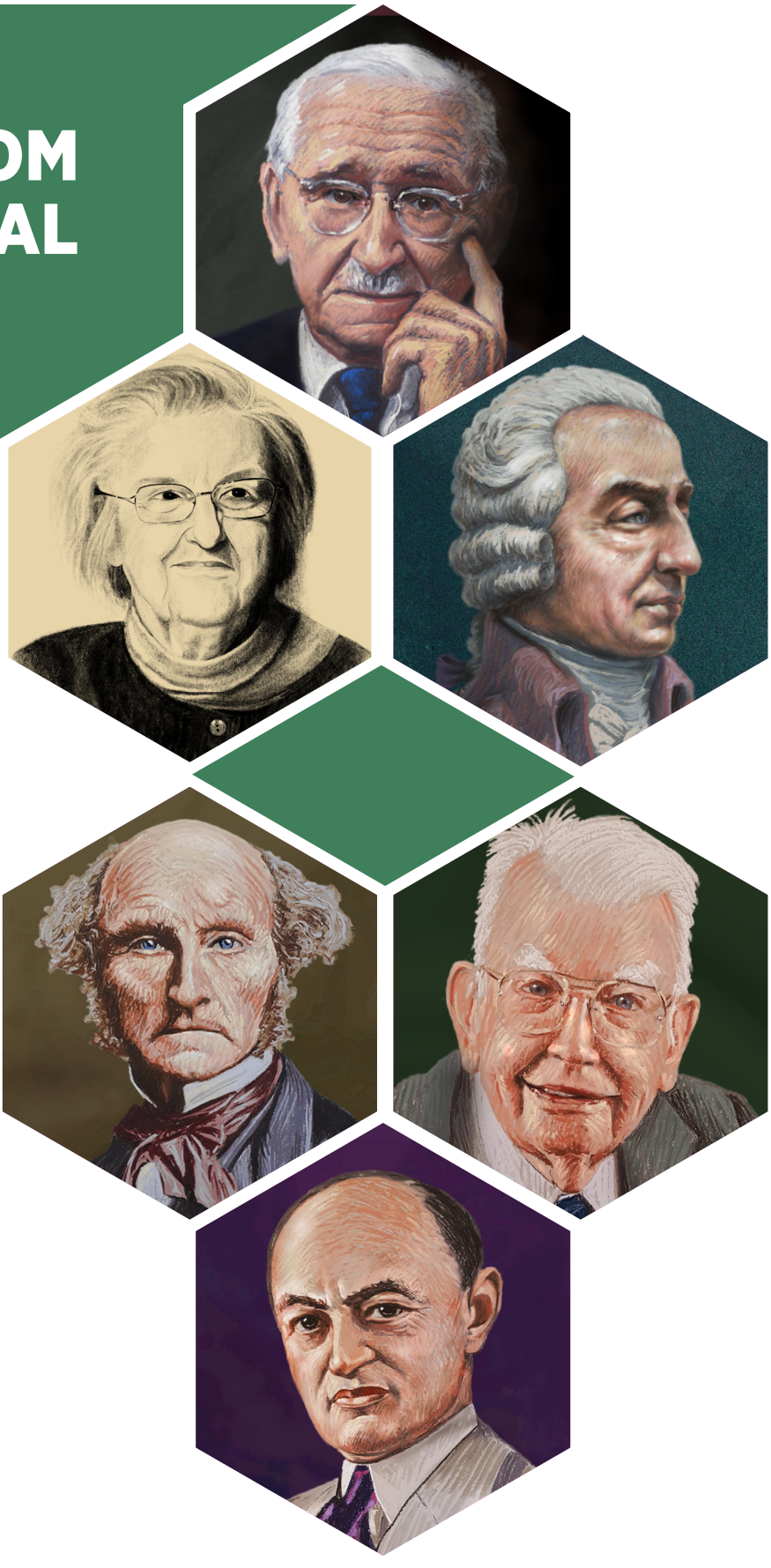
FRASER INSTITUTE

BUSINESS LESSONS FROM THE ESSENTIAL SCHOLARS

Classroom Lesson Plans



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OVERVIEW

The four lessons presented here explore concepts in economics and business, each focusing on key contributions from the Essential Scholars to our understanding of economic systems, production, and societal interactions.

The first lesson examines the ideas of John Stuart Mill and Adam Smith on production. Mill's perspective centres around the self-interested behaviour of individuals, which drives economic activity and wealth creation. Meanwhile, Smith emphasizes the importance of the division of labour in boosting production efficiency, illustrating how specialization leads to greater output, lower prices, and an improved standard of living.

The second lesson delves into Friedrich Hayek's views on the knowledge problem and prices in a market economy. Hayek highlights the decentralized nature of economic coordination, where prices act as signals to guide the actions of producers and consumers. This system allows for efficient resource allocation without central planning, as individuals acting in their own self-interest contribute to a spontaneous order that benefits the entire economy.

In the third lesson, we turn to Joseph Schumpeter's theory of entrepreneurship and creative destruction. Schumpeter argues that entrepreneurship is the driving force behind economic progress, involving the continuous search for innovation and improvement. His concept of creative destruction describes how new ideas and technologies constantly replace outdated practices, fostering economic growth and societal development.

Finally, the fourth lesson discusses the insights of Elinor Ostrom and Ronald Coase on public goods and institutions. Ostrom advocates for the creation of institutions that promote cooperation and social trust, emphasizing the importance of community participation in designing effective solutions. Coase focuses on transaction costs and property rights, suggesting that clearly defined rights and an understanding of external costs can lead to more efficient economic outcomes.

Together, these lessons provide a comprehensive view of how individual actions, market dynamics, innovation, and institutions contribute to the functioning of modern economies.

CURRICULUM TABLE OF CONTENTS

Acknowledgments The creation of these lesson plans was funded through the Fraser Institute. The authors worked independently and any errors or omissions are their sole responsibility. The views and conclusions expressed do not necessarily reflect those of the Board of Directors of the Fraser Institute, its staff, or supporters.

LESSON 1

Mill and Smith on Production

INTRODUCTION

This lesson discusses the ideas of two prominent economists, Adam Smith and John Stuart Mill, regarding production and its role in economic prosperity.

John Stuart Mill believed that individuals are primarily motivated by self-interest and a desire to maximize wealth while minimizing effort. This form of self-interested behaviour is sometimes referred to as *homo economicus* (or "economic man"), and it suggests that people consistently act in ways to obtain the most goods and services with the least amount of work.

Adam Smith, on the other hand, focused on the concept of division of labour as a key driver of increased production. Smith illustrated this idea with the famous example of pin-making, demonstrating how task specialization leads to significantly higher output compared to individual workers producing an entire pin on their own. Smith emphasized three reasons why division of labour leads to increased production: Specialization—workers become more skilled at their specific tasks; Time Savings—eliminating the need to switch between different tasks saves time; Innovation—specialization encourages the development of machines and tools that enhance productivity.

Furthermore, Smith's showed that increased production leads to improved living standards since dividing labour leads to increased production. Subsequently, increased production results in lower prices for goods and services. Finally, lower prices make goods and services more accessible, thus raising the overall standard of living.

LEARNING OBJECTIVES

Define production, profits, specialization, division of labour, and living standards.

Explain Mill's view of self-interested behaviour and how it leads to efficient production in pursuit of greater profits.

Compare and contrast Mill's view with Smith's focus on the division of labour and specialization.

Explain how division of labour and specialization can reduce costs and promote innovation and production that lead to higher profits and living standards.

Understand the relationship between costs and profits.

Understand the difference between marginal cost, fixed cost, variable cost, implicit cost, and explicit cost.

ECONOMIC CONCEPTS

Costs

Costs can be understood as the resources expended in the process of production. This includes raw materials, labour, and capital (such as investments in machinery and tools).

These can be further separated into **variable costs**, such as raw materials and labour that vary according to the amount of production and **fixed costs**, such as machinery, buildings, and tools that do not vary per unit of production.

Costs are not solely the monetary, **explicit cost** directly associated with production. Smith's definition of wealth as "the relative ability to satisfy one's needs and desires" suggests that costs can encompass non-monetary factors as well. These are understood to be **implicit costs** such as time, effort, risk, and opportunity cost of capital.

Profit

Profit emerges when the value an individual creates and offers through production and exchange exceeds the costs they incur in producing it.

Smith's "invisible hand" argument highlights the societal benefits that emerge from this pursuit of individual profit.

- While individuals primarily seek their own gain, their actions, within a well-governed market, unintentionally serve the "public interest" by increasing overall wealth and prosperity.
- This suggests that profit, while accruing to individuals, is not achieved by exploiting others but rather by offering them something of value.

Mill's distinction between production and distribution adds another layer to the understanding of profit.

- He acknowledges that while production is constrained by technological and knowledge factors, distribution is shaped by societal choices.
- This implies that the distribution of profits can be influenced by societal rules and customs, such as those relating to property rights, taxation, and social welfare.

Division of Labour

Division of labour refers to the separation of a production process into distinct tasks, each performed by specialized workers. Instead of each individual completing a product from start to finish, the work is divided, allowing workers to focus on specific aspects of production.

This concept is intrinsically linked to specialization. Specialization arises as a direct consequence of dividing labour, with individuals becoming increasingly skilled and efficient in their assigned tasks.

Specialization

Specialization refers to the concentration of individuals or firms on specific tasks or areas of production within a broader economic system. It arises naturally from the division of labour, which breaks down complex production processes into smaller, more manageable tasks assigned to different workers.

Smith's Observations on the Benefits of Specialization:

- Increased dexterity: When workers focus on a single task, they become more proficient and efficient at performing it. This leads to higher quality and faster output.
- Time savings: Specialization eliminates the need for workers to constantly switch between different tasks, saving valuable time that would otherwise be lost in transitioning.
- Innovation: Focusing on specific areas allows workers to develop a deeper understanding of their tasks, leading to the invention of new tools and techniques that further enhance efficiency and productivity.

Living Standards

Living standards can be broadly understood as the level of material well-being experienced by individuals or societies. This encompasses a wide range of factors, including:

- Access to essential goods and services: Food, shelter, clothing, healthcare, and education are fundamental necessities that contribute to a basic standard of living.
- Disposable income: The amount of income individuals have left after meeting their basic needs determines their ability to purchase goods and services that enhance their quality of life.
- Quality of life indicators: These encompass factors beyond material possessions and include things like health outcomes, life expectancy, environmental quality, social mobility, and overall happiness.

TIME

60–75 minutes

MATERIALS

1. PowerPoint “Mill and Smith on Production”
2. AV system to play videos
3. Tennis Ball Production Activity Materials
4. Explicit vs. Implicit Cost Activity Materials
5. Kahoot! “Mill and Smith on Production”

TEACHER'S GUIDE

1. Assign reading to be completed before class: chapters 6 and 8 from *The Essential Adam Smith* and chapter 5 from *The Essential John Stuart Mill*.

(Note: for steps 2–9, refer to the "Concept List" and the PowerPoint "Mill and Smith on Production")

2. Explain the concepts of costs, profit, division of labour, specialization, and standard of living.

3. Show how each concept above builds upon the other to lead to higher living standards.

4. Introduce the distinction between variable and fixed cost.

5. Do the "Tennis Ball Production" activity (see **Activities**).

6. Debrief the "Tennis Ball Production" activity (see **Activities**).

7. Discuss explicit vs. implicit costs.

8. Do the Explicit vs. Implicit Costs activity (see **Activities**).

9. Summarize the key takeaways from the lesson.

The following videos are embedded in the PowerPoint:

The Division of Labour: https://youtu.be/JhhS5jF3Ugg
The Invisible Hand: https://youtu.be/NdUa2zrJL0g
Dunder Mifflin Infinity: www.economicsoftheoffice.com (Dunder Mifflin Infinity clip)
Drake and Josh's New Sushi Scene: https://www.youtube.com/watch?v=kkQXYbXZYW4
Work Song Nanocluster (Big Bang Theory Season 2 Ep. 18): https://www.youtube.com/watch?v=i5UbII_Q0_c

ACTIVITIES

Activity 1: Tennis Ball Production

Maximizing production, lowest cost, most profit.

Teaching cost can be one of the most challenging topics in business. This demonstration provides concrete data that you can enter in the accompanying spreadsheet to show the connection between profits and diminishing returns.

Materials

- 30 tennis balls
- Eight volunteers
- Tennis Ball Production Spreadsheet
- Two buckets

Time: 15–20 minutes

Class Size: works well with any size

Procedure

Set up bins/baskets 25 feet apart.

Explain the rules to the volunteers: Your aim is to transfer as many tennis balls as possible from one bucket to the other in 30 seconds. Begin by having all eight volunteers participate in Round 1. This process is then repeated three additional times, with two workers subtracted from the labour force each run. The work that each successive group completes constitutes one point on the production function. From this we will calculate the marginal and average products.

Rules

1. No throwing of tennis balls.
2. Each of the balls must be placed in the second bucket.
3. Only one person may take balls out of the first bucket, and only one at a time.
4. Each student must handle every ball on each run; the balls should be passed from hand to hand.

For every tennis ball that is moved from the first bucket to the second bucket, $400 in participation points is earned. However, $200 is charged per worker, and there is a $500 fixed cost for playing. To get the class involved in the experiment, we offer participation points.

Students cast their vote by predicting the number of workers (2, 4, 6, or 8) that will earn the highest profit. Each dollar of profit equals one participation point.

Round 1: Eight Workers

Count the total product (tennis) balls and then pass them back to the original basket. We like to have a bit of fun by getting the audience to "vote off" the two least productive workers. The instructor walks behind each worker, and the crowd yells "stay" or "go."

Enter the total product (TP) for eight workers.

The spreadsheet looks like this before the activity data is entered:

Tennis Ball Production

	$400/ball		TR=P*Q		P_K=$500			P_L=$200	
Q labor	TP	MP_L	TR	MR/wkr	FC	VC	TC	MC/wkr	Profit
0	0		$0		500.00	0.00	500.00		**-$500.00**
1	0	0	$0	$0	500.00	200.00	700.00	200.00	**-$700.00**
2	0	0	$0	$0	500.00	400.00	900.00	200.00	**-$900.00**
3	0	0	$0	$0	500.00	600.00	1,100.00	200.00	**-$1,100.00**
4	0	0	$0	$0	500.00	800.00	1,300.00	200.00	**-$1,300.00**
5	0	0	$0	$0	500.00	1,000.00	1,500.00	200.00	**-$1,500.00**
6	0	0	$0	$0	500.00	1,200.00	1,700.00	200.00	**-$1,700.00**
7	0	0	$0	$0	500.00	1,400.00	1,900.00	200.00	**-$1,900.00**
8	0	0	$0	$0	500.00	1,600.00	2,100.00	200.00	**-$2,100.00**
9	0	0	$0	$0	500.00	1,800.00	2,300.00	200.00	**-$2,300.00**
10	0	0	$0	$0	500.00	2,000.00	2,500.00	200.00	**-$2,500.00**
11	0	0	$0	$0	500.00	2,200.00	2,700.00	200.00	**-$2,700.00**

Round 2: Six Workers

See above for description. Enter total product figure for six workers.

Round 3: Four Workers

See above for description. Enter total product figure for four workers.

Round 4: Two Workers

See above for description. Enter total product figure for two workers.

You have four data points: 2, 4, 6, and 8. In order to complete the production function, add in values for 1, 3, 5, 7, 9, and 11 (we use midway points). The students are attracted to the profit column. You need to redirect their attention to total product and, more importantly, marginal product. Ask them: When do diminishing returns set in? They should be able to see that beyond a certain point, workers become less productive, and eventually marginal product is negative.

After you have entered all the data with 2, 4, 6, and 8 workers and then interpolated and extrapolated the data for the missing values in the TP column, your finished spreadsheet should look something like this:

Tennis Ball Production

	$400/ball		TR=P*Q		P_K=$500			P_L=$200	
Q labor	TP	MP_L	TR	MR/wkr	FC	VC	TC	MC/wkr	Profit
0	0		$0		500.00	0.00	500.00		**-$500.00**
1	6	6	$2,400	$2,400	500.00	200.00	700.00	200.00	**$1,700.00**
2	12	6	$4,800	$2,400	500.00	400.00	900.00	200.00	**$3,900.00**
3	17	5	$6,800	$2,000	500.00	600.00	1,100.00	200.00	**$5,700.00**
4	21	4	$8,400	$1,600	500.00	800.00	1,300.00	200.00	**$7,100.00**
5	21	0	$8,400	$0	500.00	1,000.00	1,500.00	200.00	**$6,900.00**
6	21	0	$8,400	$0	500.00	1,200.00	1,700.00	200.00	**$6,700.00**
7	20	-1	$8,000	-$400	500.00	1,400.00	1,900.00	200.00	**$6,100.00**
8	19	-1	$7,600	-$400	500.00	1,600.00	2,100.00	200.00	**$5,500.00**
9	16	-3	$6,400	-$1,200	500.00	1,800.00	2,300.00	200.00	**$4,100.00**
10	13	-3	$5,200	-$1,200	500.00	2,000.00	2,500.00	200.00	**$2,700.00**
11	10	-3	$4,000	-$1,200	500.00	2,200.00	2,700.00	200.00	**$1,300.00**

Predict the number of workers (2, 4, 6, or 8) that will earn the highest profit. For every $1,000 in profit, you earn one participation point.

Every tennis ball that is successfully moved from the first to the second bucket earns $400. However, $200 is charged per worker and there is a $500 fixed cost for playing.

Ask or survey your students the following question:

- How many workers do you think will earn the most profit?
- What concept explains why adding more workers may not be a good idea? Explicit costs, implicit costs, economic profit, accounting profit, or diminishing marginal product?
- Can you have too few workers?

Activity 2: Explicit vs. Implicit Cost, Think-Pair-Share

You open your own delivery business in your town. Create an app, take orders. What price are you going to charge if someone comes to you with a 1 kg package for delivery.

Step 1: List your explicit costs.

Ask the class to name some of the out-of-pocket (explicit) costs that they will incur to run the business. Some possible answers are taxes, utility bills, advertising, wages, gasoline, etc.

Step 2: Determine what the average cost per unit will be.

Ask the class how much (on average) your company spends each time a delivery is made. Answers will vary. After you have heard all the answers, have the class agree on an amount (for instance $10).

Step 3: Determine what price you should charge? Ask the class what price they are willing to accept.

The way to do this is by a show of hands. Imagine that each student is setting their own price. Start by asking for a show of hands if $50 is enough for you to deliver the package. Recall that since the package only cost you $10 to deliver, $50 - $10 = $40 in accounting profit. Repeat the show of hands at $29. Fewer hands will go up and now the accounting profit is $29 - $10 = $19. Continue to $19. Now the accounting profit is $19 - $10 = $9. Eventually, all the hands will go down as the accounting profit approaches $0.

Step 4: Ask why some students require a much higher price than others.

Some students value their time differently. That is, they have higher opportunity costs.

Step 5: Ask what are the implicit costs?

The lost opportunities to work somewhere else, the money you tied up in your business instead of investing it elsewhere.

Step 6: Inform the class that unless you have accounted for both the explicit and implicit costs of production, your analysis is incomplete.

In the example the firm is ALWAYS earning an accounting profit, but when you account for the value of time, the firm could easily earn an economic loss. For instance, suppose you agreed to deliver the package for $29. You made $19 in accounting profit. If the delivery took 1 hour and you could have instead earned $22/hour working as a barista, your economic profit is not $19, it is $19 - $22 = -$3.

KAHOOT

Lesson 1 – Mill and Smith on Production, Kahoot link: https://create.kahoot.it/share/lesson-1-mill-and-smith-on-production/0e22fe66-5430-4f9c-9a8a-5fa1dccca013

CONCLUSION

Mill and Smith paint a picture of how production in a market economy leads to higher living standards.

- Increased production: Through division of labour, specialization, and technological innovation, a market economy can lower the costs of production and generate a growing abundance of goods and services.

- Lower costs and increased affordability: Competition within the market drives down costs and, subsequently, prices, making these goods and services more affordable to a broader population.

- Greater access to necessities and comforts: As people gain access to more affordable goods and services, they can better satisfy their needs and desires, leading to an improvement in their living standards.

- Impact of distribution: Societal choices regarding the distribution of wealth play a crucial role in shaping access to opportunities and resources, influencing the overall quality of life experienced by different groups within society.

LESSON 2

Hayek on the Knowledge Problem and Prices

INTRODUCTION

The existence of goods in a society is not due to a grand, centralized plan, but rather emerges from market forces that promote the specialization of knowledge and skills.

Markets employ a signalling mechanism—prices—to guide the actions of producers. Each firm, driven by self-interest and the pursuit of profit, directs its resources and efforts towards activities that command the highest prices. This decentralized system, where countless firms respond to price signals, effectively coordinates economic activity without the need for a central planner. Consumers, also motivated by self-interest, seek to maximize their satisfaction by purchasing goods and services from the most efficient suppliers, who offer the lowest prices. Inefficient suppliers face pressure to improve their efficiency or shift to different lines of production to remain competitive. This constant interplay between suppliers and consumers, guided by price signals, drives a continuous improvement in efficiency and leads to an efficient allocation of resources. The resulting economic order is not planned or designed by any single entity; it arises spontaneously from the self-interested actions of individuals operating within a framework of private property and price signals.

Hayek referred to this as a spontaneous order, highlighting the unintended but beneficial outcomes that emerge from decentralized decision-making and the pursuit of individual gain. Importantly, this system not only facilitates economic efficiency but also benefits all participants, as suppliers maximize their returns and consumers obtain the goods and services they desire at the lowest possible prices.

LEARNING OBJECTIVES

Explain the “knowledge problem” according to Hayek.

Explain how monetary prices serve as a signalling mechanism in a freely operating market, leading to a “spontaneous order” that addresses the knowledge problem.

Show how restrictions on freely fluctuating prices can interfere with their function as a signalling mechanism and create imbalances in the market.

Extend Hayek's "knowledge problem" to the ideas that led to the Efficient Market Hypothesis.

ECONOMIC CONCEPTS

The Knowledge Problem

According to Hayek, the core of the problem lies in the dispersed and fragmented nature of knowledge throughout society, making it impossible for any single entity to possess or control the vast amount of information necessary for efficient economic decision-making.

Hayek emphasizes that the knowledge required for economic activity extends far beyond theoretical or scientific understanding. It encompasses the practical, localized, and often tacit knowledge possessed by countless individuals engaged in specific tasks and industries.

Spontaneous Order

Spontaneous order is not the result of a conscious design or a grand plan but emerges from the independent actions of individuals pursuing their self-interest. Individuals, acting in their self-interest, respond to price signals, which reflect the relative scarcity of goods and services and the intensity of consumer demand.

For example, if the price of a good rises, it signals that consumer demand is increasing for that good, incentivizing producers to make more of the good and thus meet consumer needs while maximizing their profits.

This decentralized decision-making, guided by the price system, leads to a coordinated outcome where resources are allocated to their most valued uses, without the need for a central blueprint or a directing authority.

Advantages of Spontaneous Order

- Efficiency: Spontaneous order harnesses the dispersed knowledge and creativity of millions of individuals, leading to a more efficient allocation of resources compared to central planning, which often suffers from information bottlenecks and bureaucratic inefficiencies.

- Adaptability: The decentralized nature of spontaneous order makes it highly adaptable to changing circumstances. Prices adjust quickly to reflect changes in supply and demand, allowing the economy to respond effectively to unforeseen events or shifts in consumer preferences.

- Innovation: By allowing individuals to freely pursue their own ideas and initiatives, spontaneous order fosters a dynamic environment that encourages innovation and entrepreneurship.

- Individual Flourishing: Spontaneous order, based on private property and freedom of contract, allows individuals to prosper by serving the needs of others and pursuing their own goals within a framework of general rules, rather than being directed by a central authority.

Prices as a Signalling Mechanism

Prices act as signals that convey information about the relative scarcity of goods and services and the intensity of consumer demand. This information allows individuals to make informed decisions about production and consumption, even without possessing a comprehensive understanding of the entire economy and the underlying factors driving those price changes.

Changes in prices signal shifts in supply and demand. For instance, if consumer demand for a good increases, the price will rise. This price increase signals to producers that they can profit by increasing production. Simultaneously, the higher price signals to consumers that the good is becoming relatively scarcer, encouraging them to adjust their consumption accordingly.

This decentralized decision-making, guided by price signals, leads to a coordinated outcome where resources are allocated to their most valued uses. The price system offers a powerful solution to the knowledge problem.

The Efficient Market Hypothesis

The Efficient Market Hypothesis (EMH), a cornerstone of modern financial theory, asserts that asset prices in a market fully reflect all available information. This implies that it is impossible to consistently "beat the market" by using publicly available information

because any opportunities for profit based on that information would already be reflected in the current price.

The EMH challenges the notion that professional fund managers can consistently outperform the market. However, behavioural finance argues that psychological biases and irrational behaviour can lead to market inefficiencies and create opportunities for profit that contradict the EMH.

Hayek's ideas about spontaneous order and the role of prices as signals can be seen as providing a foundation for understanding how markets can become efficient. The decentralized decision-making in a market, guided by price signals that aggregate dispersed information, creates a dynamic environment where opportunities for arbitrage are quickly exploited, pushing prices towards their efficient levels.

TIME

75–120 minutes

MATERIALS

1. PowerPoint "Hayek on the Knowledge Problem and Prices"
2. AV system to play videos
3. Free Entry and Exit Experiment Activity Materials
4. Perceptions of Chance Activity Materials
5. Kahoot! "Hayek on the Knowledge Problem and Prices"

TEACHER'S GUIDE

1. Assign reading to be completed before class: chapters 1–3 from *The Essential Hayek*.

(Note: for steps 2–6, refer to the "Concept List" and the PowerPoint "Hayek on the Knowledge Problem and Prices")

2. Explain the concepts of the knowledge problem, spontaneous order, price as a signalling mechanism, and the Efficient Market Hypothesis.

3. Show how each concept above builds upon the other to solve the knowledge problem.

4. Do the “Free Entry and Exit Experiment” (see **Activities**).

5. Do the “Perceptions of Chance and the Efficient Market Hypothesis Experiment” (see **Activities**).

6. Summarize the key takeaways from the lesson.

The following videos are embedded in the PowerPoint:

Knowledge and Prices: https://youtu.be/mr2fexY-utY
Prices: https://www.essentialscholars.org/hayek#videoModal3
The Diner: I Love Lucy – Hamburgers: https://www.youtube.com/watch?v=doUYH3Uria4
Pi: https://www.youtube.com/watch?v=ShdmErv5jvs
The Big Short: https://www.youtube.com/watch?v=Pxr_FzpPM2Q

ACTIVITIES

Activity 1: Free Entry and Exit Experiment

Adapted from: Rod Garratt (2000). A Free Entry and Exit Experiment. *Journal of Economic Education,* 31, 3 (Summer): 237–243.

Materials:

- Four signs to identify areas of the room for each crop
- Free Entry and Exit Teacher Spreadsheet
- Free Entry and Exit Student Record Spreadsheet
- Incentive: Money, extra class credit, or other small prize

Set up:

The four corners of the classroom are the four markets. Before the students arrive, identify each market with a large, highly visible sign that gives the name of the market and the unit production cost: corn $8, wheat $9, rice $10, or soybeans $11.

Open the provided spreadsheet to keep track of the number of farmers, the price, and the profit in each market and in each round.

After all the students have arrived, but before the experiment begins, it is necessary to count the students to define the inverse demand function. Choose the tab on the Teacher Spreadsheet that corresponds to your class size.

Once the tab is chosen, no new students can join the experiment.

Each inverse demand function is assumed to be linear with slope equal to negative one. The intercepts are chosen so that each one is greater than, or equal to, the unit production cost in each market and the sum of the differences between the intercepts and their respective unit production costs equals the number of participants. This ensures that in long-run equilibrium there are zero (accounting) profits in each market.

The inverse demand function should not be revealed to the students.

TABLE 1
Market Demands

Farmers	Corn	Wheat	Rice	Soybeans
$25 \leq N \leq 29$	$P_C = 15 - Q_C$	$P_W = 18 - Q_W$	$P_R = 15 - Q_R$	$P_S = (N - 10) - Q_S$
$30 \leq N \leq 34$	$P_C = 16 - Q_C$	$P_W = 20 - Q_W$	$P_R = 16 - Q_R$	$P_S = (N - 14) - Q_S$
$35 \leq N \leq 39$	$P_C = 17 - Q_C$	$P_W = 22 - Q_W$	$P_R = 17 - Q_R$	$P_S = (N - 18) - Q_S$
$40 \leq N \leq 44$	$P_C = 18 - Q_C$	$P_W = 24 - Q_W$	$P_R = 18 - Q_R$	$P_S = (N - 22) - Q_S$

Preliminary discussion questions:

Why are open (free) markets so important?

How do open markets regulate prices and profits?

Watch "The Diner" https://www.youtube.com/watch?v=doUYH3Uria4.

Begin the experiment:

The Experiment's Goal:
To see how free entry and exit affect profits across markets in the long run and how taxes and subsidies can affect this process.

Your Goal: Maximize your profits, this will ensure more class dollars and you have a chance at a cash prize!

You must decide what crop you would like to produce: corn, wheat, rice, or soybean. This decision is made by moving to the assigned section.

Each crop will have a different *cost* of production: corn $8, wheat $9, rice $10, soybean $11.

The *price* will be announced *at the end* of each round.

This price will be derived from an inverse demand curve due to the fact that this experiment has no consumers.

Round 1:

1. Have all students move to the center of the room.

2. (If students remain in their seats, this will bias their production decision.)

3. Ask students to choose which crop they will produce this round by moving to the crop of their choice. It is helpful to have a 30 second time limit.

4. Record the number of farmers for each crop in the spreadsheet.

5. Announce the profits each set of farmers has earned.

6. Ask students to record this in their record sheet.

Round 2:

Announce to students, "The government has initiated a fallow program whereby you receive a guaranteed profit of one dollar if you plant nothing."

"You select this option by standing near the front of the room" (or other location the teacher chooses).

Repeat steps 1–5 in Round 1.

Round 3:

Announce to students, "The government will now provide a $2 subsidy for wheat and soybean farmers."

Repeat steps 1–5 in Round 1.

Calculating your profit:

Wheat and Soybean:

Profit = (Price - Production Cost) + $2

Corn and Rice:

Profit = Price - Production Cost

Round 4:

Announce to students, “The government will now impose a tax of $2 for wheat and soybean farmers.”

Repeat steps 1–5 in Round 1.

Calculating your profit:

Wheat and Soybean:

Profit = (Price - Production Cost) - $2

Corn and Rice:

Profit = Price - Production Cost

Concluding discussion points:

Review the final results of the spreadsheet. Ask students what they notice.

Profit-seeking behaviour will steer the market toward long-run equilibrium.

People will adapt to markets where profits are higher.

How do government interventions affect production? How does this differ from adapting to market demand? What are the potential consequences of interventions like these?

What were your strategies?

There was a 1:1 negative relationship between price and number of farmers.

Only a few students needed to move to reach equilibrium. (Students may have observed that some changed crops frequently while others stayed in the same crop for all rounds.)

Free Entry and Exit Student Record Sheet

Name: _____

	Market you entered	Profit you made/lost
1		
2		
3		
4		

Total Profit:_____

For your calculations:

Profit = (Price - Production Cost) + subsidy (if applicable) - tax (if applicable)

Per-unit production cost:

Corn = $8
Wheat = $9
Rice = $10
Soybeans = $11

Activity 2: Perceptions of Chance and the Efficient Market Hypothesis

Adapted from: David J. Cooper (1998). Perceptions of Chance and the Efficient Market Hypothesis: A Classroom Experiment. *Classroom Expernomics* 7, 1 (Spring): 1–9.

Materials:

- *Perceptions of Chance and the Efficient Market Hypothesis* Student Handout
- Perceptions of Chance Spreadsheet
- Slideshow with graphs

Preliminary discussion questions:

Can you predict the future price of a stock?

Random Walk Theory: The theory that there are no predictable trends in stock prices that can be used to "get rich quick."

Inside Information: Information that is not available to the general public about what is happening.

Legal Information: Obtained by statistical analysis of data.

Watch "Pi": https://www.youtube.com/watch?v=ShdmErv5jvs.

Often times, predictions rely on chartist principles. For instance, how many times have you heard an analyst say the market was due for a "correction"?
If someone argues that the market is due for a correction then they are implicitly saying that price changes are negatively correlated over time.

How do these misperceptions persist? The cognitive psychology literature is useful here. There are two common fallacies:

- The hot hand fallacy. Observers believe that random sequences with no correlation actually exhibit positive correlation, i.e., a player who has made a few shots in row is more likely to make the next shot. Gilovich, Vallone, and Tversky demonstrated that this does not exist.
- The gambler's fallacy. This refers to the belief that outcomes which have not occurred for some time are "due" or that recent outcomes are unlikely to be repeated. Clotfelter notes that gamblers bet winning numbers less frequently in the

days immediately after they win. Watch "The Big Short": https://www.youtube.com/watch?v=Pxr_FzpPM2Q.

Begin the experiment by reading the following to the class:

- Each of you has a set of instructions and five columns of data.
- You are being given the answers for 150 true/false questions.
- Each teacher has produced 30 answers.
- All of the teachers seek to avoid any patterns in the answers.
- Only one of the teachers does so successfully.
- All teachers are smart enough to create a roughly 50/50 split between true and false answers—you must look deeper than that!
- You are asked to pick out the professor that is truly random (rather than having patterns in his/her answers).
- You also need to document the method you use to make your choice.
- Take 5 minutes to review the data and formulate an answer. **(Do not talk to others at this point.)**

Set a 5-minute timer. Ensure students do not talk with one another or compare choices.

After 5 minutes, have students record their choice of teacher.

Then, show students the graphs of the answers and ask if anyone would anyone like to change their choice. Have them record any change.

Then allow 2 minutes to discuss their choices with those sitting next to them, and again, ask if anyone would anyone like to change their choice. Have them record any change.

Record the number of students who chose each teacher. This can be done via an anonymous poll, raising of hands, counting of record sheets, or any other method you choose.

Reveal the following table:

Probabilities Used to Generate the Data

Professor	Probability of Repeat
Alice	.8 (strongly positive)
Bob	.5 (no correlation)
Cindy	.4 (weakly negative)
Donald	.2 (strongly negative)
Emma	.6 (weakly positive)

Point out that Bob is truly random. Students that chose Alice or Emma are exhibiting a tendency towards the hot hand fallacy, and those that chose Cindy and Donald are exhibiting a tendency towards the gambler's fallacy. It is very common to exhibit a tendency towards one of these biases!

Concluding discussion points:

Refer back to the Efficient Market Hypothesis (EMH). The EMH is a theory that suggests financial markets are efficient and incorporate all available information into asset prices.

According to the EMH, it is impossible to consistently outperform the market by employing strategies such as technical analysis or fundamental analysis.

The hypothesis argues that since all relevant information is already reflected in stock prices, it is not possible to gain an advantage and generate abnormal returns through stock picking or market timing. This has significant implications for investors and market participants.

Perceptions of Chance and the Efficient Market Hypothesis Student Handout

Instructions:

Many professors like to use true/false (T/F) questions on their exams. The design of these exams raises an interesting problem. The professor would like to design the exam so that there is not any obvious pattern in the answers. Using either the current exam or past exams, the students would like to find patterns that will help them answer the questions. Thus, the design of T/F exams creates a contest pitting the ability of the professor to be random against the ability of students to recognize non-randomness.

In this experiment you have been given the answers to five T/F exams created by five different instructors. One of the five professors actually managed to be truly random, while all of the others have a predictable pattern to their answers. **(All of the professors are good enough to manage roughly a 50/50 split between T and F answers. The differences are more subtle than this.)** Your job is to identify who is truly random.

If you have any questions please raise your hand.

Name: _____

Your Answer: _____

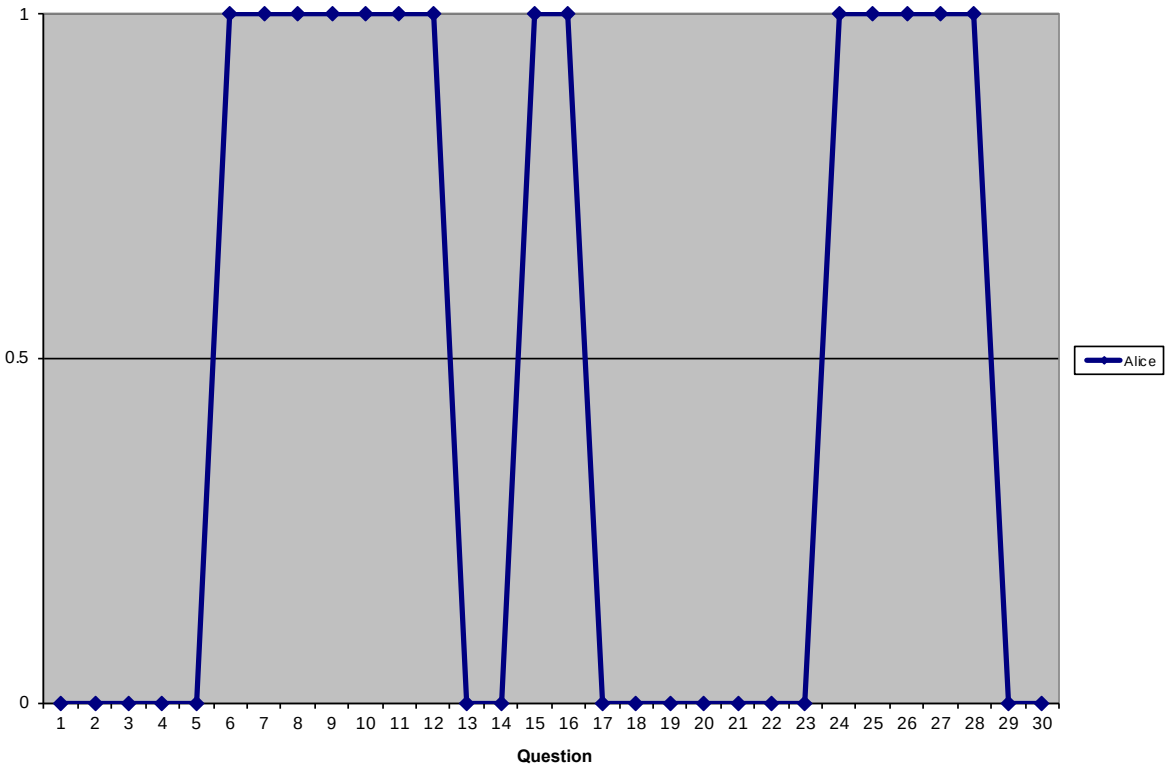
Briefly describe the method you used to determine your answer in the space below. If you had more time and/or resources is there anything else you would do to determine your answer.

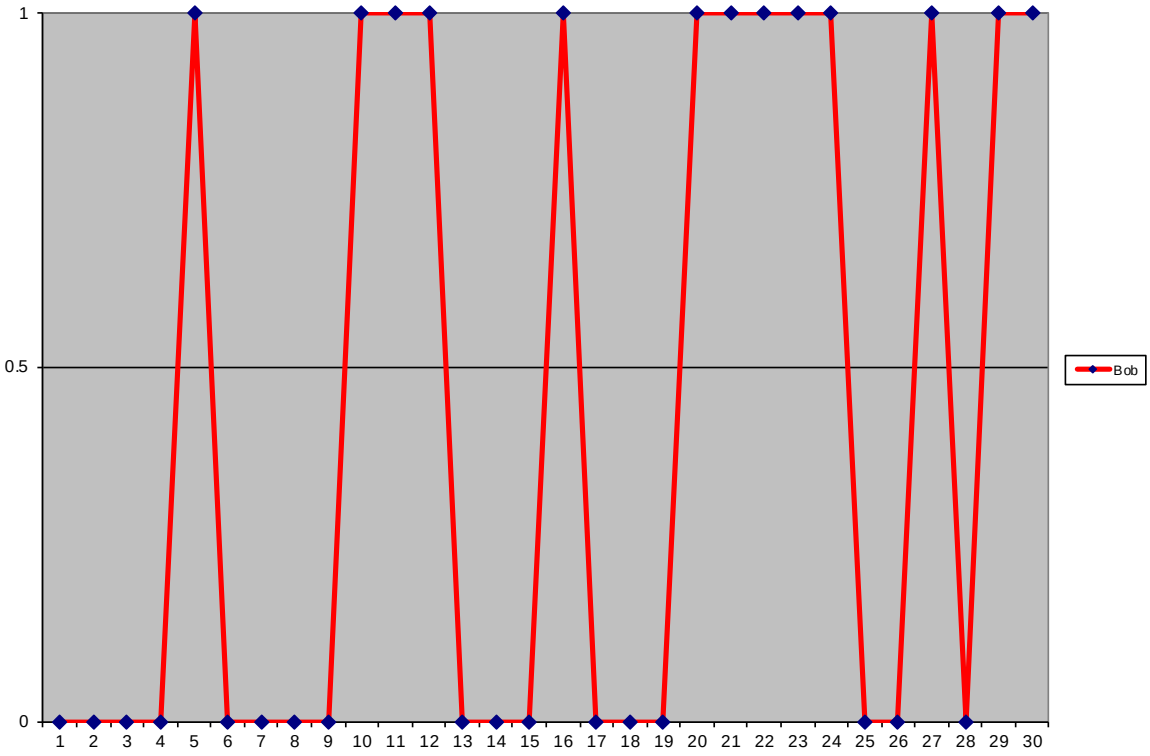
Perceptions of Chance and the Efficient Market Hypothesis Student Handout (Cont'd)

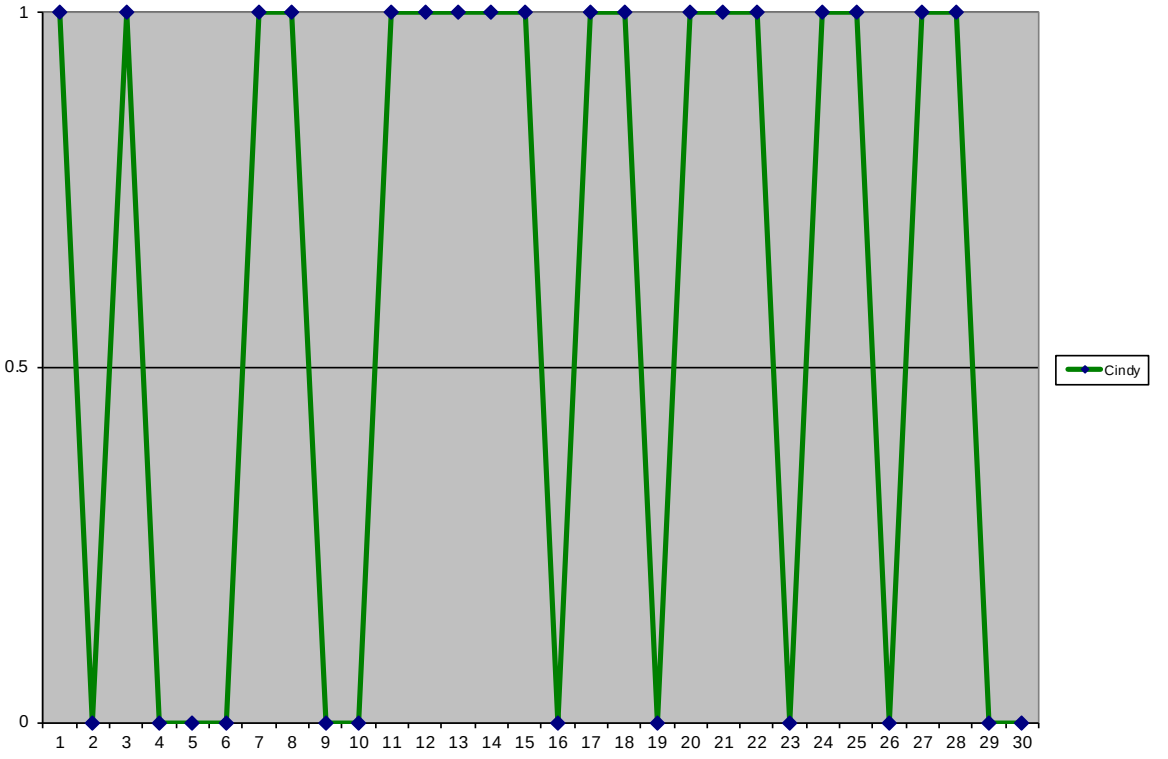
Question	Alice	Bob	Cindy	Donald	Emma
1	F	F	T	T	F
2	F	F	F	F	F
3	F	F	T	T	F
4	F	F	F	F	T
5	F	T	F	T	T
6	T	F	F	T	F
7	T	F	T	F	T
8	T	F	T	F	T
9	T	F	F	T	F
10	T	T	F	F	F
11	T	T	T	T	T
12	T	T	T	F	F
13	F	F	T	T	T
14	F	F	T	F	T
15	T	F	T	T	F
16	T	T	F	T	F
17	F	F	T	F	T
18	F	F	T	F	T
19	F	F	F	T	F
20	F	T	T	T	F
21	F	T	T	F	T
22	F	T	T	T	F
23	F	T	F	F	F
24	T	T	T	T	F
25	T	F	T	T	F
26	T	F	F	F	T
27	T	T	T	T	F
28	T	F	T	F	T
29	F	T	F	T	T
30	F	T	F	T	T

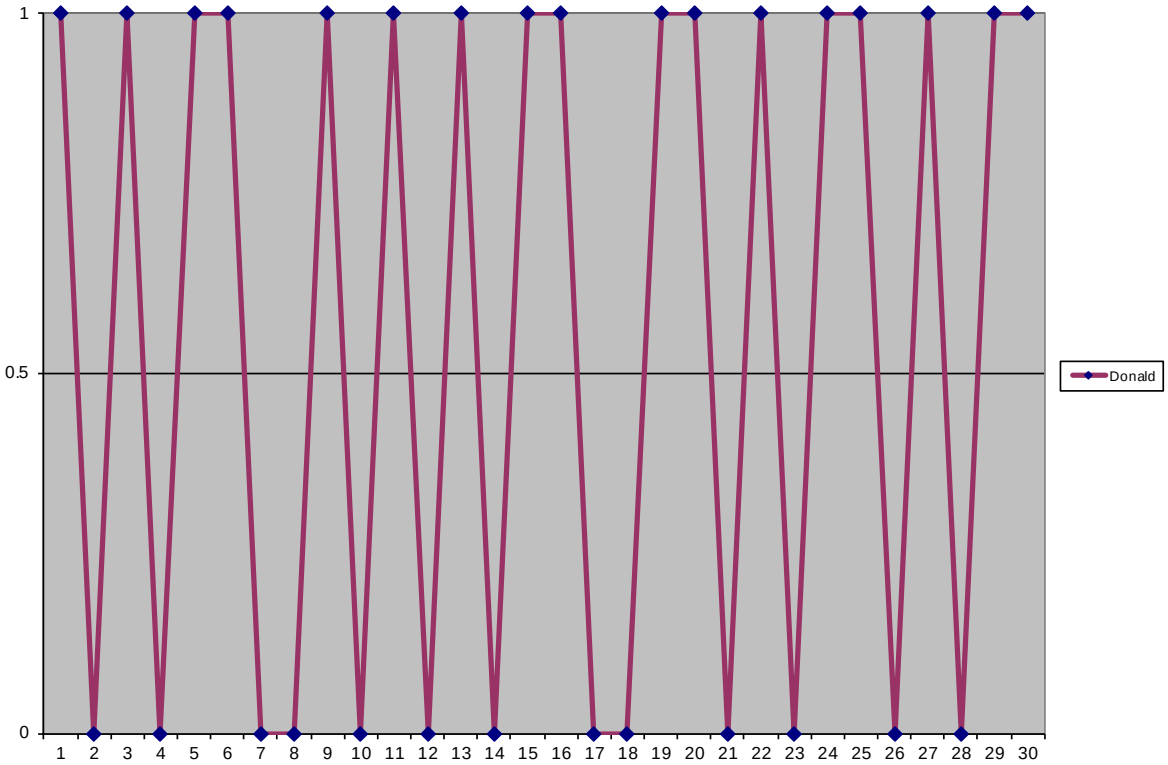
Perceptions of Chance and the Efficient Market Hypothesis
(0 = False, 1 = True)

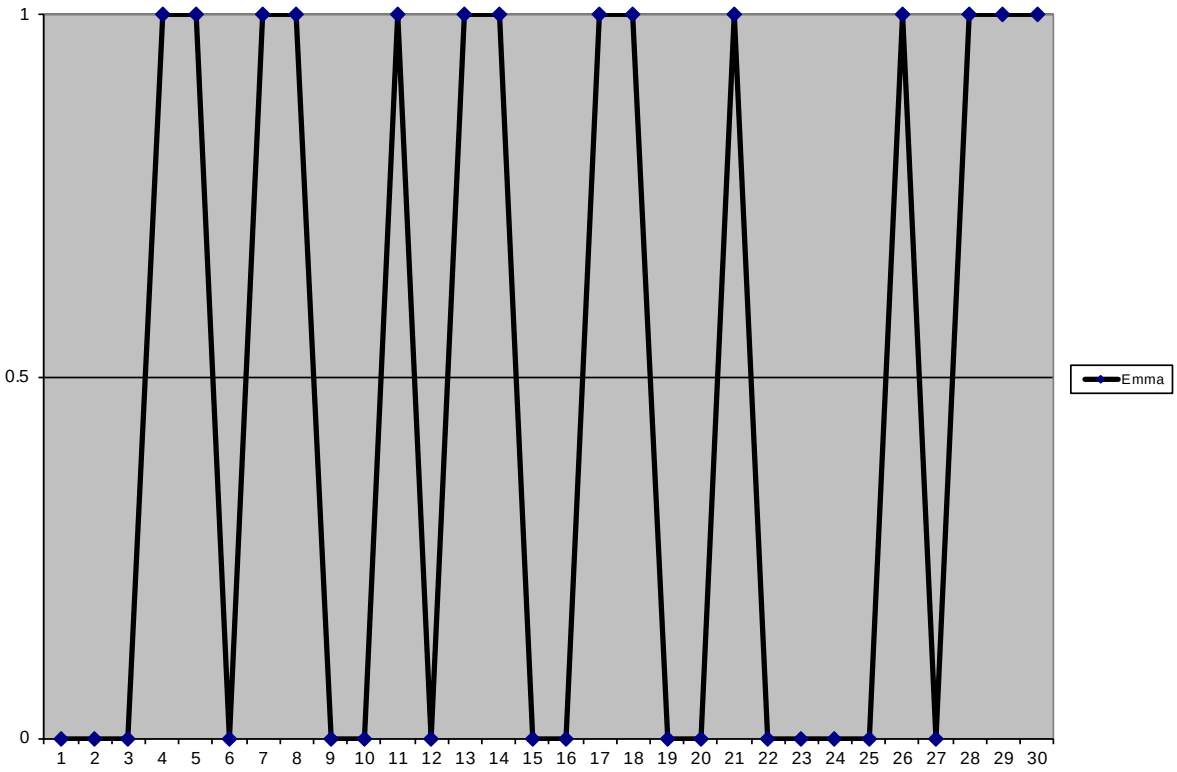
Question	Alice	Bob	Cindy	Donald	Emma
1	0	0	1	1	0
2	0	0	0	0	0
3	0	0	1	1	0
4	0	0	0	0	1
5	0	1	0	1	1
6	1	0	0	1	0
7	1	0	1	0	1
8	1	0	1	0	1
9	1	0	0	1	0
10	1	1	0	0	0
11	1	1	1	1	1
12	1	1	1	0	0
13	0	0	1	1	1
14	0	0	1	0	1
15	1	0	1	1	0
16	1	1	0	1	0
17	0	0	1	0	1
18	0	0	1	0	1
19	0	0	0	1	0
20	0	1	1	1	0
21	0	1	1	0	1
22	0	1	1	1	0
23	0	1	0	0	0
24	1	1	1	1	0
25	1	0	1	1	0
26	1	0	0	0	1
27	1	1	1	1	0
28	1	0	1	0	1
29	0	1	0	1	1
30	0	1	0	1	1


1
0.5
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Question
Alice


1
0.5
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Bob


1
0.5
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Cindy


1
0.5
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Donald


1
0.5
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Emma

KAHOOT

Lesson 2 – Hayek on the Knowledge Problem and Prices, Kahoot link: https://create.kahoot.it/share/lesson-2-the-knowledge-problem/3b990c79-cc77-4170-bbf7-fc3b537c39b6

CONCLUSION

By conveying information and incentivizing action, prices allow for the coordination of economic activity among a vast network of individuals with dispersed knowledge, leading to a spontaneous order that is more efficient and adaptable than any centrally planned system.

LESSON 3

Schumpeter on Entrepreneurship and Creative Destruction

INTRODUCTION

This lesson explores the concepts of entrepreneurship and creative destruction within the framework of capitalism, largely based on the insights of economist Joseph Schumpeter.

Entrepreneurship is a vital force in driving economic progress. It involves the continuous search for new and improved ways to combine resources, leading to the creation of new products, services, and processes. This process of discovery is inherently uncertain, often involving trial and error as entrepreneurs navigate the complex economic landscape.

The profit-and-loss system plays a crucial role in guiding entrepreneurial activities. The pursuit of profit provides a powerful incentive for entrepreneurs to take risks and engage in innovative endeavours. Successful ventures that generate substantial profits not only reward the entrepreneur but also attract capital, encouraging further investment in new ideas and initiatives.

Schumpeter's concept of creative destruction is the defining characteristic of capitalism. It describes a continuous process of innovation and transformation where new products, methods, markets, and organizational structures emerge and displace existing ones. This process is essential for the dynamism and growth of economies. It ensures that outdated and inefficient elements are replaced by more innovative and competitive ones, fostering economic progress and human flourishing.

LEARNING OBJECTIVES

Explain Schumpeter’s understanding of an entrepreneur.

Define creative destruction.

Understand the role of the entrepreneur as it relates to innovation, creative destruction, and economic progress.

Explain how profits and losses drive entrepreneurs towards creating value in society.

ECONOMIC CONCEPTS

Entrepreneur

Schumpeter defines an entrepreneur as someone who discovers and commercially applies new combinations of resources. This definition goes beyond simply owning, running, or investing in a business.

Schumpeter distinguished entrepreneurs from other economic actors because of their focus on testing and experimenting to find these new resource combinations.

Schumpeter also believed that entrepreneurs play a significant role in influencing consumer wants. Rather than simply responding to existing demands, they often anticipate future wants and educate consumers about the benefits of their new products or services.

Invention vs. Innovation

Schumpeter differentiated between invention and innovation, with the latter being central to his concept of entrepreneurship.

While invention refers to the creation or discovery of something new, innovation is the successful introduction and adoption of that new product or process in the marketplace. In other words, innovation is the economic application of inventions.

Not all inventions become innovations as many fail to translate into profitable business ideas.

The Profit and Loss System

The profit and loss system is essential in a market economy. It serves as a mechanism to distinguish successful innovations from unsuccessful ones.

Consumers ultimately determine the success or failure of new ideas through their purchasing decisions. Profitable ideas continue, while those that fail to generate sufficient revenue are abandoned. This trial-and-error process driven by the pursuit of profit is crucial for economic growth and prosperity.

Creative Destruction

"Creative destruction" describes the process of innovation and its impact on the economy. It emphasizes that economic progress and development are inherently disruptive, with new industries and products often displacing existing ones. Schumpeter argued that this process is essential for economic growth and prosperity, even though it can lead to hardship for those whose businesses or jobs are displaced.

Entrepreneurs are the agents of creative destruction. They drive economic progress by introducing new products, services, production methods, and market opportunities.

TIME

60–75 minutes

MATERIALS

- PowerPoint "Schumpeter on Entrepreneurship and Creative Destruction"
- AV system to play videos
- Pitch it! Activity Materials
- Kahoot! "Schumpeter on Entrepreneurship and Creative Destruction"

TEACHER'S GUIDE

1. Assign reading to be completed before class: chapters 2–3 from *The Essential Schumpeter*.

(Note: for steps 2–6, refer to the "Concept List" and the PowerPoint "Schumpeter on Entrepreneurship and Creative Destruction"*)*

2. Explain the concepts of the entrepreneur, innovation, creative destruction, and the profit and loss system.

3. Show how the entrepreneur's role in society lead to economic progress.

4. Give examples of creative destruction.

5. Play “Pitch it!” (see **Activities**).

6. Summarize the key takeaways from the lesson.

The following videos are embedded in the PowerPoint:

What is Entrepreneurship: https://youtu.be/RqEetboK1s4
Creative Destruction: https://youtu.be/l-soJGRgAAQ
Dragon’s Den https://www.youtube.com/watch?v=jxfcH3lsmqk

ACTIVITIES

Activity 1: Pitch It!

Pitch-It! is a card game designed to stimulate creativity and entrepreneurial thinking. Create genius or hilariously horrible products, then pitch your glorious inventions to your classmates. Be an entrepreneur and unleash your entrepreneurial spirit and experience the inventive process.

Materials

64 Product Cards (White): These cards will list various products.

64 Feature Cards (Blue): These cards will describe different features or attributes.

96 Reward Cards: These cards will be used by investors to vote for the best pitch each round.

Preliminary discussion questions:

How would you describe a successful entrepreneur?
How does an entrepreneur know if they have innovated in a way that creates value in their society?

Watch Dragon's Den: https://www.youtube.com/watch?v=jxfcH3lsmqk.

Begin the game:

1. Divide Players: Decide on the number of players and designate one or more players as investors.

2. Shuffle Decks: Shuffle the Product and Feature card decks separately.

3. Deal Feature Cards: Deal five Feature cards to each player (except the investors).

4. Draw a Product Card: An investor draws one Product card and reads it aloud.

5. Match a Feature Card: Each player (except investors) selects one Feature card from their hand that they think would best complement or enhance the product on the Product card.

6. Formulate the Pitch: Each player (or team of players) takes 3 minutes to decide on their pitch.

7. The Pitch: Each player (or team of players) has 60 seconds to pitch their combined product and feature idea to the investors. They should be creative, persuasive, and highlight the benefits of their invention.

8. Investor Decision: After all pitches are heard, the investors decide on the winning pitch of the round. Each investor secretly chooses their favorite pitch and places a Reward card face down in front of that player. All other players receive a Blank card. The Blank card is played for non-successful pitches. The Blank card preserves the anonymity of the investors. Without anonymity, students may change their true feelings about the pitch.

9. New Round: A new investor draws a Product card, players select a new Feature card from their hand, and the process repeats.

10. The first player (or team) to receive three Reward cards wins the game.

Pitch It! Cards List

Product Cards (White)

1. Sunglasses
2. Cat Bed
3. Water Bottle
4. Bird Cage
5. Laptop Charger
6. Raincoat
7. Shoe Rack
8. Dish Rack
9. Vacuum Cleaner
10. Food Storage Container
11. Trash Can
12. Pet Food Bowl
13. Coffee Maker
14. Floor Lamp
15. Throw Blanket
16. Toothbrush Holder
17. Dish Soap Dispenser
18. Towel Rack
19. Wall Clock
20. Desk Organizer
21. Step Stool
22. Closet Hanger
23. Reusable Shopping Bag
24. Dog Leash
25. Hand Sanitizer Dispenser
26. Candle Holder
27. Pillowcase
28. Cutting Board
29. Cheese Grater
30. Microwave Oven
31. Drying Rack
32. Wall Hooks
33. Portable Fan
34. Shoe Horn
35. First Aid Kit
36. Dog Crate
37. Backpack
38. Alarm Clock
39. Yoga Mat
40. Plunger
41. Ice Cube Tray
42. Storage Bin
43. Mop and Bucket
44. Clothes Iron
45. Door Mat
46. Water Pitcher
47. Air Purifier
48. Key Holder
49. Pet Grooming Brush
50. Folding Chair
51. Bedside Table
52. Car Floor Mats
53. Phone Mount for Car
54. Trunk Organize
55. Emergency Road Kit
56. Roof Rack
57. Car Wash Kit
58. Backup Camera
59. Car Battery Charger
60. Lawn Mower
61. Wheelbarrow
62. Leaf Blower
63. Outdoor Grill
64. Lawn Sprinkler

Feature Cards (Blue)

1. Weatherproof
2. Energy-Efficient
3. Motion-Activated
4. Lightweight
5. Eco-Friendly
6. Foldable
7. Rechargeable
8. Shockproof
9. Biodegradable
10. Heat-Resistant
11. Cold-Resistant
12. Stain-Resistant
13. Adjustable
14. Scratch-Resistant
15. Noise-Cancelling
16. Modular
17. Customizable
18. Compact
19. Ergonomic
20. Water-Repellent
21. Antimicrobial
22. Solar-Powered
23. Windproof
24. Fireproof
25. Magnetic
26. UV-Resistant
27. Rustproof
28. Odorless
29. Portable
30. Durable
31. Expandable
32. Reusable
33. Detachable
34. Interchangeable
35. Non-Toxic
36. Hypoallergenic
37. Transparent
38. Reversible
39. Insulated
40. Collapsible
41. Washable
42. Seamless
43. Kid-Safe
44. Pet-Friendly
45. Weather-Resistant
46. Hands-Free
47. Quick-Drying
48. Stretchable
49. Ultra-Thin
50. Ultra-Light
51. Dual-Purpose
52. Edible
53. Multi-Functional
54. Silent
55. Glow-in-the-Day
56. High-Precision
57. Programmable
58. Self-Healing
59. Contour-Adapting
60. Time-Saving
61. Zero-Gravity
62. Wireless
63. Tamper-Resistant
64. Eco-Conscious

Reward Cards (Green)

- 16 You receive Funding Cards (Can feature an image of money)
- 16 Best Pitch Award Cards (Can feature a trophy)
- 16 Investor's Choice Cards (Can feature a handshake)
- 48 Blank cards (for pitches not selected)

Concluding discussion points:

Do you think any of these pitches could be profitable in real life?

How would they be disruptive to the status quo?

Explore the Creative Destruction Lab website and discuss how it embodies the idea of creative destruction and promotes economic progress.

KAHOOT

Lesson 3 – Schumpeter on Entrepreneurship and Creative Destruction:
https://create.kahoot.it/share/lesson-3-schumpeter-and-his-influence-on-entrepreneurship-and-creative-destruction/8246c6dd-542a-4ca8-8069-a3c17ba6e4cc

CONCLUSION

Schumpeter's view of an entrepreneur is not merely a businessperson, but a driving force of innovation and economic development. Their ability to identify and implement new combinations of resources, often disrupting existing markets in the process, is key to his theory of economic progress.

LESSON 4

Coase and Ostrom on Public Goods

INTRODUCTION

This lesson focuses on the impact of institutions on societal interactions and economic decision-making in the context of public goods.

Elinor Ostrom emphasizes the importance of designing institutions that foster positive social behaviours. She argues that well-designed institutions can encourage creativity, entrepreneurship, and trust, leading to improved cooperation and well-being within communities. Conversely, poorly designed institutions can lead to inertia, predation, and suspicion. Ostrom believes that finding the right institutions is not about experts imposing solutions but about communities actively participating in the design, experimentation, and discovery of better ways to live together. This participatory approach ensures that institutions are tailored to the specific needs of each community.

Ronald Coase's work focuses on transaction costs, which are the costs associated with using factors of production. He highlights that exercising a right, such as the right to use a factor of production, often comes with external costs that impact others. For example, a factory's right to produce goods might involve the cost of pollution, affecting the health and well-being of nearby residents. Understanding transaction costs is crucial for efficient resource allocation. Coase's work suggests that clearly defining property rights and considering the associated external costs can lead to better economic outcomes.

Both Ostrom and Coase's insights emphasize the need for thoughtful institutional design to promote positive social and economic outcomes. While Ostrom focuses on fostering cooperation and trust, Coase highlights the importance of understanding and managing the costs associated with using resources. Their combined perspectives provide valuable insights for creating a more just and efficient society.

LEARNING OBJECTIVES

Define public goods.

Explain how institutions impact societal interactions and economic decision-making, especially pertaining to public goods.

Summarize Elinor Ostrom's perspective on the importance of institutional design for promoting positive social behaviours like creativity, entrepreneurship, and trust.

Describe Ronald Coase's concept of transaction costs.

Explain why clearly defined property rights efficiently solve externality problems.

ECONOMIC CONCEPTS

Public goods

A public good is defined as a good that is both nonrival and nonexcludable. Nonrival means that one person using the good does not diminish another person's ability to use the good. Nonexcludable means that it is difficult to prevent individuals from enjoying the benefits of a good once it is produced.

Institutions

Institutions are the arrangements or "rules of the game" that structure social interactions. These rules can range from informal social norms to formal laws. Institutions shape individual incentives and decisions, ultimately influencing outcomes for individuals and society as a whole.

Transaction costs

Transaction costs are the costs associated with using markets, contracts, and the price system. They represent the expenses incurred when establishing and maintaining property rights. These costs significantly impact how property rights are distributed across different governance structures and organizations.

Externality

An externality arises when a transaction between two parties creates costs for people who are not involved in the transaction. These costs, often called external costs, are not fully reflected in the accounting costs of the transaction, leading to a discrepancy between the private cost of an action and its social cost.

TIME

75–120 minutes

MATERIALS

- PowerPoint "Coase and Ostrom on Public Goods"
- AV system to play videos
- Free Riding Experiment Kahoot and Materials
- Pollution Permits Activity Materials
- Kahoot! "Coase and Ostrom on Public Goods"

TEACHER'S GUIDE

1. Assign reading to be completed before class: chapters 1, 3, and 5 from *The Essential Ronald Coase* and chapter 9 from *The Essential Women of Liberty*.

*(Note: for steps 2–6, refer to the "Concept List" and the PowerPoint "*Coase and Ostrom on Public Goods*")*

2. Explain the concepts of public goods, institutions, transaction costs, and externalities.

3. Introduce the work of Elinor Ostrom and discuss the challenges associated with providing public goods.

4. Conduct the Free Riding Experiment.

5. Introduce Ronald Coase's idea of transaction costs and the impact of institutions on transactions costs and efficiency.

6. Play the Pollution Permits Game.

7. Summarize the key takeaways from the lesson.

The following videos are embedded in the PowerPoint:

Elinor Ostrom: https://youtu.be/L-ob_9Fb03I
What are Transaction Costs: https://youtu.be/JsQ7tc3G-KQ
Transaction Costs and Institutions: https://youtu.be/HswlAQtyqOY
The Problem of Social Cost: https://youtu.be/_pKMHKHLHFQ

ACTIVITIES

Activity 1: Free Riding Experiment

Here is a simple game where you can think about free riding while working in small teams (large classes) or individually (small classes). You earn $200 for each of the "red cards" you keep and $1,000 × percentage of the red cards contributed.

Each team of two students has *two* red cards to allocate in one of three ways:

- Keep both red cards.
- Contribute one red card.
- Contribute both red cards.

Materials

- Your class (everyone participates!)
- Free Riding, Kahoot link: https://create.kahoot.it/share/lesson-4-public-goods-with-ostrum-and-coase/afb31ffb-ec1a-475d-a167-70302f997ab1

Class Time: 15–20 minutes

Class Size: any

Procedure

1. The game consists of four rounds. In Round 1, each team/individual decides how many red cards to keep. Then each team/individual submits its decision via Kahoot! The instructor displays the results and computes the percentage of red cards contributed. This percentage is multiplied by $1,000, and the result is the community pot received by all teams/individuals. For instance, if the percentage contributed is 60% = 0.6, we get $1,000 × 0.6 = $600. Every team/individual gets $600. If one red card was kept, those teams/individuals earn $600 + $200 = $800. If a team/individual kept both red cards, they earn $600 + $400 = $1,000. This reveal comes as a big surprise to a number of teams/individuals.
2. Now run Round 2. Each team decides how to allocate the cards again, and the process described in Round 1 is repeated.
3. Run Round 3. Same process.
4. In Round 4, we usually like to double the stakes and multiply the contributions by $2,000. This provides a stronger incentive to contribute.

Reflections of Activity

The wonderful part of this demonstration is that every team/individual player recognizes the dual incentive structure. If everyone keeps the red cards, the low contribution rate penalizes the entire society. When most teams/players are contributing, the incentive to free ride (and earn more) is strong!

The demonstration is best when the instructor allows teams/players to address the class vocally after each round.

Let's measure the extent of free riding by determining the potential earnings with every team fully contributing compared to what happened in each set of rounds.

Summary: In a given round, a player/team can maximize earnings by not contributing, but earnings for the group as a whole are maximized when everyone contributes fully.

Did the level of contribution decline within each set of rounds?

It is thought that individuals are often more likely to contribute when their contributions will be matched by others. What are some examples of institutions that are (or could be) used to increase contributions toward public goods?

Activity 2: Pollution Permits Game

In this game you will examine how alternative air pollution control strategies can have dramatically different costs of compliance. You will be managers of a polluting firm attempting to comply with pollution control regulations or a member of the Sierra Club, a concerned environmental group.

Materials:

- Role Playing handouts for each team (four total)
- Pollution Record Sheet (Print or Digital)
- Pollution Permit Auction Teacher Spreadsheet

Set up:

Divide the class into four teams. Three teams should be of approximately equal size, and the Sierra Club should consist of two or three students. The Board (teacher) is considering two pollution control options: (1) auctioning 12 pollution permits which will reduce emissions in the industry by half or (2) assigning 12 pollution permits so that each company will receive enough permits to cover one-half of their present emissions level. We will conduct two experiments to evaluate the costs and benefits of each option.

Round 1:

Each group is asked to bid for the available permits. Remember that no company will be allowed to pollute without a permit so failing to acquire a permit means that your company will shut down and there will be no profits for this portion of the experiment. As the government representative, I will employ various auctioning mechanisms to sell the permits.

Round 2:

Each firm is granted a number of permits consistent with half the level of production they are currently producing. Each is then free to buy permits from, or sell permits to, the other companies, or the Sierra Club. The companies, which sell permits, are asked to perform an auction of their choosing.

In all cases, your group's profit/losses will determine your participation points. However, just for being here, each team starts with $1,000 points.

Discussion

Which firms bought permits and why did they do so?
Which firms sold permits and why did they do so?
Did any firm go out of business, and if so, why?

Role Playing Handout #1: Sierra Club

Round #1: You are granted a budget of $2,250. Your task is to acquire as many pollution permits as your budget allows. A total of 12 permits are up for auction and any money you have remaining in your budget is lost. You earn $300 for each permit you acquire.

Round #2: The firms will offer permits at auction to the highest bidder. Your new budget of $2,250 will need to be spent wisely since you do not know the number of permits that the firms are willing to sell. Once again, any money left over in your budget is worthless, only the permits that you acquire are worth $300 each.

Role Playing Handout #2: Coal-Burning Power Plant

Round #1: You are the biggest polluter. Your marginal revenue (MR) from acquiring permits is as follows:

Number of Permits	MR
1	400
2	500
3	700
4	900
5	1500
6	700
7	300

You are willing to bid positive amounts in order to capture profit. The profit for this round is determined by taking the total revenue you earn minus the marginal cost of the bids you make. Your biggest profits come from being able to produce a large output.

Round #2: Since you are the biggest polluter, you are granted five pollution permits, which allow you to continue to operate your company with half the emissions as before.

Sell/Buy Permits	Marginal Revenue (+/-)
sell 4 permits	-$1000
sell 3 permits	-$800
sell 2 permits	-$600
sell 1 permit	-$400
do nothing	$0
buy 1 permit	$1000
buy 2 permits	$1500
buy 3 permits	$1750
buy 4 permits	$2000

Any trades you make in this round are determined by auction (of your choice if you decide to sell). Your team may set a minimum (or reservation) price.

Role Playing Handout #3: Chemical Plant that Manufactures Sulphur Dioxide (SO_2)

Round #1: You are the intermediate polluter. Your marginal revenue (MR) from acquiring permits is as follows:

Number of Permits	MR
1	450
2	550
3	700
4	700
5	600
6	400
7	200

You are willing to bid positive amounts in order to capture profit. The profit for this round is determined by taking the total revenue you earn minus the marginal cost of the bids you make.

Round #2: Since you are the intermediate polluter, you are granted four pollution permits, which allow you to continue to operate your company with half the emissions as before.

Sell/Buy Permits	Marginal Revenue (+/-)
sell 3 permits	-$1500
sell 2 permits	-$750
sell 1 permit	-$250
do nothing	$0
buy 1 permit	$300
buy 2 permits	$900
buy 3 permits	$1800
buy 4 permits	$2700

Any trades you make in this round are determined by auction (of your choice if you decide to sell). Your team may set a minimum (or reservation) price.

Role Playing Handout #4: Steel Plant

Round #1: You are the smallest polluter. Your marginal revenue (MR) from acquiring permits is as follows:

Number of Permits MR

1	1000
2	800
3	700
4	600
5	400
6	250
7	100

You are willing to bid positive amounts in order to capture profit. The profit for this round is determined by taking the total revenue you earn minus the marginal cost of the bids you make.

Round #2: Since you are the smallest polluter, you are granted three pollution permits, which allow you to continue to operate your company with half the emissions as before.

Sell/Buy Permits	**Marginal Revenue (+/-)**
sell 2 permits	-$250
sell 1 permit	-$50
do nothing	$0
buy 1 permit	$250
buy 2 permits	$400
buy 3 permits	$550
buy 4 permits	$700

Any trades you make in this round are determined by auction (of your choice if you decide to sell). Your team may set a minimum (or reservation) price.

Pollution Record Sheet

TO POLLUTE OR NOT TO POLLUTE

RECORD SHEET

Group Name: _____ Revenue per Unit: $ _____

Group Number: _____ Cost of Abatement: Primary _____ Secondary _____

Treatment	Output	Units Abated	Pollution Level	Revenue	Cost	Profit
1						
2						
3						
4						
5						
6						

KAHOOT

Lesson 4 – Coase and Ostrom on Public Good, Kahoot link: https://create.kahoot.it/share/lesson-4-public-goods-with-ostrum-and-coase/afb31ffb-ec1a-475d-a167-70302f997ab1

CONCLUSION

By understanding and considering transaction costs, policymakers and communities can design institutions that foster cooperation, innovation, and sustainable resource management.

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