Checking credit and debit statements.

UNIT 6

# The Phillips curve

The Phillips curve shows how changes in demand can temporarily affect inflation and output as prices adjust over time. In the experiment, participants act as price setters, choosing prices based on demand and their expectations of others, which demonstrates how these individual decisions shape wider economic outcomes.

## Student instructions

Each participant represents a producer in an economy. In each of the ten rounds, your only task is to determine a price $p$ for your product. At the same time, the other participants determine the price of their product. By choosing $p$, you determine the level of demand according to the function:

$$y = \omega - p$$

The lower the price you choose, the greater the demand, $y$. It increases with the exogenous influence $\omega$, which indicates the maximum possible demand at a price of $p = 0$. Each participant automatically produces as much as is demanded.

Each producer purchases intermediate goods from other producers at prices determined by those producers. The capital letter $P$ denotes the average of the prices of all producers. This average determines your unit costs. These are $P - 10$ and the

**CORE projects**

Concepts in the experiment are related to material in:

- Sections 4.4 (https://tinyco.re/3153573), 4.5 (https://tinyco.re/1354658), and 4.6 (https://tinyco.re/3553735) in *The Economy 2.0: Macroeconomics*
- Sections 15.3 (https://tinyco.re/5346312), 15.4 (https://tinyco.re/2646845), 15.5 (https://tinyco.re/4857967), and 15.6 (https://tinyco.re/4646846) in *The Economy 1.0*

total cost of the entire production therefore amounts to $y \times (P - 10)$. Profit is calculated as sales minus costs, that is

$$y \times p - y \times (P - 10)$$

The average price, $P$ is necessarily unknown at the beginning of a round. This means that when you set the price of your product, you do not yet know the cost of your production, as this depends on the prices of all other producers.

The game is played over ten rounds. In the first five rounds, $\omega = 30$. In the second five rounds, $\omega = 50$.

Individual participants achieve high profits when production and profit per unit do not differ greatly.

This is shown in Figure A, which depicts the demand curve for $\omega = 30$. It also shows the costs per unit $P - 10$. As the demand curve reflects the price, the difference between the two curves is the profit per unit. Total profit is reached by multiplying with the quantity produced. Therefore, total profit is represented by the rectangle in Figure A. Maximizing this rectangle implies making it quadratic.

Your screen in the experiment will look like Figure B. You are given the demand and the cost function and you are asked to enter your price, $p$.

After all participants have set their price, you will receive feedback on the average price set by the participants, and your payoff you gained in that round (your 'income'). This is shown in Figure C. It also shows the solution in a graphical way.

It is very important that you abide by the following rule: All your decisions must be kept private. You must not communicate with other students nor make public announcements, no matter how tempting it might become.

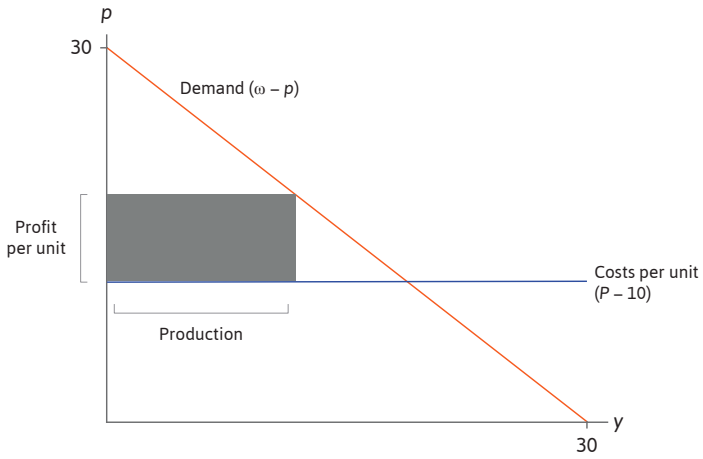


**Figure A** Visualization.

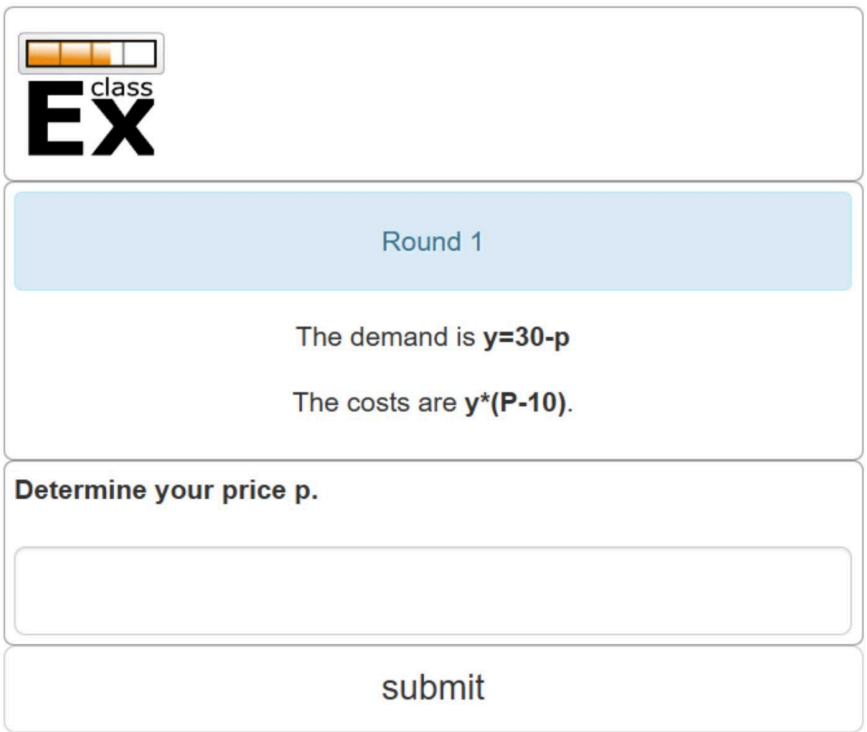


**Figure B** Price input screen.

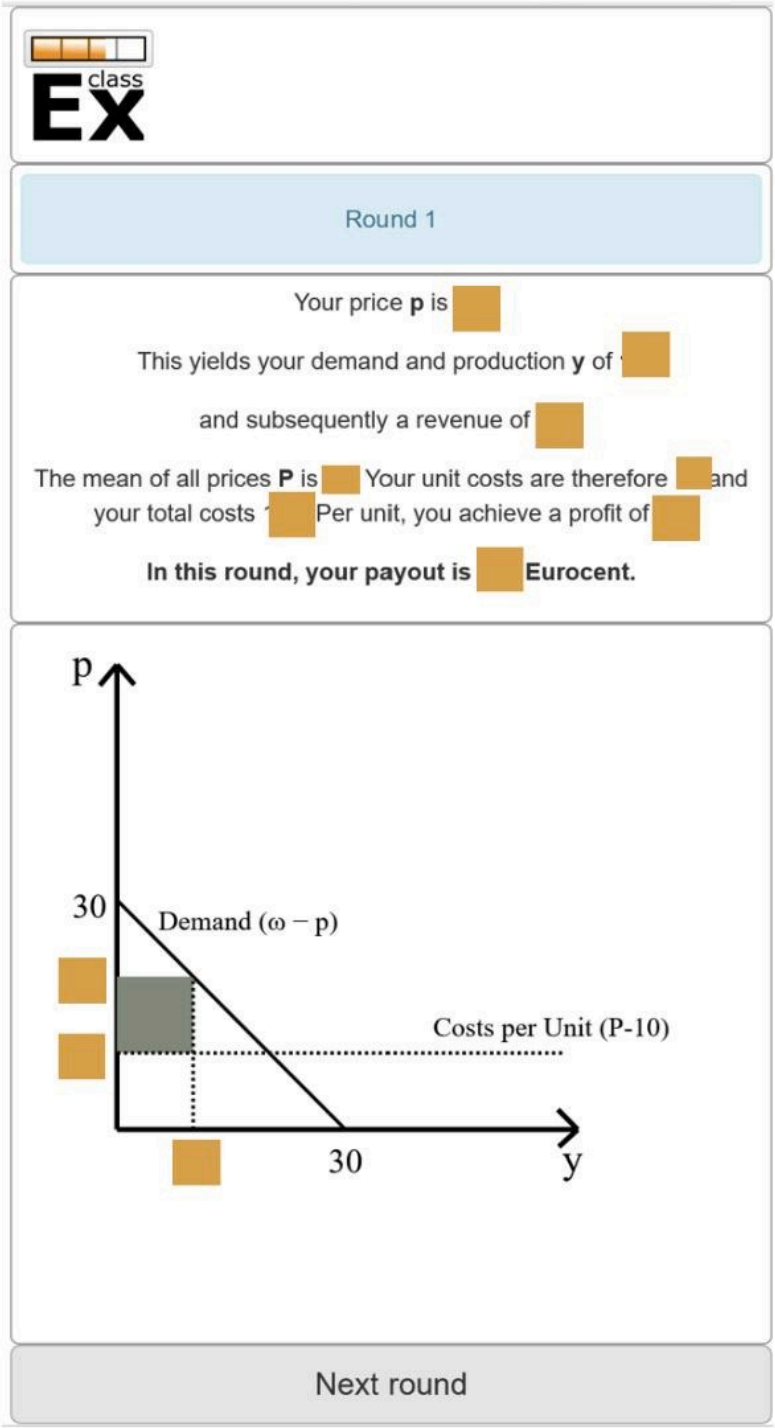


**Figure C** The classEx feedback screen.

### *Warm-up questions*

You can use the following questions to test your understanding of the rules.

1. What is your decision in each round?
   - A. How much to produce
   - B. Which price to set
   - C. What the average price will be
   - D. How much to pay other producers
2. If you choose a lower price, what happens to demand for your product?
   - A. Demand increases
   - B. Demand decreases
   - C. Demand stays the same
   - D. Demand becomes zero
3. What does $P$ represent in the experiment?
   - A. Your own price
   - B. The highest price chosen by any producer
   - C. The average price chosen by all producers
   - D. Your profit
4. Why do you not know your exact production costs when you choose your price?
   - A. Because demand is random
   - B. Because costs depend on the average price chosen by all participants
   - C. Because $\omega$ is unknown
   - D. Because production is chosen after the round
5. Unit costs are given by: $P - 10$. If the average price is $P = 18$, what are your unit costs?
6. Profit is calculated as: $y \times p - y \times (P - 10)$. If your demand is $y = 20$, your price is $p = 15$, and the average price is $P = 18$, what is your profit?

You can check the answers on the student instructions' webpage (https://tinyco.re/9554621).

## Homework questions

1. Assume that the demand, $y$, for products from a representative producer in an economy is given by $y = \omega - 2p$ and that production corresponds to demand. The costs amount to $y \times (P - 40)$, where $P$ is the price of the basket of all products in the economy.
   *(a)* Determine the optimal price, $p$, as a function of the price of the basket of goods, $P$.
   *(b)* Determine the optimal price in the event that all other producers also choose this price.
   *(c)* Assume that $\omega = 480$ in the first five rounds and $\omega = 680$ in the remaining five rounds. Calculate the optimal price and quantity in each round.
   *(d)* Figure D shows the prices and quantities chosen by participants in a lecture hall in 2022 for a similar task. In Round 6, $\omega$ increased. Why did production increase in Round 6? How can the chosen prices be explained by sticky information or limited rationality?

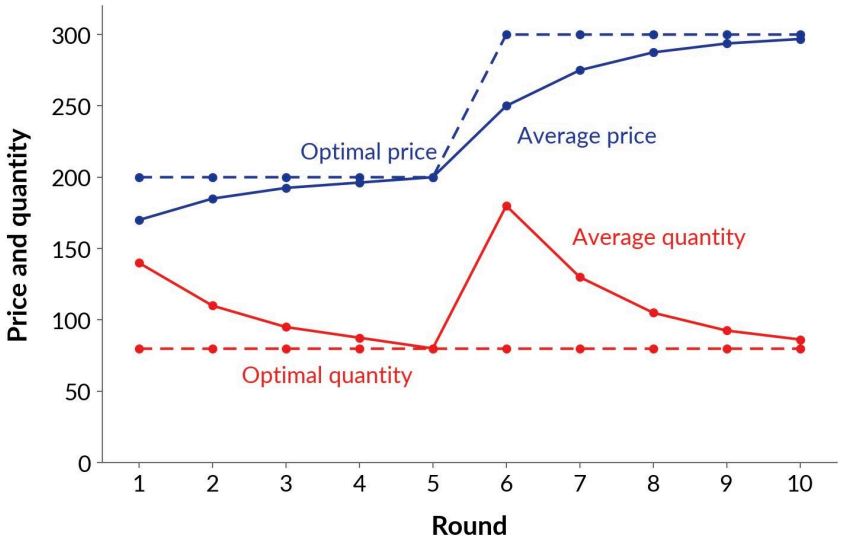


**Figure D** Results from a run of the classEx game.