GAME The Market Experiment

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Introduction

This experiment is used to introduce students to the working of competitive markets. As The Economy explains in more detail in unit 8, the experiment was first run in 1948 by Edward Chamberlin, whose results were quite different from what equilibrium theory would predict. Later, at the beginning of the 1960's, Vernon Smith reran the experiments with two key innovations: firstly the prices of agreed trades were made public, the second was to repeat the game several times, with the participants keeping the same valuation in each round. Both the design of the history and the experiment serve various pedagogical objectives, which we now discuss.

1. The experiment is actually quite different from the way many students picture "demand and supply" when one teaches it to them. It is important that they understand that models are useful to represent situations that are not obviously connected to the model.
2. It shows that the theory we explains gives empirically validated conclusions. They are in fact more likely to believe the results are true, if they have behaved in the way the theory predicts.
3. In conjunction with the history of the experiment, it also demonstrates that, as we point out in unit 5, "the rules of the game matter". It was only when Vernon Smith changed the way the games was played that the behaviour was in accordance with the theory.
4. As per the previous point, it also shows that empirical work sometimes needs to be persistent and one needs to try many things until one can be sure what makes a particular "treatment" work, and when it does not.

The game should ideally be played before the theory about markets is introduced, to avoid the risk that knowing the theory might affect how some students play. It can be played in quite large groups (at University College London and Universitat Pompeu Fabra groups of 300-400 students have played it successfully), but it works in groups as small as a dozen people (as in Universidad Carlos III). For large groups it is important to have a very visible screen or blackboard to record trades, and to have enough space for people to move around and find and discuss with potential trading partners.

Useful for…

Concept(s)/theme(s)	Competitive markets; supply and demand
Unit(s)	8

Materials required

Checklist:

Large screen/whiteboard □
Instructions (below) □
Forms to record earnings □
Playing cards □

Trader's instructions

We are going to set up a market in which the people on my right will be buyers, and the people on my left will be sellers of home painting services. I will now give each buyer and seller a numbered playing card. Some cards have been removed from the deck, and all remaining cards have a number. Please hold your card so that others do not see the number. The buyer's cards are red (hearts or diamonds), and the seller's cards are black (clubs or spades). For the buyers, their number is the maximum willingness to pay for painting. For sellers, their card number represents the minimum price (i.e. cost) they would accept to make a trade.

Trading: Buyers and sellers will meet in the centre of the room and negotiate during a five-minute trading period. When a buyer and a seller agree on a price, they will come together to the front of the room to report the price, which will be announced to all by writing it on the whiteboard. Then the buyer and seller will turn in their cards, return to their original seats and wait for the trading period to end. There will be several market periods where new cards will be distributed.

Sellers: You can each sell a single unit of the commodity during a trading period. The number on your card is the cost (in pounds) that you incur if you make a sale. You will be required to sell at a price that is no lower than your cost (that is, the number on your card). Your earnings on the sale are calculated as the difference between the price that you negotiate and your cost. If you do not make a sale, you do not earn anything nor incur any cost in that period. Suppose that your card is a 2 of clubs, and you negotiate a sale price of 3.5 pounds. Then you would earn 3.5-2 = 1.5 pounds. You would not be allowed to sell at a price below 2 pounds with this card (2 of clubs). If you mistakenly agree to a price that is below your cost, then the trade will be invalidated when you come to the front desk; your card will be returned, and you can resume negotiations. Think of it this way: it's as if you knew someone who would sell you the commodity for a price that equals your cost number, so you can keep the difference if you are able to resell the commodity for a price that is above the acquisition cost.

Buyers: You can each buy a single unit of the commodity during a trading period. The number on your card is the value (in pounds) of your budget. You will be required to buy at a price that is no higher than the value number on the card. Your earnings on the purchase are calculated as the difference between the value number on the card and the price that you negotiate. If you do not make a purchase, you do not earn anything in the period. Suppose that your card is a 9 of diamonds, and you negotiate a purchase price of 4 pounds. Then you would earn 9-4=5 pounds. You would not be allowed to buy at a price above 9 pounds with this card (9 of diamonds). If you mistakenly agree to a price that is above your value, then the trade will be invalidated when you come to the front desk; your card will be returned, and you can resume negotiations. Think of it this way: it's as if you knew someone who would later buy the unit from you at a price that equals your value number, so you can keep the difference if you are able to buy the unit at a price that is below the resale value.

Recording earnings: Some sellers with high costs and some buyers with low values may not be able to negotiate a trade, but do not be discouraged, since new cards will be passed out at the beginning of the next round. Remember that earnings are zero for any unit not bought or sold (sellers incur no cost, and buyers receive no value). When the period ends, I will collect cards for the units not traded, and you can calculate your earnings while I shuffle and redistribute the cards. Your total earnings equal the sum of earnings for units traded in all periods, and you can use the Earnings Record Form to keep track of your earnings. Sellers use the left side of the Earnings Record Form, and buyers use the right side. At this time,

please draw a diagonal line through the side that you will not use. All earnings are hypothetical. Please, do not talk with each other until the trading period begins. Are there any questions?

Final Observations: When a buyer and a seller agree on a price, both should immediately come to the front table to turn in their cards together, so that we can verify that the price is neither lower than the seller's cost nor higher than the buyer's value. If there is a line, wait together with your trading partner. After the price is verified, it will written on the board and announced loudly. Then those two traders can return to their seats to calculate their earnings.

Earnings Record Form

Name:

Sellers	**Buyers**
1st Period (cost =) _____ - _____ = (price) - (cost) (earnings)	1st Period (value =) _____ - _____ = (value) - (price) (earnings)
2nd Period (cost =) _____ - _____ = (price) - (cost) (earnings)	2nd Period (value =) _____ - _____ = (value) - (price) (earnings)
3rd Period (cost =) _____ - _____ = (price) - (cost) (earnings)	3rd Period (value =) _____ - _____ = (value) - (price) (earnings)
4th Period (cost =) _____ - _____ = (price) - (cost) (earnings)	4th Period (value =) _____ - _____ = (value) - (price) (earnings)
5th Period (cost =) _____ - _____ = (price) - (cost) (earnings)	5th Period (value =) _____ - _____ = (value) - (price) (earnings)
6th Period (cost =) _____ - _____ = (price) - (cost) (earnings)	6th Period (value =) _____ - _____ = (value) - (price) (earnings)
7th Period (cost =) _____ - _____ = (price) - (cost) (earnings)	7th Period (value =) _____ - _____ = (value) - (price) (earnings)
8th Period (cost =) _____ - _____ = (price) - (cost) (earnings)	8th Period (value =) _____ - _____ = (value) - (price) (earnings)

Data

In this section, we illustrate briefly the data from two different sets of experiments in two different countries. In one case, at Universidad Carlos III, the experiments took place in many different tutorial groups ranging from 10 to 40 students in size, and they were repeated three to four times in each group. This data is available in the accompanying Excel file.

At University College London, the experiment took place in a large classroom, and it was only repeated once.

Figure 1: Data from University College London, UK

Price	*Transactions*
1	0
2	0
3	0
3.5	1
4	6
4.5	1
5	19
5.5	2
6	23
6.5	1
7	14
8	1
9	1
9.5	1
10	0

Additional experiments

One advantage of this experiment is that it is possible to do a number of variations with the same format:

1. *Unit tax*: The sellers are told that a certain amount T is taken from them and given to the experimenter upon making a trade. This is easier to implement and compute than a proportional sales tax. The effect on the average price can be calculated.
2. *Maximum/minimum price*: The sellers cannot sell for any price above/below an externally fixed amount p^M/p^m.
3. *Monopoly/Oligopoly*: There is a single seller for the group. Easier to do in small groups.
4. *Collusion:* The sellers are allowed to discuss and agree on prices. It will be interesting to test when the agreements are sustainable and when they are not.

Possible questions

Multiple choice questions

Based on the results available from experiments we can say that:

1. The theory of equilibrium in competitive markets has been clearly rejected. [*Answer:* FALSE].
2. The theory of equilibrium in competitive markets is accepted independently of how the market is organised. [*Answer:* FALSE, the details of the experiment matter, and the variations discussed above matter as well].
3. It is not possible to test economic theories since they are not falsifiable, as the assumptions require infinitely many consumers and producers and perfect knowledge. [*Answer:* FALSE, as the next question clarifies].
4. The predictions of the theory of equilibrium in competitive markets can work under some conditions (sufficient knowledge and experience of the participants, a sufficiently large number of participants). [*Answer:* TRUE].

Discuss questions

1. Based on the results obtained in the experiments, discuss conditions under which the theory of equilibrium in competitive markets can work.
2. Based on the results obtained in the experiments, discuss conditions under which the theory of equilibrium in competitive markets is not likely to work. In particular, consider institutional arrangements that make it less likely. (For this question, the additional experiments we describe in the previous section are especially useful).

Exam questions

1. Can economics be called an experimental science? Why?
2. What lessons can be learnt from the history of the market experiment?
3. Will the predictions of the theory of equilibrium in competitive markets work under any conditions? If your answer is yes, explain why. If the answer is that they cannot, are there any conditions when they will be satisfied?