Classroom

EXPERNOMICS

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Experiments and the Intermediate Micro Class

*B. Patrick Joyce**

The intermediate micro class may be the best place in the curriculum for full integration of experiments as a pedagogical device. Most students in the intermediate class are coming from a principles experience which is much more descriptive, and, as a result, many are wrestling with a level of abstraction having no obvious anchor in either their experience or in observable behavior. Adding to this difficulty is the attitude that theory is not useful in the sense that students who can and do use economic theory to answer questions on an exam, will give an entirely different explanation when asked to analyze an economic event away from the classroom environment.

Experiments can do three things for the instructor. First, they can provide the anchor for the theoretical constructs used, especially if the experiments are conducted prior to introducing the concepts in the classroom. Second, they do illustrate the two major themes of economics; economic theories (usually) predict well, and institutions make a difference. Third, and maybe most important for the classroom environment, they produce an interest as the students think, "What are we going to do today?" because the instructor has

changed a passive lecture/note-taking format into an active *doing* format.

At Michigan Tech, we're on the quarter (10 week) system, so there is little or no slack time, and experiments must be carefully integrated for maximum impact. I currently use as many as eight separate experiments and combine each with the requirement of a two page (maximum) report (the analog of a lab report with which Tech students are very familiar). The lab report is designed to get the student to think about the structure of the experiments and the resulting data (I grade the reports leniently, except for spelling and writing incomplete sentences). The instructor can then use the experiment as a universal reference point while the concept (theory) is developed, and can use the reports to see what parts need emphasis. The reports are particularly important because they identify what the students know, and often highlight fallacious reasoning held by a surprisingly large proportion of the students.

The experiments I use are (with references):

1. Voluntary contributions (Brock, 1991 or Leuthold, 1987)
2. Preference reversal (Grether and Plott, 1979)
3. Oral double auction--pit (Smith, 1962)
4. Chamberlin double auction--search (Chamberlin, 1948)
5. Production function (Anderson, 1986)--this is really a demonstration, but students love it
6. Monopoly--oral double auction (Smith and Williams, 1989)
7. Monopoly--posted offer (Smith, 1981)
8. Insider trader (Plott and Sunder, 1982).

The data from these experiments is not research quality nor should it be. There will be some students who won't understand the instructions no matter how clearly they are written or how carefully you explain them. Don't worry about it. Some students will simply try to finish as quickly as they can. Don't worry about this either or the occasional student who will try to sabotage the experiment. As long as your parameter choices are robust you will get good results. For example, in experiments (labs?) 3 and 4 choose your values so the curves are fairly flat near the equilibrium price, so a few non-trades have no appreciable effect on the price.

What if your results are inconsistent with the theory you are teaching? Don't worry about this either (as long as it is only for a few experiments). For example, you will surely get strong preference reversals on the $-bets in experiment 2 and you should not get monopoly pricing in experiment 6. Both of these provide an excellent opportunity to talk about hidden assumptions (does the monopolist have perfect information about the buyers' values?) and limitations (do individuals always behave rationally--do individuals have endowments effects or focal points?). In other words, experiments are not an unmixed blessing and are clearly not prescribed for dogmatic theorists.

For experiments to be effective, students have to be motivated by a salient reward structure. Here at Michigan Tech, we use a lab fee which funds the earnings in the experiments, but bonus points can be used and even food is possible (Netusil, 1995).

Instructions for these and other experiments can be found in *Experimental Economics* by Davis and Holt (1992). Remember you are not striving for research quality data, but you will get data which is very useful for pedagogical purposes. I allot one half of a class period (25 minutes) to run an experiment. This can be a tight fit, but I have yet to throw an experiment out because of fatally flawed data. I would be more than willing to share my experience with anyone. Please contact me at (906) 487-2677 or pjoyce@mtu.edu.

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Classroom Experiments in Price Formation: Improving the Understanding of Market Behavior in Romania

*W. Whitney Hicks**

Many people in Eastern Europe and the former Soviet Union apparently expected that the transition from central planning to the market was going to be a "quick fix" to problems of inefficiency and stagnant or declining income levels. There was and still is incomplete understanding among the population in these countries of how markets work and what is required to make them function effectively. Among other things, the role of information in efficient pricing is not fully appreciated. With support from the U.S. Information Agency, the School of Business and Public Administration at the University of Missouri-Columbia (MU) is helping to establish a program in business management in the college of engineering at the University of Sibiu in Romania. I was one of several faculty members from MU who taught four-week courses during the summers to faculty members in the college of engineering in Sibiu. As an economist, I thought classroom experiments simulating the operation of markets was a good way to help the engineering faculty understand how markets operate and what is required to make them work efficiently.

In the summer of 1993, I taught an introductory economics course in which we simulated a double oral auction.[1] In that experiment, many of the participants in the auction clearly did not bargain to get the best price for the principal whom they were representing. Many seemed almost oblivious to the information in the form of posted prices for transactions as they were made. Rather they seemed intent on making as many transactions as they could during the trading period.

During the past summer the class simulated a double oral auction, a posted offer auction, a price searching experiment, an experimental test of preferences over the distribution of income, and a pollution rights trading game.[2] When playing the double oral auction game[3], participants were allowed to make only one transaction in each period. This modification was made to encourage more bargaining among the participants before they made a transaction. The information available to the participants was increased in each of the four trading periods. During the first period participants could bargain with only the participant to whom they were assigned, while in subsequent periods participants could bargain with anyone in the class whom they chose to bargain with. In the second period, the prices at which transactions were made during the previous period were not posted. In the third and fourth period, prices for transactions made in the previous periods were posted. The equilibrium price was constant during the four periods, but there was only weak convergence toward the equilibrium price during the four periods. In general, participants in 1995 with the modified format behaved as eager buyers and reluctant sellers just as they had in 1993. The participants continued to

make transactions quickly before the end of the trading period, frequently with the same person they had made a transaction with in the previous period. Buyers and sellers behaved in this way even though they knew that they and the person they were trading with had received new instructions from their principal at the beginning of each period. The median and average prices established after four periods of trading were above the equilibrium level.

In the posted price experiment sellers posted the price and buyers could choose how much to buy at those prices. After four rounds of trading, the price and quantity had converged to the equilibrium level. This was the only experiment in which the equilibrium price and quantity were reached. The price searching experiment proved to be difficult for the class. The participants played the role of monopolists and sought to "discover" the profit-maximizing price and quantity. Those sellers who offered an amount in excess of the quantity demanded and who recognized the quantity sold at that price as a point on the demand curve, had the most successful search strategy.

The experimental test of preferences over the distribution of income showed that 38 percent of the participants opted for a distribution of income more equal than the distribution that could be explained by their individual risk aversion. The majority's response in this "game" is consistent with a survey that showed that among the societal goals of efficiency, economic freedom, growth, stability and justice, justice received the lowest ranking among 18 participants. Finally, in the pollution rights trading game, buyers of pollution rights paid somewhat more for rights to pollute than the cost of alternative methods of reducing pollution--reductions in output and/or the installation of pollution reducing technology, e.g., scrubbers.

In summary, the experience Romania's population has had of living in a shortage economy where sellers had short-side power seems to have resulted in a situation where eager buyers pay reluctant sellers more than the equilibrium price. This result seemed to hold in all of the relevant experiments, except the posted offer auction. Classroom experiments provide an opportunity to demonstrate the workings of the market in reaching market equilibrium and an efficient allocation of resources. Unfortunately, the double oral auction experiment showed only weak evidence in support of the participants' understanding of the importance of information for establishing an equilibrium price.

[1]*The double oral auction game was a variation of the one described in Experiment 4 in Greg Delemeester and John Neral, Classroom Experiments To Accompany Taylor's Economics: A User Guide (Boston: Houghton Mifflin Company, 1995). The modifications are based on the description of the*

game in Mindella Schultz, Economics Readings for Students of Ninth Grade Social Science or Readings in Economics for Twelfth Grade Students of American Democracy (DEEP).

[2]*Greg Delemeester and John Neral, ibid., Experiments 4, 5, 6, 9, 13 and 15.*

[3]*Mindella Schultz, op. cit.*

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An Experiment on Externality Rights

*Jim Stodder**

This experiment is simple and fun, but I have found it useful to make some Law and Economics points about externality rights and efficient specification of right, following Ronald Coase and Richard Posner.

Pair up everyone in the room to be either a BarBQer or a neighbor to one. The BarBQer likes to send smoke, the neighbor doesn't like to breathe it. Tell one half of the classroom that they live in a country where the neighbor has the right to be compensated for any smoke level over 0. The other half lives in a place where the BarBQer has to be compensated to accept any level other than 3.

Then let every pair try to come to a satisfactory bargain. Their total and marginal values over the externality are as follows. (It turns out that it doesn't make much difference whether each side knows, not only its own costs/benefits, but also those of the other side. You could demonstrate this if you want, but it will go quicker if you just put each side's information up on the board for everyone to see.) I do not include the "marginal" calculations below initially, but fill them in later in discussing the exercise

Smoke from BarBQ	0	1	2	3
BarBQer's Total Value	$0	$30	$50	$60
(BarBQer's Marginal Values)		(+$30)	(+$20)	(+$10)
Neighbor's Total Value	~~$35~~	~~$30~~	~~$20~~	~~$0~~
(Neighbor's Marginal Values)		(-$5)	(-$10)	(-$20)
BarBQer + Neighbor Value	~~$35~~	~~$60~~	~~$70~~*	~~$60~~

Most will arrive at smoke=2, ~~where their demanding smoke and the~~ Neighbor selling it, if we move from smoke=0, or *vice versa* if it's smoke-*reduction* for sale from smoke=3. combined values are maximized at $70. They can also now understand how this can be shown in marginal cost/benefit, i.e., supply/demand terms, with the BarBQer

The idea is that if the Neighbor has the right, so we are moving from smoke=0 as our starting point, then the BarBQer will reason that she could afford to make the neighbor better off than she is at 0 smoke (where she has a value of $35) and still be much better off than $0 herself. A deal of the BarBQer giving the Neighbor $25 at smoke=2 would do this, leaving them with $25 and $45, respectively.

Similarly, if the starting point for negotiation is smoke=3, the Neighbor will reason that she can afford to compensate the BarBQer for a reduction to Smoke=2. An example would be a deal leaving the BarBQer with $65 and herself with $5 of value (which is better than $0).

This analysis can be done in graphical terms, with the marginal values graphed above. It can be seen that 2 is the optimal level of smoke if levels are discrete (non-divisible). Notice, however, that if the levels of smoke are instead continuous (divisible) then the optimal level of smoke is actually somewhat higher, about 2.5.

These marginal value curves can be interpreted as *either* supply or demand curves -- depending on the direction that one is moving in! That is, if one is taking smoke=0 as the reference point, with N having the right and selling "smoke permissions" to B, then N is suffering *increasing* marginal damages (costs) and B is getting *decreasing* marginal benefits. So B has the "demand curve" and N the "supply curve." If we are moving in the opposite direction, from smoke=3 as our reference point, then this implies *increasing* marginal costs to B, and *decreasing* marginal benefits to N, so B now has the supply (of "smoke reductions") and N is the demander.

To see what can go wrong with this "internalization of the externality" consider what would happen if there were *two* peak levels of total output, as is possible--instead of just one as in the example above. For example, one can change just one number--so that N has a total value $75 at smoke=0. This would involve supply and demand "crossing twice." There are many real externality examples when this sort of non-convexity is a problem, so that any market has difficulty in finding the best solution.

The other major way for markets to mess

up is if the externality is "public"--not just between two individuals as in this nice little example, but between two large groups of individuals who cannot be presumed to cooperate--even with members of their own side--to express their true preferences, costs, or benefits. There are "free riders" if your side has to pay, and "hold outs" if your side has to accept compensation. This can be demonstrated by having just two big groups in the experiment, and giving each individual private cost/benefit information.

With publicness or non-convexity, it's not clear that government will have any better luck than markets. Thus we come to the Coase-Posner idea of efficient specification: legal right should be vested with the side likely to choose its own best level close to the global optimum. In the above-mentioned non-convexity when N values smoke=0 at $75, for example, the country that gets the optimum will more often be the country where N has the right. (See Stodder, "The Evolution of Externality Rights," *European Journal of Law and Economics*, 1996.) In practice of course, legal right is often awarded on distributional, rather than efficiency grounds.

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Expernomics on the Web

Readers with access to the world wide web can now browse past issues of Classroom Expernomics at the following URL:

http://www.marietta.edu/~delemeeg/expernom.html

Experiments Session Slated at Western Economic Association Meetings

On Sunday, June 30, at 8:15 a.m., a session on experimental economics titled "Using Experiments in the Classroom" will be held at the Western Economic Association meetings in San Francisco. The chair of this session will be Jeffrey Parker of Reed College in Portland, Oregon. Presentations will be made on the following topics:

- "Motivation and Coordination Games: Experiencing Organizational Dynamics" --Nicole M. Bouchez, University of California at Santa Cruz
- "A Common Property Experiment with a Renewable Resource"--Denise Hazlett, Whitman College
- "Yarns Spun, Tales Told: Weaving Experiments into the Macro Principles Course"--Scott Benson and Tesa Stenger, Idaho State University
- "A Classroom Experiment on Optimal Choice and Preferences for Fairness: Let them Eat Cake"--David J. Cooper, University of Pittsburgh

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