INSECURE PARTICIPATION: EXPERIMENTS IN A ONE-DAY INTRODUCTION TO ECONOMICS

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ABSTRACT

Classroom experiments and exercises served as a one-day introduction to economics for students who felt insecure about taking first year business classes. The first experiment addresses demand in isolation, while the second addresses supply. A third integrates supply, demand and equilibrium in a pit market with all students having equal expected profits. A monopoly pricing exercise addresses market failure. Exercises use many incremental questions to reveal principles of microeconomics. Evaluations show that at the end of the program, students were familiar with economic results and concepts, and were more comfortable with taking economics.

Key words: classroom experiments, exercises, principles, bond, auction, pit market.

J.E.L. Classifications: A21, A22, C90

1. INTRODUCTION

Experiments and exercises formed the core of a one-day introduction to economics program for two cohorts of incoming first year students with little or no previous experience in business classes. Economics was one day of a five-day program with two days each of accounting and finance. For eight years, we held and advertised this introductory program to prepare and reassure incoming students who felt unprepared for first-year university business units. Students paid fees specifically to attend this program, and the program was financially successful for our school.
The purposes of this paper are to make these teaching instruments available, persuade lecturers of their usefulness, and to give guidance on possible ways to use them. To that end, my Deakin University School of Accounting Economics and Finance Working Paper 2006-32 (Geller, 2006) includes appendices providing all instructions, experiments and exercises for non-commercial educational use with appropriate citation. I re-edited the appendices fixing a few errors, making them simpler to use, and condensed their printed length. An earlier working paper (Geller, 2004) includes the instructions, experiments and exercises as used during the one-day introduction. Due to space constraints in this publication, all appendices are available electronically through those working papers: http://www.deakin.edu.au/buslaw/aei/publications/economics_wp.php.

Forty-nine students attended the first introductory program on a regional campus and 79 other students attended the following day on an urban campus. None of the students attended both sessions as each cohort was participating in the week-long program on their campuses. Both cohorts had received two days of accounting lectures and the second had also received one day of finance lectures. The remaining day or two of finance followed the day of economics. I felt that an active day in the middle of a week of lectures would leave the students more open to my material on economics, and have them more refreshed for their remaining financial material.

Our one-day introduction to economics used four classroom sessions separated by breaks. The first session consisted of a thirty-minute introduction and overview of economics, an experiment consisting of auctioning a bond, and an exercise using auction results to illustrate demand. The second session consisted of a ten-minute question and answer session on the bond auction exercise, a nightmare auction detailed below illustrating supply, and the beginning of a pit market experiment illustrating the interaction of supply and demand. The third session completed the market experiment and began an exercise investigating the market experiment. The final session completed the market exercise and an exercise on monopoly power. Overall, the students were active and engaged relative to undergraduate lectures throughout the program, returned promptly from lunch and breaks, and showed only limited fatigue in the final session.

Eighty-eight percent of the students who responded to an end of day evaluation expressed greater comfort about taking economics units. Further, three of the five participants who expressed no increase in comfort, drew supply and demand diagrams properly, read equilibrium price and quantity from their diagrams, and correctly answered at least half of multiple-choice questions applying supply and demand.
Although I developed these experiments and exercises over several years of teaching without referring to published materials, my experiments grew from seminars, classes on research experiments, and experiences with the experimental economics laboratory at Georgia State University in the 1990s. There is a large literature on classroom economics experiments and Charles Holt’s website at the University of Virginia: http://www.people.virginia.edu/~cah2k/teaching.html has many experiments and descriptions of much of the literature on economic experiments including instructional ones for classroom use. Holt (1999) provides an excellent overview of the broad range of classroom economics experiments.

The experiments presented here contribute to the body of experiments in three ways. First, they isolate demand and supply individually in two experiments. Second, the unusually detailed exercises ‘baby-step’ students through discovery of economic principles and provide correct responses several lines after students address an issue. This level of detail and prompt checks make these exercises suitable to students who were absent for the experiment or take economics through distance learning. Third, these experiments are equitable in the sense that all students have the same potential to earn points, money or other incentives, and that none are excluded from participation through limited numbers of roles in games or through the need for non-participating assistants. However, the main contribution of this paper is an effective, entertaining, and reassuring introduction to economics.

These experiments and exercises have several objectives. They introduce students incrementally to the principles of supply and demand including equilibrium, changes of curves, market outcomes and market failures. They give the students personal experience with supply, demand, and related processes. They create interaction between students and give students a common experience of economic phenomenon. They build student ability to perform basic economic skills such as drawing diagrams.

As a one-day introduction, our program also had the objective of increasing student comfort with taking first year economics and providing students without previous economics experience with a foundation of economic knowledge.

2. BEGINNING THE PROGRAM

Preparation for the exercises took most of a workday: updating a bond, photocopying, printing and reviewing instructions, and preparing overhead slides. The bond (figure 1) required a new maturation date and
redemption instructions, with one printed bond for each session and a slide version to display to students. Each student needed a copy of each exercise “write-up”: bond, market exercise, and monopoly; as well as a buyer or seller sheet for the market exercise. I used printed instructions for myself and enlarged overhead slides of the instructions for the students to read. I wrote and photocopied the evaluation during the lunch break the first day of the program, having failed to consider the need for it in advance.

I began the program by introducing myself including my qualification and experience. Then I explained economics as the science, art, and mathematics of doing the best we can with what we have. ‘We’ can vary between individual, family and societal scales; ‘best’ can take a variety of meanings. Our one-day program in economics served as an illustration of such constrained maximisation in which I had to make choices about what material to address and how to address it in the limited time available. My approach was unconventional, active, participatory, and used experiments. Students need not understand the lessons and objectives of the experiments while we did them, rather the meanings would become clear during the written exercises or even later. I finished by requesting their tolerance of the unusual approach and asking for their participation.

All of the following numerical observations about the experiments comes from the second cohort. I did not retain records on the first day, as I had not thought of writing this piece.

3. BOND AUCTION

The first exercise of the day constructed a demand curve from demand prices provided by the students. A bond is a suitable good for addressing demand for students since it is easy to explain and students quickly understand that receiving money in a few months is worth something to them. The bond auction illustrates demand but also introduces the idea of bonds as well as providing an opportunity to explain interest rates. An example bond is figure 1; appendix 1 is my instructions; appendix 2 is the bond exercise and figure 2 gives results. Twenty-seven students did not submit bids, apparently without affecting the exercise.

While projecting a transparency of the bond and showing a twenty-dollar bill to the students, I explained that a bond is merely a document of debt with a specific date for payment. I would pay someone -- whoever brought the bond to me -- $20 at the end of the semester; I would also take money from someone -- the winner of the auction -- that day. This auction provided an opportunity to explain interest as the reward for delaying using money for consumption, as well as interest as the difference between the
price of a bond and the redemption value. I noted my name, position, and university on the bond, illustrating the role of accountability and credibility in bond value. I also noted that I could die before the maturation date, which introduced the concept of risk and why the bond cannot be worth more than $20. While it is not strictly true that the bond cannot be worth more than $20, I feel it is important to make the claim that it must be worth less. If I were to make a ‘profit’ by receiving more than $20 someone may complain that I had abused my position thereby causing me inconvenience.

The auction for the bond is a second price auction. Winners do not pay the amount they bid, but rather they pay the second highest bid amount. This invites an explanation of incentive compatibility, the reason for the use of the second price. If winners paid their bid, they would have an incentive to report a lower bid than the highest amount they would be willing to pay. By making the payment the second highest bid, the planner of the experiment has removed the incentive to report falsely. The incentives of the procedure are compatible with the teaching objective of revealing demand. Notice that this approach introduces the concept of demand as willingness to pay.

The students wrote their names on slips of paper with the most they would be willing to pay in order to get $20 at the end of the semester. (Detailed instructions are in appendix 1.) The students passed the pages to the end of the row and the student on the end sorted them from high on the bottom to low on the top. I re-stacked them into one pile with low on the bottom and high on the top, and wrote the bid prices quickly on a projected transparency. The students copied the bids to use in their exercise (appendix 2). Figure 2 gives the results of the bond auction as a diagram.

While students copied the bids, I distributed the Bond Exercise that guides the students through organising the bids into a diagram. Groups of two to four students completed this exercise in about 35 minutes. Each student should have an individual write-up as it provides notes on demand. I told the students that the exercise was written for diverse students. Most of the questions are very elementary (numbers 1 and 2 for example), and should be answered on face value. Others address particularly interested students (Appendix 2: Bond auction write-up question 50 for example) and are identified by statements like ‘Interested students may want to’. Most students should ignore such questions.

I walked around the room giving help to students as they worked on the exercise. After five minutes, I spent two minutes addressing the group as a whole to guide the students through the first 17 questions. These first questions merely orient the students to the bids and label the diagram. After 15 minutes, I briefly extended the students to question 24. Most students
were beyond question 24, but a brief summary advanced those who lagged and may have reassured those who had proceeded further. After 25 minutes, I reviewed through question 41. This left seven minutes and most students completed the exercise.

One could well explain to the students during the regular unit following this introduction, or while debriefing this experiment as part of an introductory unit, that our “demand” curve is simplified for easy presentation. We allow each student to bid on only one bond, instead of allowing multiple bids at varying prices and quantities for each student. True demand curves allow each buyer to have values for many units, and permit different values for each unit each buyer desires. The following supply auction has a comparable simplification.

The objectives of the bond experiment and write-up exercise focus on a simple introduction to demand. Students must think explicitly about a dollar value of the benefit of a purchase. In the written exercise students plot points and draw curves, find demand prices and quantities demanded, shift demand curves as well as listing factors that shift demand. The relevance of this exercise goes beyond demand in that it exposes students to vocabulary relating to finance and macroeconomics.

4. SUPPLY AUCTION

Bonds are not suitable for demonstrating supply as supply prices do not vary -- unless I issued everyone with a bond, which is prohibitively expensive. Instead, I chose ‘the nightmare auction’ in which students submit the lowest payment they would accept to live through the anxiety nightmare of being the only person nude in class. The objectives of this exercise are to:

• introduce supply highlighting the role of costs,
• introduce and illustrate implicit and explicit costs,
• show upward sloping supply as marginal cost increasing with quantity,
• show a general increase of marginal costs as a decrease of supply,
• present a shift of supply,
• introduce the idea of simplified models, and
• introduce the conditions of perfect competition.
The procedures in this experiment are emotionally sensitive; gradual introduction helps. I made sure that several points were clear to the students, and explained some issues before revealing the nature of the auction. I advised the students to select someone they know well, someone they can ‘speak for’ on privacy issues and that obviously the easiest person would be themselves, but they are free to select someone else if they wish. They need not ever reveal whom they chose. I told the students that unlike the bond experiment, in this one they would not reveal their names, no money would change hands, and the winner would not do the auctioned activity.

I gently introduced the topic. “When I was young we had this anxiety nightmare. We’d look up and realise that we were the only person in class with no clothes on.” Example instructions are in appendix 3. Students wrote on pieces of paper the minimum amount of money they would accept to live through that nightmare, to be the only person naked in class for an entire class period.

I then collected the papers as with the bond, but stacked with high on the bottom and low on the top. I kept an eye out for interesting cases in order to use the time constructively and engage the students while sorting the bids. Lessons about supply awaited more organised time after the sorting when I could present supply systematically. Is one billion dollars a thousand million (USA) or a million-million (UK)? What is the daily interest on a billion dollars anyway? In each session, someone computed the interest. Some students actually specified goods, unambiguous real prices. Others specified dollars and cents or a specific unrounded dollar, which is likely to be for a specific purchase. Such real prices provided an opportunity to discuss nominal and real. Some participants expressed surprise to find out that money is not real and that economics is not about money.

With the stack finished, I plotted the prices on a diagram. Our results are in figure 3, which also shows that most students did not submit bids. There is no written exercise for the nightmare auction as the specific skills and lessons would largely repeat the bond auction. Instead, I demonstrated the work. Beginning students may not know how to draw a diagram, so I showed them how to establish the length of the quantity axis and the height of the vertical axis. I had to use a logarithmic scale on the price axis. Nearly all Victorian students, from which we draw the vast majority of our students, learn logarithms during high school, although retention varies. I briefly reminded them about base 10 logarithms as the number of digits: 1 for 1, 2 for 10, 3 for 100....
One begins plotting supply schedules with the lowest numbers because buyers sort them that way. They buy from the cheapest sources first, before ones that are more expensive. Students were sceptical. I explained that sometimes economists assume that all examples of a particular type of good are exactly interchangeable – equally useful naked bodies – and allowed further scepticism to remain for the final punch line. Anyway, buyers select the lowest cost unit and then select progressively more costly units. This is an example of marginal cost increasing as quantity increases and supply is marginal cost, as it is in markets with many buyers and sellers.

I challenged the students. “I said supply was marginal cost. What costs are there in being the only person naked in class?” The students offered a series of implicit costs including loss of social standing, embarrassment, loss of friends, etc. One person mentioned the possibility of legal costs. The latter example is as close to explicit costs as I normally received in this experiment, a risk of an out of pocket expense. I asked the students if loss of social standing and embarrassment were ‘real’. They agreed both were. At this point, we can see supply on a diagram illustrating marginal (mostly implicit) costs increasing with quantity.

The final stage of the nightmare auction introduces shifts of supply, increase of the marginal cost schedule as a supply decrease, and concept of ceteris paribus. I repeated the nightmare auction saying that everything would be the same as before, except for one condition. I explained that the practice of making one change at a time, ceteris paribus, is important in economics as it allows for interpreting the effects of specific causes. The one change in the nightmare auction is that ‘this time, pretend that your oldest living relative who can see is in the room with the class and you.’ I asked people to raise their hands if they (or their alter-ego) would be willing to be naked for a lower payment than before, and got no volunteers. When I asked about who would require higher payment, about half the students raised their hands.

Returning to the supply diagram, some of the points moved higher with ‘grandma’ present, some stayed the same height (showing no change in cost of producing the product) and none moved downward. So, the curve in aggregate moved upwards. I reminded them that when asked for a show of hands, the participants indicated that they were less willing to provide the product, not more willing. Therefore, an increase in marginal costs (pointing upward on the diagram) is a decrease in supply (pointing leftward on the diagram).

The final aspect of the nightmare auction was to ask the students if the example was realistic. They said no. Then I told them that in the
upcoming semester there would be classes with one naked person and any
naked person who could hold still was as good as any other – figure
drawing in arts. I hope this will make them more receptive to economic
assumptions.

The nightmare auction introduced costs: implicit and explicit costs,
increasing marginal cost schedule and upward sloping supply, shift of
supply, and an increase of marginal cost as a decrease of supply. It
illustrates vividly that implicit costs are real. It foreshadowed perfect
competition and the use of assumptions, while challenging participants’
ideas about what is realistic. Academics have questioned the
appropriateness of using the idea of public nudity as an auctioned activity. I
have used this experiment for ten years in a variety of universities with
students from all over the world. No students have complained about it
either on student evaluations or through any other process. Using nudity for
this labour supply auction has the marked advantage of being immediately
imaginable in a way that most other labour supply examples are not: an
hour of cooking hamburgers, painting a house, data entry, etc.

5. PIT MARKET EXPERIMENT

The third event of the introduction to economics program was a
market simulation ‘pit’ experiment that integrated supply and demand. It
introduces equilibrium, demonstrates demand and supply along with shifts
of both, illustrates a level of precision in equilibrium, shows supply and
demand as a predictive model, and further introduces the concept of perfect
competition.

This pit experiment shares features, good and bad, with Chamberlin
(1948). Chamberlin found that the quantity traded in his experiments often
exceeded the equilibrium quantity due to his market breaking into smaller
markets around the classroom, resulting in inefficient trades. Holt (1996)
dresses this phenomenon in detail. Smith (1962) resolved the problem by
having buyers separated from sellers and each group call successively more
favourable bids to the other group until they agreed upon a trade price. I
found Chamberlin’s method of having all buyers and sellers circulate in the
room to be effective in large classes. Holt notes that double auctions can be
difficult and slow in large classes. “With large classes it is better to use the
students near the aisles and let the others watch” (1996, p.196). “Classroom
experiments are more difficult to use effectively in large classes since it is
the personal involvement that stimulates student interest” (1999, p.607). I
have not experienced this difficulty, but my experiments have involved at
most 180 students. I prefer full participation by all students even at the cost
of potentially weaker results. Of course, the double-oral auction format provides much more information to buyers and sellers, presents that information in a more public manner, and gives a faster convergence to equilibrium.

The market simulation experiment divides the participants evenly into buyers and sellers. Each participant receives a sheet (Appendix 4, pages 2 and 3) of paper divided into seven playing rounds documenting two units of an abstract commodity ‘stuff’ for each round. Detailed instructions are in appendix 4. Sellers have the costs for each unit of stuff and buyers have a ‘resale value’ for each of two units. Sellers make profits by selling units for more than their costs and buyers make profits by buying units for less than their resale values. Since this experiment focuses on costs and resale values, it provides an opportunity to introduce abstract commodities that feature strongly in introduction to economics units.

The values and costs yield an equal expected profit (appendix 5) for all buyers and sellers. That is, if each unit trades at equilibrium price, each participant would earn equal profit. As an incentive to participate industriously, I treated each point of profit as a ‘lottery ticket’ chance to win twenty dollars. Students did participate enthusiastically, and I conclude that $20 was sufficient motivation. If one used this experiment in a regular class, one may be tempted to use profit as class marks as incentive, since all students have equal chances to earn profits, but be aware of strong arguments against this practice (Stodder, 1998 and Cheung, 2003).

The market experiment sheets fit classes in multiples of 20. However, the order of the buyer and seller sheets allows other numbers to participate with only minor distortion of results. On the first day of our introductory program, there were 49 participants and 79 on the second day. I did not retain records on the first day. On the second day, there were 39 sellers and 40 buyers.

I read the instructions of the game to the participants, showing them example buyer and seller sheets, as well as demonstrating how to record trade prices and other information as well as how to compute profit.

The market experiment begins with a practice round in which the profit does not count as a chance to win money. I have found it productive to walk through the classroom checking sheets, reminding people to play only the practice round, to “buy low and sell dear” and other aspects of the instructions.

The demand and supply curves for the practice round were \( P_d=50-0.2Q_d \) and \( P_s=20+0.2Q_s \) with \( Q \) expressed as a percentage of the participants. Equilibrium price and quantity were 35 points/unit and 75% of the class size of units (59 trades). The class reported 48 trades. Specifically,
I asked all buyers who had traded no units to raise their hands, and none did – establishing at least 40 sales. Then I asked all buyers who had bought two units to raise their hands; eight did -- establishing 48 sales or 61%. Presumably, most of the participants had no idea at that time of the specifics of supply and demand, or even that the concept of equilibrium existed, much less what equilibrium was in this case. I asked buyers who traded in the last two minutes of the game to raise their hands then asked them to tell me the trading price. They reported prices of 26.5, 35, 39, and 32.

The supply and demand curves remained the same for the first and second round as in the practice round. Now that the participants were familiar with the game and playing with a chance to win money, they played more enthusiastically than in the practice round. Buyers reported 53 trades, or 67%. They reported prices of 38, 33, 33, 35, 36, 34.5, 36, 31 and 34, averaging 34.5. Round 2 had 54 trades with the average price of the final trades being 35.3.

In rounds 3 and 4, 25% of buyers self-selected out of each round through tâtonnement auction. I asked for a show of hands for buyers who would be willing to ‘sit out of’ round 3 and not trade any units. They would receive 10 points in compensation. Few raised their hands. I then suggested higher or lower prices until we settled on a compensation of 16 points for 10 buyers to sit out of round three.

It is impossible, a priori, to give the equilibrium prices for rounds three and four since we cannot know which buyers will accept the buy-out. However, a 25% reduction in demand drawn shifted or rotated from the price axis, yields a predicted equilibrium of about 63 or 64% (50 trades) and a price of about 32 or 32.5.

The result in round 3 was 40 reported trades (50%) with an average of final prices being 31.5. In round 4, 10 buyers sat out for 15 points. Buyers reported 43 trades with the prices in the last minute between 30 and 35 yielding an average of 32.5.

Note that I asked buyers to report trade prices in rounds 3 and 4 when the equilibrium price had fallen. In the past, I have noticed a small bias in participant reporting of results. Buyers occasionally decline to report high prices, and sellers occasionally exclude low prices. Apparently, they hear other prices being reported and adjust their numbers or lower their hands before I can call on them. That bias could cause difficulties in the classroom if it conflicted with economic prediction. But, with care the bias can help in the classroom, although the distortion would be problematic in research. By asking buyers to report prices in rounds with suppressed prices, if a bias occurs, it does not harm teaching objectives.
In rounds 5 and 6, all buyers participated and 10 sellers sat out for payments of 8 and 11 points. Sellers reported 45 trades in each of rounds 5 and 6 with the average of the final prices being 36 and 37 ½.

Quantities traded were consistently lower than the predicted equilibrium quantity, while prices were close to the predicted equilibrium. This suggests that some costs affected both buyers and sellers. Such undocumented costs would shift both supply and demand inward. With brief leading questions, the students proposed possible costs, such as the inconvenience of moving around the room and seeking trades. In this way, students discovered transaction costs as a source of market distortions.

Detailed results from the six trading rounds provide students with empirical results to compare to theoretical predictions in a 53-question exercise (appendix 6). Students can complete the exercise independently or in small groups. Several important or informative answers follow shortly after relevant questions, providing students with prompt feedback and preventing them from going too astray. The exercise relies upon the students having access to the instructions introducing the market experiment, the number of participants in the exercise (class size), as well as the number of trades and final prices for each of the trading periods. With that information, even students who did not participate in the experiment, including off-campus students, may complete the exercise.

Since I seldom know the number of participants before running this experiment, the exercise allows for any number of participants. Unfortunately, this requires an awkward re-scaling of the quantity axis of the diagrams in the exercise, and the re-scaling must be completed at the beginning of the exercise, questions 1.3 to 1.6. As I did with numbering the axes on the bond exercise above, I guided the students moderately quickly through re-scaling the quantity axis on the market experiment exercise.

In the remainder of the first section (questions 1.xx) participants identify equilibrium through comparing marginal costs with marginal benefits, then compare the theoretical equilibrium with empirical results from the experiment. Unlike most introductions to economics, this exercise presents participants with an example of the dispersion of results around equilibrium. The second section (questions 2.xx) relates buyers to demand and shows a change in demand with its effects upon the equilibrium. The final section (section 3.11) presents the same lessons for supply.

6. MONOPOLY EXERCISE

The last exercise of the day presented students with monopoly price setting and foreshadows market failure (appendix 7). As well as
introducing monopolies and the concept of price maker, the exercise also introduces profit maximisation; total, fixed and, variable costs; total revenue; as well as marginal cost and demand as a system of equations.

I began developing this exercise years ago as an experiment. It did not work well. Over a few semesters, I reduced and dropped the experiment and simplified the exercise. I believe the current form is efficient and effective, but engaging and fun for most students only if they do it as a group exercise.

This exercise presents students with a downward sloping demand curve and a horizontal marginal cost curve. It then guides them though calculations of revenue, cost, and profit. It provides details of a zero profit example, and invites the students through a profitable but not profit maximising example. The students then try to find the maximum profit through trial and error. Participants completed this exercise in small groups or individually, as they chose, and nearly all completed it in about 20 minutes.

I debriefed the students afterwards, and asked students to tell the highest profit. Most found $400, the correct answer. I then showed them how to find the profit maximising price and quantity using the marginal revenue curve. I did not explain how to derive MR, but rather how to draw it from a linear demand curve. Many participants expressed appreciation of the speed of the technique.

7. CLOSING THE PROGRAM

I finished the introductory program with a five minute summary of what we learned. First, I told them that I would like them to complete an evaluation of my program before they left. I warned them that the evaluation would test them on the material so that I could find out what they learned. It would not evaluate them because their names would not be on the forms. I requested that they do their own work so that I may get good information and be able to improve the program. Then I summarised what we had done, reviewing demand and benefits from the bond exercise, supply as costs from the nightmare auction, demand and supply interacting in the market experiment, equilibrium, shifts of supply and demand, market results and monopoly pricing. While distributing the evaluation I thanked them for participating, I requested that students who had taken economics previously place their evaluations in one box, and the rest of the students place them in a box by the exit.
8. EVALUATION

An evaluation (figure 4) assessed the economic component of the introductory program, including the effect on the goals of increasing student comfort and providing basic economic knowledge. It was as an instrument to improve my teaching, not a research instrument. I wrote the evaluation quickly to provide information to me as a participant and witness to the program. I did not include controls that would be important in convincing others of subtle conclusions. Therefore, conclusions using the instrument are broad and imprecise. However, the evaluation was sufficient to support some interesting conclusions.

Sixty-seven students who had not previously taken economics returned the evaluation. Of these, fifty-nine said they were more comfortable about taking economics (question 1) including 13 who volunteered that the increase was limited. Five reported no increase in comfort and three did not respond. No more than half a dozen students who had taken economics returned the evaluation, therefore I have not addressed them in any analysis.

The evaluation had eight questions, but it evaluated ten aspects of economic performance. Question two revealed two criteria: 2a) Did the student label price and quantity on the diagram? 2b) Were supply and demand drawn properly, sloping up and down respectively and labelled? Question three required that the student find both equilibrium price and quantity (rounding permitted). Questions four to seven were interpreted as stated on the evaluation. Question eight served as two questions with price and quantity treated distinctly. The tenth aspect was ‘Did the student draw a changed supply or demand curve in order to answer questions four to eight on the evaluation?’

The students performed at a passing level (at least 50%) on each of the first nine points. Few students drew a curve as a tool in finding the effects of a change. I did not tell them to draw curves generally to find effects of changes nor did I direct them to do so or in the evaluation. I ‘role-modelled’ drawing curves and I had them draw changes in curves in the market experiment exercise; however I did not present the technique as a general practice. Clearly, I should have explained the usefulness of drawing curves more explicitly as only three participants used the technique.

The other major problem area that the students showed was with relating marginal cost to economic results. Half of the students gave incorrect answers for each of the marginal cost questions (6 and 7).
Overall, the students received passing marks for the material we addressed. Students who replied that they were more comfortable about taking economics after the one-day program answered two-thirds of the evaluation questions correctly (table 1). Those reporting little or no increase in comfort responded correctly on 59 and 56 percent of the items.

9 Summary and Conclusion

I conclude that the experiment-based program for a one-day introduction to economics increased participants’ comfort about taking economics and provided participants with a foundation of knowledge of economics. As a participant, I feel that the program ran well, that the students remained engaged, and that the breadth and depth were appropriate given that the students would see the material again during a regular unit. The program would improve with a more explicit recommendation to use economic tools of analysis, specifically supply and demand diagrams and drawing changes in the curves.

Economic experiments show promise as engaging and effective teaching techniques that may benefit our increasingly diverse student base. Experience with experiments and detailed exercises may assist foreign students (who may feel insecure about both the English language and economics terminology) as well as less academically inclined students who are entering university in increasing numbers due to economic shifts. However, experiments and especially the detailed exercises as used in this paper are not yet internationally mainstream teaching tools. A next step would be to evaluate these techniques in a controlled study in which the effectiveness of these experimental techniques is directly compared to the effectiveness of some other preparatory course.

I hope other instructors find these experiments and exercises useful and I would appreciate any comments on their applications and effectiveness.
Figure 1: Example bond

The holder of this bond is entitled to $20.00 from Teacher Name of the School of Economics, This University. The bond may be redeemed on or after Date during office hours. This bond may only be redeemed once, after which it is of no value. Only the signed original of this bond is valid.

Teacher name
Department of Economics
This University

Figure 2: Bond auction results

Note: Twenty-seven of seventy-two students did not submit bids.
**Figure 3:** Results of nightmare auction

Bids to be the only person nude in class were: 5, 20, 50, 100, 200, 1000x4, 1500, 1734.73, 5K, 6K, 10Kx3, 50K, 300K, 300K, 800K, 1M, 1.1M, 1.1M, 10M, 1KM, 1.25KM, 99KM, 1MM, 1KMM. Also, ‘3 bottles of tequila’. The $5.00 bid said “lunch money.”

**Figure 4:** Evaluation for one-day introduction to economics
1. Do you feel more comfortable about taking economics this year?
2. Draw reasonable supply and demand curves in the diagram below and label the axes.
3. If there were many buyers and sellers facing your supply and demand curves, what would be the market equilibrium price and quantity traded?

P=  
Q=  

4. What would happen to the equilibrium price if demand increased?

Decrease  Stay the Same  Increase  Not enough information  Don’t Know

5. What would happen to the equilibrium quantity traded if demand increased?

Decrease  Stay the Same  Increase  Not enough information  Don’t Know

6. What would happen to the equilibrium price if marginal cost increased?

Decrease  Stay the Same  Increase  Not enough information  Don’t Know

7. What would happen to the equilibrium quantity if marginal cost increased?

Decrease  Stay the Same  Increase  Not enough information  Don’t Know

8. Referring back to your original supply and demand curves and answer in question 3, what would happen to the equilibrium price and quantity if there were one seller instead of many (and still many buyers)?

Price would:

Decrease  Stay the Same  Increase  Not enough information  Don’t Know

Quantity trade would:

Decrease  Stay the Same  Increase  Not enough information  Don’t Know
Table 1: Evaluation results

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<th>Students with no previous economics</th>
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<tr>
<td>More Comfortable about</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>46</td>
<td>68.6</td>
</tr>
<tr>
<td>Marginally Yes</td>
<td>13</td>
<td>19.4</td>
</tr>
<tr>
<td>No</td>
<td>5</td>
<td>7.5</td>
</tr>
<tr>
<td>Not Answered</td>
<td>3</td>
<td>4.5</td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>100</td>
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</table>

Performance of those not more comfortable

<table>
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<th>Comfort</th>
<th>Percent of test questions correct</th>
<th>Drew S&amp;D correctly</th>
<th>Found Equilibrium P&amp;Q</th>
</tr>
</thead>
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<tr>
<td>Marginal Yes</td>
<td>59</td>
<td>12/13</td>
<td>10/13</td>
</tr>
<tr>
<td>No</td>
<td>56</td>
<td>3/5</td>
<td>4/5</td>
</tr>
<tr>
<td>Not Answered</td>
<td>67</td>
<td>3/3</td>
<td>3/3</td>
</tr>
</tbody>
</table>

REFERENCES


