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While the term “dismal science” was originally used to describe economics because of the negative outcomes associated with human behavior or the Malthusian theory of population (Schneider, 2018), more recently that negative description has been used to describe the methods in which economics is taught (Sheridan et al., 2014). Movement away from traditional “chalk and talk” delivery has the potential to be beneficial to instruction in any discipline. It is likely that one field of instruction with the greatest need for movement to other teaching methods is economics (###).

One alternative teaching method with the potential for significant benefits to students and instructors is the use of classroom experiments. Through these experiments, instructors and students create and collect data on students’ economic decision making in a controlled environment (Li & Wong, 2018). Such experiments provide students with opportunities to test the validity of economic theories and provide a range of potential benefits to students and instructors.

These experiments provide students with the opportunity to connect with theoretical concepts from a firsthand perspective (Emerson, 2014). Doing so is likely to increase students’ motivation to learn given that they see the topics as more than just theoretical constructs. The use of classroom experiments prompts students to see the subject matter as a tool for solving real-problems (Hawtrey, 2007). By working on classroom experiments, potentially in small groups, students teach each other and learn from each other (Sheridan et al., 2014). Furthermore, featuring classroom experiments provides another means of engaging students, which facilitates student learning (Atwood et al., 2023) and makes the course work more stimulating to students (Ball, Eckel, & Rojas, 2006). This type of active approach is entirely different from more traditional teaching methods. By using classroom experiments to force students to be more active, their mindsets change, and they are more likely to take ownership of the concepts, resulting in improved long-term retention of the material (Emerson & Hazlett, 2012).

In addition to the benefits mentioned above, classroom experiments also are associated with other quantifiable benefits. Ball et al. (2006) found that this type of interactive learning resulted in higher grades and better results on students’ evaluations of teaching, which is typically an element of the promotion and tenure process. Guest (2015) found that using games was associated with positive impacts on attainment. Lin’s (2020) study indicated that the level of activity required for classroom experiments made class meetings more entertaining and resulted in improved attendance at class meetings.

Despite the range of benefits noted above, the use of classroom experiments by economics

the PowerPoint and talk method – while less than optimal, remains the most common approach used by economics instructors to undergraduates (Garnett, 2015; Jones, 2015). There has been some increase in the usage of classroom experiments over the years, they are utilized by only a small percentage of economics instructors and typically only for a limited range of topics (Guest, 2015; Sherstyuk et al., 2016; Van Long, 2010).

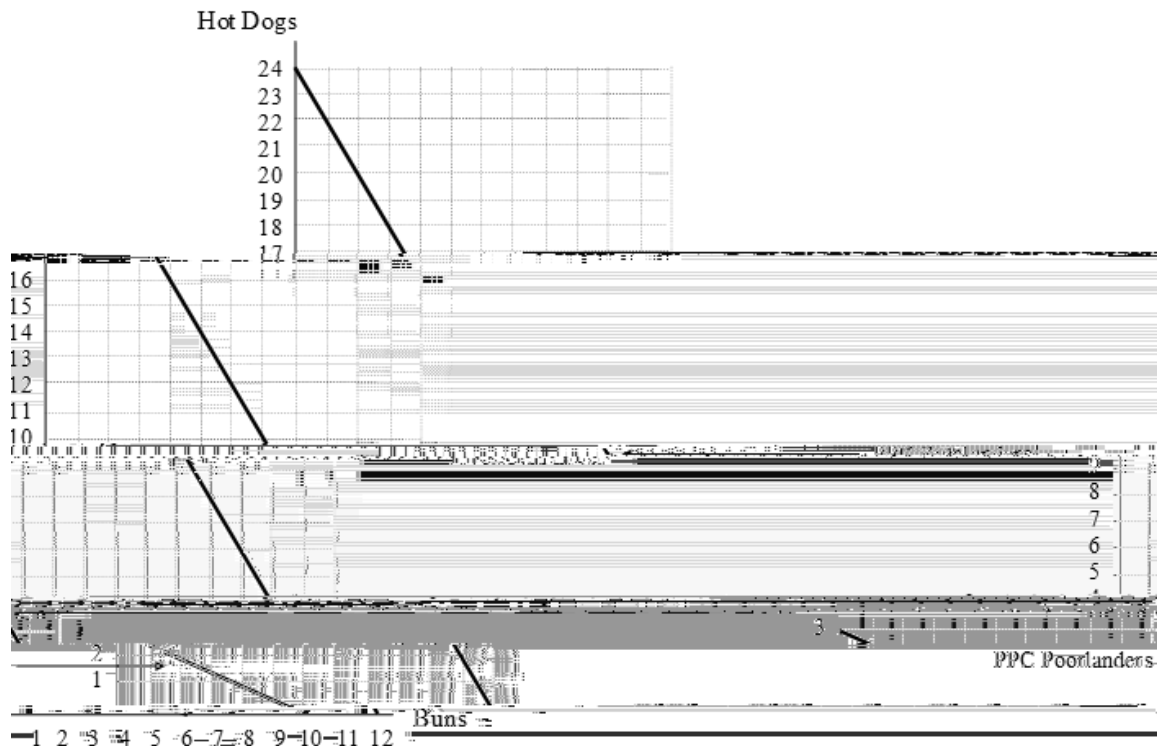
Why has there been such limited adoption of classroom experiments in economics? Instructors likely consider the additional time cost associated with preparing and developing such activities as too large, making these activities not worth the effort (Goffe & Kauper, 2014). Some existing classroom experiments require instructors to purchase software or items used as elements of the experiment (Emerson & Hazlett, 2012; Guest, 2015;). Such purchases may be problematic for instructors teaching multiple sections or with limited financial resources. In other cases, instructors may consider experiments that are a bit more intricate (Fuyar, N. & Toubanc, N. Rojas, 2010; Von Blackenburg & Neubert, 2015; Economics.com) to be too complex for their students. While such experiments hold substantial value for more advanced students, these activities may provide less value to students in principles classes. As such, instructors of principles sections may be less likely to incorporate these activities into their classes.

Based on the conditions described above, the goal of this paper is to assemble a set of classroom experiments that covering the most substantial topics typically included in principles of microeconomics course work. It is important that this proposal limits two types of costs to the instructor – monetary cost and time cost. Regarding money cost, the listing developed here will focus on experiments that utilize materials that are commonly found on college campuses. While a monetary cost certainly does exist from an economic perspective, instructors should be able to acquire the items at no cost or limited cost to themselves. Regarding time cost, this paper will

groups promotes interaction between students, yielding more student-led learning than individual decision makers. The instructor will designate 25% of the groups as citizens of Richland and 75% of the groups as citizens of Poorland. Group size can be adjusted to meet these ratios; each group represents one individual citizen.

For the first round, each group will decide how many hot dogs and how many buns it wants to produce. The instructor can provide information regarding the options using a graph such as Figure 1 or by using a table with the same information. In this first round, citizen groups will not conduct any trade. As such, each citizen group's consumption will be equal to its production. In this experiment, hot dogs and buns will be considered perfect complements; citizen group utility will be equal to whichever good has the lower quantity of production, which also will be their quantity of consumption. Hopefully, these instructions will lead the groups to realize that these two goods are perfect complements. Therefore, they will choose equivalent production and consumption levels of eight hot dogs and eight buns for each group in Richland and two hot dogs and two buns for each group in Poorland. Each group will note the quantity of each good produced in the first row of their tally sheet, similar to the version included as Appendix A. It is relevant to note that the utility is not divided by the number of students in the group; each student receives the resulting level of utility. If the results do not imply maximum utility associated with equivalent production and consumption, it may be necessary to repeat this initial round.

Figure 1.



In the second round, each group will act as a single decision maker again, determining how many hot dogs and how many buns the group wants to produce. Once again, the instructor can provide information regarding production options using a graph such as Figure 1 or a table with the same information. Before the groups make their selections, the instructor should inform the groups that they will be allowed to trade hot dogs and buns to other groups from either Richland or Poorland. Each citizen group's utility will be equal to whichever good – hot dogs or buns – has the lesser quantity after all trades have taken place. These quantities will represent the consumption for the citizen group. Again, in this round, the utility for the group is not divided by the number of students in the group; each student receives the total level of utility achieved by the group.

Once each group has determined the amount of each good that they wish to produce, the instructor or an assistant can distribute the appropriate number of slips for each good. After the slips have been distributed to the groups, then groups can move around the room to trade with other groups in order to improve their well-being. Groups can only make trades for whole numbers of hot dogs for whole numbers of buns; no fractions are allowed. Since trading is taking place in this round, production and consumption are not likely to be the same. Once again, each citizen group's utility will be equal to whichever good has the lower quantity of consumption. One member of each group should record the production before trade and the consumption after trade on the group's tally sheet. The group will then submit the slips for each good to the instructor or an assistant, who will record the citizen group's country – either Richland or Poorland – and the group's total level of utility after trade. Stapling the slips of each group together

production and trade based on comparative advantage. The second option is to use the suboptimal results of some groups coupled with the utility maximizing results of other groups to highlight the potential benefits of trade based on comparative advantage for the class. In doing so, it would be advisable for the instructor to anonymize the group names. A modified version of Figure 1 above that contrasts the potential consumption options for each country without trade and the potential consumption options for each country with trade could be useful in this regard.

Supply & Demand

double auction with fictional good (Hazlett, 2006)
EconPort M&M reverse auction
Emerson and Taylor (2004)

Market Limits

Dickie, M. (2006). Do classroom experiments increase learning in introductory microeconomics? *The Journal of Economic Education*, 37(3), 267-288. <https://doi.org/10.3200/JECE.37.3.267>

Elasticity

Introducing elasticity to economics students adds nuance to their understanding of supply and demand. HI (2001) created a classroom exercise that builds upon the creation of market demand curves to illustrate the concepts of price elasticity of demand, income elasticity, and cross elasticity. Instructors will begin by having four products available for students to buy. In her example, she uses Snickers bars, cartons of milk, cans of Coke, and packs of Twinkies, though her main recommendation is to select products that appeal to college students and are somewhat reasonable in price. There are three rounds of purchases made by the students before they work in groups to create market demand and then elasticity calculations.

Each student is given a sheet of paper with instructions that include three sections, one for each round. In each section there is a column of the available products and their associated price for that round, a column for the student's individual quantities, and a column for market quantities. In the first round, each student has a "budget" of \$5 that they can use to purchase the goods listed. For simplicity's sake in the first round, each item has a price of \$1. Students can decide the quantity of each good they would like, which may be zero units. However, they must spend exactly \$5 in total. In the second round, students have the same \$5 budget, but the price of one good doubled from \$1 to \$2. Without regard to previous purchases, students must list the quantities they would purchase with their \$5 given the new price. For the third round, all prices revert to \$1, but students now have a larger budget, potentially \$8 to purchase their desired quantities of each good.

After finishing the third round of purchases, students gather in small groups to sum their individual quantities into market demand and graph them for each of the three scenarios. Students can use a simple price elasticity of demand formula to calculate a value for the second round in comparison to the first round. Then, using a simple income elasticity formula, they can calculate a value for the third round. Lastly, students can calculate cross elasticity





To start the experiment, the instructor informs all groups in the class of the amount of the economic loss for each firm. Each group records their losses for the first day. The instructor or an assistant will give each group one red playing card and one black playing card. The first decision for each group will relate to the second day of operations. If the group wants to remain in business, they will place their red playing card face down in front of them on the table or desk. If the group wants to exit the industry, they will place their black playing card face down in front of them on the table or desk. Once each of the groups has made their decision, the instructor or an assistant will walk around to check the decision of each group and determine the total number of groups still in business. In this experiment, the industry's total revenues will not change each day. As such, the revenues of \$1,600 for a group exercise, will be divided among the firms that remained in business. The instructor will compute profits for each of the remaining firms and announce that total to the class. Each group will record its daily profit or loss on their tally sheet; the instructor should keep a record of the groups profits or losses to verify the amounts and avoid incorrect listings by any groups.

Once record keeping is complete for each group's decisions regarding entry and exit for the second day, the instructor will repeat the process giving each remaining group the opportunity to exit the industry or remain in business. In addition, groups that exited previously will have an opportunity to reenter the industry if they wish to do so. Again, if a group wants to operate in the industry, they will place their red playing card face down in front of them. If they do not want to operate within the industry, they will place their black playing card face down in front of them. Instructors can choose to repeat the process as many times as they see fit. We expect that a minimum of five iterations will be necessary for the exit and potential reentry of groups to move the toward a zero profit result for all groups.

Once the instructor chooses to cease the iterations of the experiment, the instructor or an assistant will total the losses and potential profits recorded in all rounds for each firm. It is likely that the last round will see firms that exited with no profit loss and firms that remained with profits or losses very close to zero. Regarding potential incentives for this exercise, the "winning" groups are likely to be those who, recognizing that economic losses were likely for firms in this industry, exited in one of the first rounds. Doing so, would limit the total losses for such groups. It should be noted that it would be possible for a single group or a limited number of groups to obtain substantial profits if all other groups exit, allowing substantial profits for the few that remain.

In order to provide an incentive for groups to attempt to minimize losses, we recommend an incentive for the "winning" groups. It may be challenging to find one group in each class with the smallest total losses. As such, we recommend awarding credit – or bonus points if that is the instructor's preference – to the half of groups that had the lowest total losses. If several groups had equivalent losses, instructors could use their discretion in reward slightly more or less than 50% of all groups.

Oligopoly

An experiment that effectively illustrates the interdependence of oligopolistic firms is found in

Ryan and Doyle-Portillo (2014). For the modified version of this experiment that we recommend, the instructor should prepare by cutting or obtaining slips of paper that are approximately three inches by three inches. A total number of slips ten times the size of the class should be sufficient. A tally sheet or computer spreadsheet to record results is the only other requirement.

In the first round of the experiment, the class is divided into teams of two students. Each team is given two minutes to decide if they want to submit a slip of paper that is blank except for their names or a slip of paper that is marked with an 'X'. The payout for the exercise is dependent upon the total number of marked slips that are submitted. If only one team submits a marked slip, the students on that team receive 10 points each. If two teams submit marked slips, the students on those teams receive 9 points each. If three teams submit marked slips, the students on those teams receive 8 points and so on. The process proceeds such that if eleven or more teams submit marked slips, then no students receive points. However, if no teams submit a marked slip (e.g., an



Mounts & Vaughan (2000) monopsony with auction => pricing & quantity

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Appendix A

RichlandPoorland Tally Sheet

Group Number: _____

Names of Students in Group: _____

	Column #1	Column #2	Column #3	Column #4
	Hot Dog Output	Bun Output	Hot Dog Holdings	Bun Holdings
Round 1 Select from table Col. #3 = Col. #1 Col. #4 = Col. #2				
Round 2 Select outputs from table; holdings based on results of trade				
Round 3 Select outputs from table; holdings based on results of trade				
Round 4 Select outputs from table; holdings based on results of trade				

Appendix D

Daily Profits or Losses

Group Number: _____

Names of Students in Group: _____

	Profit/Loss
Day 1	
Day 2	
Day 3	
Day 4	
Day 5	
Day 6	
Day 7	
Day 8	
Day 9	
Day 10	
Total	