Classroom

EXPERNOMICS

Volume 6, Number 1 http://www.marietta.edu/~delemeeg/expernom.html Spring, 1997

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Selfish Economists? A Means of Generating Classroom Involvement

*Catherine S. Elliott**

Introduction

Over the past several years, two points made by authors in *Classroom Expernomics* have changed the way I teach my Intermediate Microeconomic Theory students about the free-rider paradox. First, Hoaas and Drouillard [1994, p. 6] warned that participation in a public goods experiment was not sufficient to understand the paradox, and advised "post-experiment explanation." Second, Stodder [1994, pp. 1-2] persuasively argued that in many classrooms the voluntary contributions motive is "denigrated," either intentionally or without thought.

In response to the first point, I employ a straightforward all-or-nothing voluntary contributions game. The length of the game is significantly shorter than the more common tokens-distribution game--leaving more time afterwards for immediate classroom dialogue. Further, the characteristics of the game are easily explained. In response to the second point, I summarize the students' contribution rates in chart form and use the recent articles in the Winter 1996 issue of the *Journal of Economic Perspectives* as a springboard for discussion of the implications of and motivations behind their own and others'

choices.

Parameters of the Game

My most recent game was funded by the New College Foundation, allowing me to provide an initial endowment of $1 to twelve students for each of six rounds. When funding is unavailable, hypothetical endowment values of $10 or even $100 can be used. However, grade points should not be incentives as the game would be critically biased against cooperation: "Most students understand that if everyone gets the same amount, extra-credit is no credit at all" [Stodder, 1993, p. 3].

The basic framework of the game is opportunities to invest one's endowment in a group fund or to keep one's endowment. In either case, fund earnings are shared equally among all group members. The most recent game had the following design features: no one was told when the game would end, decisions were anonymous (and without discussion), and group size was four, resulting in a marginal per capital return (MPCR) of 0.3 (i.e., each dollar placed in the fund yielded a total group payoff of $1.20). The parameters of the game can be easily changed to incorporate discussion, lack of anonymity, various iterations, group sizes, and MPCRs, and so on. A single post-experiment narrative questionnaire was also administered: "Please describe what you did and why you decided to do what you did."

In addition to being learned quickly, the uncomplicated structure of the all-or-nothing game allows for easy explanation of concepts such as the MPCR and the "minimal profitable coalition" [Davis and Holt, 1993, p. 332]. For instance, when N=4 and MPCR=0.3, the minimal profitable coalition is the grand coalition where all players cooperate. I contrast this set up with another standard payoff structure--that of MPCR=.75 (i.e., each dollar placed in the fund yields a total group payoff of $3.00). For a group size of four, a minimal profitable coalition is just two players. The difference in incentive structures is obvious to the students.

Selfish Economists?

Participatory classroom discussion seems far more productive than a post-experiment lecture on how the game illustrated the free-rider paradox. Both the contribution rates (see Figure 1) and the decision explanations (see Table 1) are summarized on the blackboard. To address Stodder's concerns, the choices and reasons are presented without value judgment. This neutrality is an advantage of writing the summary data on the board, as unintentional commentary may occur if the data are voiced.

Then, to generate discussion, the dialogue between researchers who claim to find economics students (and economists) less cooperative than noneconomics students and those who claim to find the opposite is introduced. Two useful quotes are: (1) Frank *et al's* (1996) assertion that dilemma experiments "speak with one voice"--"They tell us that there are large differences in cooperation rates between economics students and others" (p. 189); and (2) Yezer *et al*'s (1996) evidence that "undergraduate students of economics display real-world behavior that is substantially more cooperative than their counterparts studying other subjects" (p. 185).

The above is usually sufficient. However, for more background on "selfish economists" research, Carter and Irons (1991), including the three response letters in the "Correspondence" section of the following Spring 1992 issue, can be consulted. The original work that sparked this debate is sociologists Marwell and Ames' (1981) article "Economists Free Ride, Does Anyone Else?" Also of interest are two rebuttal experiments: Isaac *et al.* (1985) observing significant non-cooperative behavior by sociology students, and Mestelman and Feeny (1988) finding similar free-riding in experiments involving anthropologists and human ecologists.

Another issue to introduce, if discussion is lagging, is what impact economics training might have on cooperation. Ledyard (1995) remarks: "The effect of [economics] training and/or self-selection on cooperation remains a wide-open problem" (p. 161). In particular, Carter and Irons (1991) state "we find that economists are different, but they are already different when they begin their study of economics" (p. 175). In contrast, Frank *et al.* (1993) "found evidence consistent with the view that differences in cooperativeness are caused in part by training in economics" (p. 170). On the other hand, Yezer et al. (1996) claim that "it is not obvious that exposure to economics should be expected to encourage less cooperative behavior"--because "the study of economics also considers mutual gains from voluntary trade and exchange" (p. 178). Normally, especially toward the end of the term, Intermediate Microeconomics Theory students believe themselves to have had substantial economics training, and consequently, many have strong opinions regarding the relationship between economics and their own "selfish" or "cooperative" motives.

Results and Specific Discussion Questions

As Figure 1 and Table 1 illustrate, this simple experiment can yield intriguing results, and thereby provide the basis for dynamic classroom discussion. Specifically, Figure 1 raised the issue: What factors might have contributed to the high levels of cooperation (92% in the final round) when previous studies have linked such levels to, among other things, group discussion and high MPCR--neither of which occurred in this version of the game.

Questions stimulated by the articles cited above have included: Are economics students

more selfish than others? If yes, could it be considered an advantage? Which, if any, of the experimental results reported by these researchers are convincing? Are there alternative methods of investigation which might be more convincing? What is being taught in economics courses?

Some issues specific to voluntary contributions games have been: How sensitive are the dynamics of group interactions to the choices made in the initial rounds of the game? What, if any, are the implications of contributing one's endowment because of a cooperative motive versus a selfish motive? What, if any, are the implications of not contributing because of risk aversion versus not contributing because of an explicit desire to free ride? Why does "free riding" have a negative connotation while "profit maximization" typically does not?

Table 1. Excerpts from Narrative Explanations

Student 1 (Group 1): "I invested most of the time because if the others also invested our cumulative return would be greater." Earnings = $6.40 Choices: kept, invested, invested, invested, invested, invested
Student 2 (Group 1): "At first, I held on to my money because the rate of return wasn't large enough to get me to invest since I wasn't sure about what the rest of my group would do. Then my strategy was to throw enough money out so that other people in the group would invest and to occasionally hold my endowment while the rest of the group put in money so I could pull in the big money!!!" Earnings = $8.40 Choices: kept, kept, invested, invested, kept, invested
Student 3 (Group 1): "For the most part, I invested the money because I believe it is better when you work together to make more. If I had not, everyone would not be as well off as they could have been." Earnings = $6.40 Choices: invested, kept, invested, invested, invested, invested
Student 4 (Group 1): "I made those choices dependent upon my dividend and/or the past decisions of my group members. At some point I felt like retaliating because I knew that someone had not invested. But I ceased to retaliate because it was not beneficial to me or the group." Earnings = $6.40 Choices: invested, kept, invested, invested, invested, invested
Student 5 (Group 2): "I did not invest at first because I saw the potential of reaping the profits of others. But after the trust factor bottomed out, I tried to raise trust by investing every time. I realize that I probably would have had higher total money if everyone had invested every time." Earnings = $6.90 Choices: kept, kept, kept, invested, invested, invested
Student 6 (Group 2): "I first made a decision that would be best for the group. But then I responded to not everyone going in. Then I decided I had been receiving enough to try for group maximization." Earnings = $6.90 Choices: invested, kept, kept, kept, invested, invested
Student 7 (Group 2): "When I invested, my return was less than my endowment. I then decided if I held my endowment I could do no worse than my endowment, and I would gain even if only one group member invested.

Basically, I let the other group members take the risks while I sat in security." Earnings = $7.90 Choices: invested, kept, invested, kept, kept, kept
Student 8 (Group 2): "The safe bet was to keep the endowment. But after thinking about it more, I felt in the long run my best chance to make the most money was to continue to invest, and given enough opportunities I felt others would invest if they had enough confidence. Enough mutual investments and my short run losses would amount to long run profits." Earnings = $4.90 Choices: invested, kept, invested, invested, invested, invested
Student 9 (Group 3): "I put in my money each time, and simply sat back and watched my money grow. Since growth was always positive I could only gain by investing. Only one who is irrational would decide to keep his or her money." Earnings = $7.20 Choices: invested, invested, invested, invested, invested, invested
Student 10 (Group 3): "For me, the risky investment was really the first one. After that, the incentive to invest increased since the amount I could have lost was decreasingly important. And after the first investment opportunity, I could only be better off than before I came to this session." Earnings = $7.20 Choices: invested, invested, invested, invested, invested, invested
Student 11 (Group 3): "Once one person screws the group, everyone will try to. Not knowing for how long this would go on, I thought investing was the smart move. I also assumed that after the first round, everyone follows my lead." Earnings = $7.20 Choices: invested, invested, invested, invested, invested, invested
Student 12 (Group 3): "I waited till someone shorted the group. If they did, I'd retaliate. But no one shorted." Earnings = $7.20 Choices: invested, invested, invested, invested, invested, invested

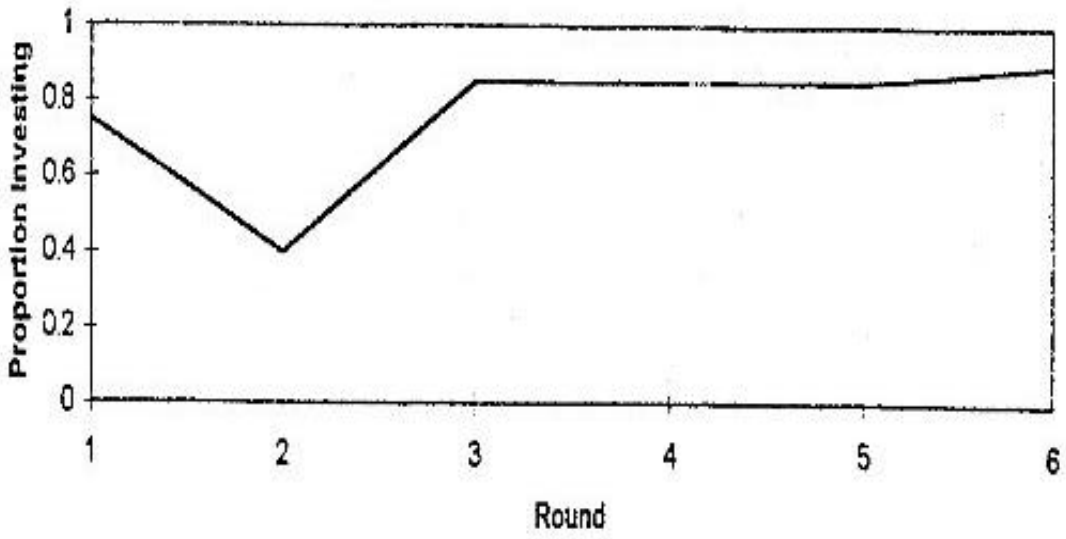

Figure 1

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The Construction and Identification of Demand Curves: A Concerted Experiment for Principles Instructor and Dining Services

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Introduction

Demand curves are one of two key ingredients of the economist's totem--supply and demand analysis. Their identification and construction are notoriously difficult, especially as regards classroom instruction. More recently, several authors (De Young 1993, Ortmann and Colander 1995; Neral and Ray 1995; Delemeester and Neral 1995; Brauer 1995) have used classroom experiments to illustrate concepts related to supply and demand analysis.

Classroom experiments allow for a far-reaching control of the environment. This strength of traditional (classroom) experiments is also its biggest weakness. In a sense, the induced environments are too controlled, thereby tidying up the inevitable messiness of research, and making the identification problem disappear.[1] This has led some instructors to simple in-classroom construction and evaluation of production and cost functions (Neral and Ray 1995) that do not use the induced value approach typical for traditional (classroom) experiments. Here we report a simple complementary semester-long experiment involving the construction and identification of demand curves in a college environment.

Design

The experiment consisted of the construction and identification of demand curves for a set of goods that were being sold in either the student center's convenience store or cafe. The selection of goods was based on a preliminary selection of items by a principles class that the first author taught in the fall of 1995. The second author discussed the list with her staff who agreed to a list of eight items for which "frequent price changes would not start World War III." For the items ultimately selected--pastry/coffee package, turkey sandwich, milk (1/2 gal, 2%), Snapple Lemon Tea, Arizona Ice Tea, Harmony Hall Snacks, Tylenol extra strength (30 tablets), batteries (4AA),-- prices were varied and price-quantity data were collected on a weekly basis (from Wednesday morning to Tuesday evening). The resultant data were then used to construct demand curves and discuss such things as possible violations of the *ceteris paribus* assumption implicit in demand curves, elasticities, substitutability, consumer surplus, *etc.*

Implementation

The experiment was announced to the class during the first week; each student was told to draw up a list of five items. Students were admonished not to publicize the experiment.[2] During the third week of the semester, after the class had covered some basic supply and demand analysis as well as discussed elasticity, revenue test, *etc.*, the director of dining services visited with the class. She explained how consumers' historical product price sensitivity, prices charged by businesses considered to be local competitors, and the need to operate on a break-even basis, factored into dining services' pricing policy. Students also learned that prices of some items in the convenience store were based on suggested retail pricing guides which similarly take into account local conditions. In the ensuing discussion between the director of dining services and the class such issues as the need for "loss leaders" and the pricing of items in the cafe and grill operations of the college were discussed.

The experiment proper started in the fourth week of the fall semester and was conducted over a ten-week period. Each week, students were told the price for the coming week and asked to make, and justify, a prediction for the quantities sold. Each week average percentage differences between predicted and actual quantities were computed[3] and the top predictors were announced in class. After the eighth and twelfth week students were asked to plot the data points for all items. As was to be expected the data did not line up as nicely as textbooks suggest.

For example, the data points for milk, teas, turkey sandwiches, Tylenol, and batteries were rather randomly distributed. For the latter two that was easily explainable --the quantities sold were simply too small. The other two were less obvious. However, persuaded by earlier classroom experiments that willingness-to-pay indeed declined, a number of interesting in-class discussions of *ceteris paribus* conditions and shift factors (vacations, homecoming, parents' weekend, weather) ensued.

Students also pointed out that the data would be contaminated by "polar points"-- an arrangement that allows students to charge items in both convenience store and cafe to their meal plan. In light of the students' comments, the data for the coffee/pastry package were of special interest. This package was sold mostly in the morning in the cafe, thereby significantly reducing the proportion of students on meal plan that bought it. Indeed, with the exception of one dramatic outlier, the data points for this package come closest to suggesting a clearly downward-sloping demand curve. The outlier denoted a coffee/muffin package, and in this respect was different from the other packages which typically contained croissants, scones, cinnamon rolls, *etc*. The outlier led to a useful discussion of the importance of not comparing apples and oranges.

The experiment concluded with two assignments given to students--the first asked students to plot the data points onto graphs, and to bring these graphs to the final. The second consisted of the following exam question on the final:

> On one of the attached copies you find the complete set of data from the experiment we did during the semester. Construct the demand curves for turkey sandwiches, snacks, Snapple, and Arizona tea. When doing so, take into account the following additional information.
>
> Smith Union weekly sales:
>
> | | |
> |---|---|
> | 9/27-10/ 3 | $14,000 |
> | 10/ 4-10/10 | $10,000 |
> | 10/11-10/17 | $18,000 |
> | 10/18-10/24 | $17,000 |
> | 10/25-10/31 | $15,000 |
> | 11/ 1-11/ 7 | $16,000 |
> | 11/ 8-11/14 | $17,000 |
> | 11/15-11/21 | $17,000 |
> | 11/22-11/28 | $ 8,000 |
> | 11/29-12/ 5 | $18,000 |
>
> Comment on the demand curves that you constructed. Do they have the expected shape? If not, what could be the reason? (Recall that Fall vacation began October 6 (after class), October 14 was homecoming, October 27-28 was parents' weekend, Thanksgiving vacation began November 22 (after class).)

Results

Economics 101 Experiment									
Date	**9/27-10/3/95**			**10/4-10/10/95**			**10/11-10/17/95**		
Good	**Price**	**Quantity**	**Norm. Q**	**Price**	**Quantity**	**Norm. Q**	**Price**	**Quantity**	**Norm. Q**
Pastry/Coffee	1.30	53.00	3.78	1.20	50.00	5.00	0.90	62.00	3.44
Milk	1.65	20.00	1.43	1.45	18.00	1.80	1.99	34.00	1.89
Snapple Tea	0.89	121.00	8.64	0.85	53.00	5.30	0.94	152.00	8.44
Arizona Tea	1.09	78.00	5.57	1.14	52.00	5.20	1.04	53.00	2.94
H.H. Snacks	2.99	52.17	3.73	3.59	34.78	3.48	3.39	62.19	3.46
XS Tylenol	4.49	3.00	0.21	4.29	3.00	0.30	4.69	1.00	0.06
Batteries, 4AA	4.09	8.00	0.57	3.99	6.00	0.60	4.19	4.00	0.22
Turkey Sandwich	1.99	72.00	5.14	2.25	37.00	3.70	2.50	63.00	3.50
Date	**10/18-10/24/95**			**10/25-10/31/95**			**11/1-11/7/95**		
Good	**Price**	**Quantity**	**Norm. Q**	**Price**	**Quantity**	**Norm. Q**	**Price**	**Quantity**	**Norm. Q**
Pastry/Coffee	1.05	70.00	4.12	0.99	57.00	3.80	1.10	45.00	2.81
Milk	1.55	29.00	1.71	1.75	20.00	1.33	1.60	31.00	1.94
Snapple Tea	1.04	136.00	8.00	0.99	122.00	8.13	1.19	106.00	6.63
Arizona Tea	1.25	97.00	5.71	1.30	75.00	5.00	1.20	78.00	4.88
H.H. Snacks	3.69	67.33	3.96	3.89	59.36	3.96	3.19	61.13	3.82
XS Tylenol	4.59	0.00	0.00	3.89	3.00	0.20	3.89	2.00	0.13
Batteries, 4AA	4.29	6.00	0.35	3.89	6.00	0.40	3.59	5.00	0.31
Turkey Sandwich	2.75	51.00	3.00	2.35	66.00	4.40	2.05	47.00	2.94
Date	**11/8-11/14/95**			**11/15-11/21/95**			**11/22-11/28/95**		
Good	**Price**	**Quantity**	**Norm. Q**	**Price**	**Quantity**	**Norm. Q**	**Price**	**Quantity**	**Norm Q.**
Pastry/Coffee	1.15	158.00	9.29	1.35	52.00	3.06	1.35	27.00	3.38
Milk	1.50	29.00	1.71	1.40	34.00	2.00	1.40	13.00	1.63
Snapple Tea	1.09	139.00	8.18	0.89	137.00	8.06	1.15	44.00	5.50
Arizona Tea	0.99	99.00	5.82	0.89	95.00	5.59	0.89	46.00	5.75
H.H. Snacks	3.09	64.82	3.81	2.89	111.85	6.58	2.89	31.12	3.89
XS Tylenol	3.79	1.00	0.06	4.09	1.00	0.06	4.09	1.00	0.13
Batteries. 4AA	3.79	3.00	0.18	4.39	10.00	0.59	4.39	5.00	0.63
Turkey Sandwich	1.89	48.00	2.82	1.75	56.00	3.29	1.89	25.00	3.13

Date	11/29-12/5/95		
Good	**Price**	**Quantity**	**Norm Q.**
Pastry/Coffee	0.85	65.00	3.61
Milk	1.25	33.00	1.83
Snapple Tea	1.15	106.00	5.89
Arizona Tea	0.89	106.00	5.89
H.H. Snacks	3.49	114.61	6.37
XS Tylenol	4.19	0.00	0.00
Batteries, 4AA	4.49	7.00	0.39
Turkey Sandwich	1.89	52.00	2.89

Figure 1

Discussion of Results

Figure 2a presents a plot of the pastry/coffee package data. So does figure 2b. However, in the latter figure quantities are normalized by dividing the quantity data from Figure 1 by the Smith Union weekly sales. The purpose of this computation was to demonstrate the impact of shift factors such as homecoming, *etc.*, here proxied by the sales data. The data for the other items are more scattered. Simple regression line computations with the normalized data suggest that milk, Snapple and Arizona teas all have the right slope coefficient. This is also true for snacks and Tylenol. However, for sandwiches and batteries the slope coefficient is positive.

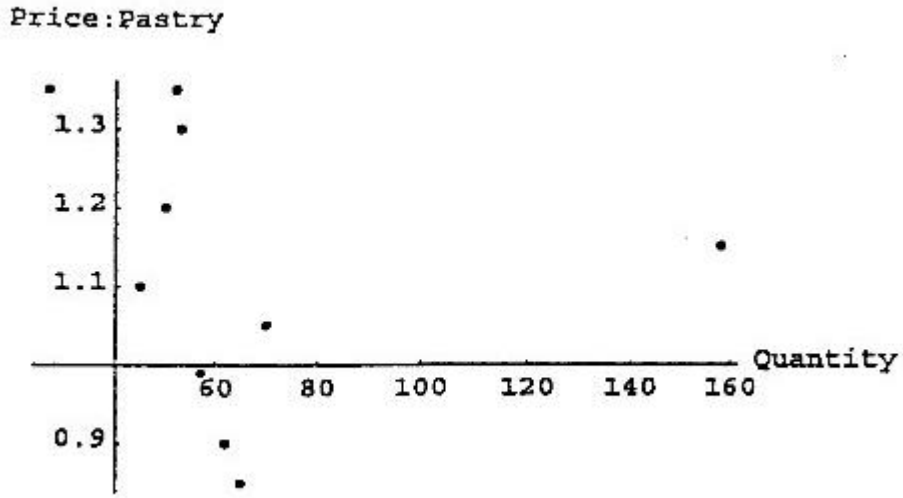

Figure 2a

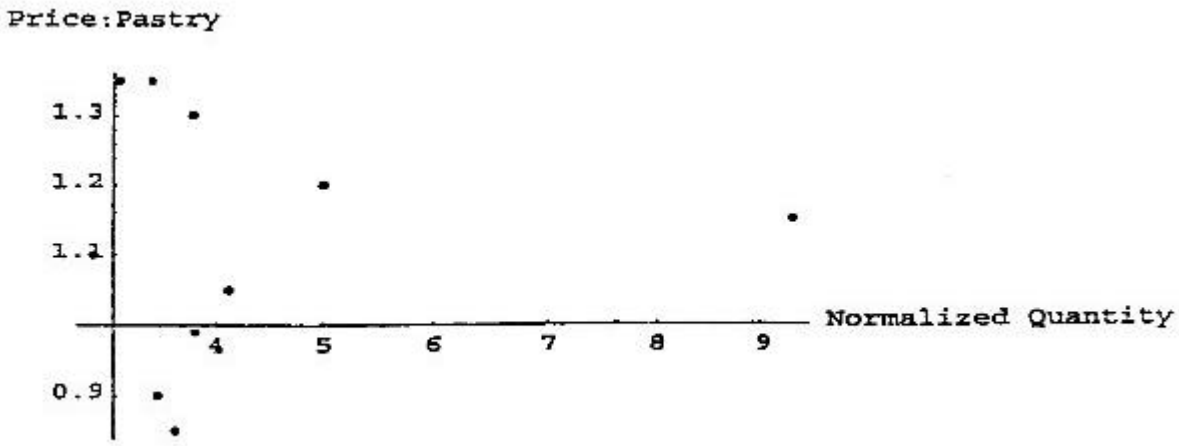

Figure 2b

Evaluation of the Experiment

To judge from their journals and in-class reactions, students liked the experiment for the most part. The in-class visit by the director of dining services was well received, and got students' attention. The weekly predictions, too, were well received. (Predictions incidentally became increasingly better. While initially no average prediction error was below twenty percent, halfway through the semester, and for two consecutive weeks, one third of the class had average prediction errors of between 10 and 20 percent.) Some students really got involved, discussing at length (in their journals) how they arrived at their predictions.

The results of this trial run of the experiment were messier than the instructor foresaw. However, the messiness of the data gave plenty of opportunity to discuss the construction and identification of demand curves.

Conclusion

This was a concerted effort by the instructor, students, and dining services. It was motivated by the idea of experiential learning (Ortmann and Scroggins 1995; Bartlett 1996). The direct results of the experiment are less important than the indirect ones: while this experiment initially confirmed many students' suspicions that economics is an imprecise science, it also made them see, and in some cases appreciate, the interesting issues connected with the construction and identification of demand curves. Student reaction suggests that the experiment is worth re-doing. The trial-run reported here suggested a couple of kinks in the design that ought to be ironed out.

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1. Roughly, the identification problem is described by two questions: Do data come from one demand curve or several? Do data come from one supply curve or several?
2. This admonishment seems to have been successful. However, the cashier of the cafe -- initially not so instructed -- felt the need to explain the initial high price of the pastry/coffee package to patrons. Some of those patrons were rather unhappy about (the reason for) the price change.
3. Since the quantities of Tylenol and batteries which sold were very low, the decision was made to eliminate everyone's worst prediction.