

4. You are required to make at least one trade in both the futures and options markets.

You are required to write a three- to four-page paper that discusses your reasoning for making the marketing decisions you used in the project. At the end of the paper, one page should be devoted to a profit/loss statement on the cash sale of your cattle. One page should show profit/loss on your futures and options trading activity. One page should consolidate both cash and futures activity.

Fifteen percent of your grade in this course will depend upon the profit/loss from the sale of cash cattle. Fifteen percent of the grade will depend upon the profit/loss from futures and options trading. Ten percent of your grade will be based on the written paper turned in at the end of the course. The balance of your grade in laboratory will depend on tests, quizzes, and problems.

GOOD LUCK

MAKE UNCLE HARRY PROUD

The Introduction of Experimental Economics in the Agricultural Marketing Classroom

Nona R. French
and Steven C. Turner

Abstract

The use of experimental economics methods in teaching agricultural marketing concepts was illustrated. An example experiment was presented comparing private treaty, price reporting, and English auction market types. Five concepts were taught using the experiment; supply, demand, equilibrium, price discovery, and economic surplus.

The use of laboratory equipments in economics in the areas of industrial organization and market performance is well documented (Plott, Smith). In recent years, experimental economic methods have been adopted by agricultural and resource economists. Among these applications are an investigation by Buccola into efficiency in centralized and non-centralized markets, a comparison of oral and electronic auctions by Forster and Roberts, and an application of experimental economic methods to the design of contingent markets by Bergstrom and Stoll. The purpose of this paper is to illustrate the use of experimental methods as a tool for teaching agricultural marketing.

The marketing concepts of price discovery, price determination and market performance are traditionally taught using combinations of lectures, observing market trading, and trading simulation such as a futures market trading program (Drinka, et al.). Initially students are introduced to these ideas using the theoretical construct and assumptions of a perfectly competitive model. But since many students rarely recognize their participation in markets, they have difficulty in understanding how market structure, different institutional trading mechanisms, and the informational environment can alter market outcomes (prices and quantities).

The current trend of greater numbers of students in agricultural economics courses coming from nonagricultural backgrounds may contribute to the need for helping students bridge this gap. A student who has never attended a cattle auction, or sold produce at a farmers market, or sold grain at an

elevator may be at a disadvantage in being able to apply the concepts he is being taught to actual situations. Under such circumstances it may be profitable for teachers of agricultural marketing to seek means of enhancing the learning process by providing personal experiences for students that reinforce and clarify the ideas being taught.

One means of achieving greater comprehension of these concepts by students is to allow them to participate in experimental markets designed to simulate various market scenarios. Hudson et al, described a project for using microcomputer based networks in teaching agricultural marketing. The program was designed to meet educational needs in developing an effective mix of theory and practical applications of such theory. Experimental markets can also be designed for classroom use that do not require the use of computers. Many hypotheses tested using experimental economics methods may simultaneously be presented to students in a teaching format. After presenting an overview of experimental economic methods, an example is reviewed, followed by a discussion of the presentation and value of the results.

Experimental Economic Methods and Procedures

The methods in economic experiments follow standard scientific methods, which include developing a hypothesis, designing and conducting an experiment, analysis (test hypothesis), and drawing inferences. Procedures are defined as a particular way of doing something. They are a means of accomplishing a method therefore each of the subparts of the scientific method has alternative procedures.

Developing hypotheses often is the most difficult task of any experiment. This is the case because the hypothesis defines the experiment. Furthermore, quantitative measurements are required to test the desired hypothesis. In the experiment illustrated here, distribution of rewards under different market mechanisms was one of the foci. The hypothesis was that under an asymmetric English auction where only buyers bid, buyers would capture less of the total surplus than under private negotiation markets. The development of a testable measurement, an index of buyers' surplus, enabled the above hypothesis to be tested.

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Designing an economic experiment for teaching purposes can be complicated or simple. Either way, it is crucial that the outward appearance be simple and clear. Students must not be overwhelmed by the complexity of the task. Detailed instructions must be written and handed out along with all the materials necessary to conduct the experiment. These include buyer and seller reservation price cards, identification badges, individual trading forms, and summary trading forms. For market experiments, students are divided into two groups, buyers and sellers. Each trader receives a card with their reservation price which they keep private. For buyers, the reservation price represents the maximum price to be paid for one traded unit. Buyers are not to trade at prices greater than their reservation price. For the seller, the reservation price represents the minimum price to be received for one unit. Again, sellers are not to trade at prices below their reservation price.

A student's trading "profit" is calculated as the difference between the reservation price and the price at which his unit was exchanged. For example, a seller with a reservation price of \$2.50 who exchanged one unit with a buyer whose reservation price was \$3.50 at a price of \$2.96 would have a \$.46 profit on that traded unit. The buyer's profit would be \$.54 on that unit.

The reservation prices for buyers generate a demand curve while the sellers' reservation prices generate a supply curve (Figure 1). Notice that at each price the corresponding quantity is the maximum amount that could be traded at that amount. For instance, at \$2.70 all the buyers would be willing to trade yet sellers would only be willing to sell 20 units since many of the sellers have a reservation price above \$2.70. The supply and demand curve define the set of possible supply and demand quantities at each hypothetical price (Smith, 1962).

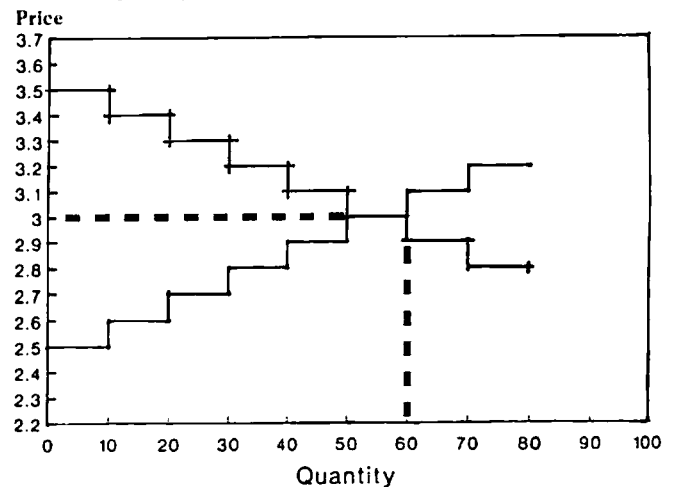
Competitive price theory would imply that price and quantity equilibrium would occur at the intersection area of the demand and supply schedules. That is, according to figure 1, 60 units would be traded with an evolving equilibrium price of \$3.00.

The supply and demand schedules set broad limits on the behavior of the market, and, hypothetically, every buyer and seller can make a trade. The experiments mimic real markets in several ways. Traders only know their individual reservation prices and do not know the prices at which other buyers and sellers are willing to trade. The only way a trader can learn market conditions is to observe offers, bids, and trades. Furthermore, the number of traders is practical, from twenty to forty (Smith, 1962).

An Example Experiment

An experiment was designed to analyze price results from markets with different institutional mechanisms for achieving transactions. A hypothesis was treated regarding distribution of profits between buyers and sellers across the market types. In carrying out the experiment, students experienced the effect of

Figure 1. Demand and Supply Schedules for Market with Equilibrium Price and Quantity of 3.00 and 60.



changes in the availability of market information and rules regarding how transactions are made on their personal outcomes. In addition to reporting personal outcomes of trading, a presentation of the research results of the experiments exposed the students to the empirical evidence gathered.

Three different types of markets were simulated. The first was a market, referred to as private treaty, in which students were free to arrange transactions among themselves. In the second market, private treaty with price reporting, students traded among themselves and at the completion of each transaction the price was reported to a market news reporter and publicly posted on the blackboard. The third market was conducted as an asymmetric, or English, auction. In this market the entire lot for an individual seller was sold to the highest bidder by an auctioneer.

The experiment was conducted using undergraduate agricultural economics students. The students were divided into three groups of 22 students each. Each group held a trading session for each market type, resulting in 9 trading sessions. Half the students in a group were assigned identification numbers as sellers and the other half as buyers. For each trading session each student was assigned a reservation price. In the case of sellers this price represented the lowest price they could accept; for buyers the reservation price was the highest price they would be willing to pay. The students were instructed not to engage in transactions for which the price was beyond their reservation values. The reservation values were derived from areas on linear stepwise demand and supply curves in which the slope of the demand was exactly the negative of the slope of the supply (figure 1). The reservation prices represented 11 equally spaced areas long each curve. The equilibrium price was changed for each trading session although the slopes of demand and supply curves and equilibrium quantities were held constant. Equilibrium prices ranged from \$3.00 to \$4.00. Each student was permitted to trade up to ten units. In the private treaty and price reporting sessions traders could trade one to ten

units in each transaction, not to exceed a total of ten units in a trading session. Transactions were recorded with traders completing a form with the buyer's identification number, seller's identification number, quantity traded, transaction price, and the time the transaction was completed for each transaction. In the English auction sessions each trade consisted of a lot of ten units. Trading sessions lasted fifteen minutes and were conducted over a two day period.

The motivation behind trading was to maximize profit although students were not monetarily rewarded. Instead, students were given an experiment grade based on participation and performance. Performance was measured by a student's actual to expected profit, with expected profit being the difference between the reservation price and the predetermined equilibrium price. For example, a student who made 10 cents per unit and was expected to make 5 cents per unit was ranked higher than one who made 10 cents but was expected to make 10 cents per unit.

Presented Results

The results are presented to impress five concepts upon the students: supply, demand, equilibrium, price discovery, and economic surplus. After the experiment, a list of buyer and seller reservation prices was distributed to the students. This was a powerful visual tool since the students saw the downward sloping nature of the demand curve and the upward sloping nature of the supply curve from which their reservation prices were derived. Furthermore, they saw the price and quantity equilibrium determined by the intersection of the supply and demand curves (Figure 1).

The concept of price discovery is short run in nature and evolves out of the structure and rules of a market. Price discovery is a communication process whereby traders exchange information. This process was presented to students in the form of the path of transaction prices that occurred over time under a certain type price discovery mechanism. Figure 2 does this for one of the English auction sessions. The

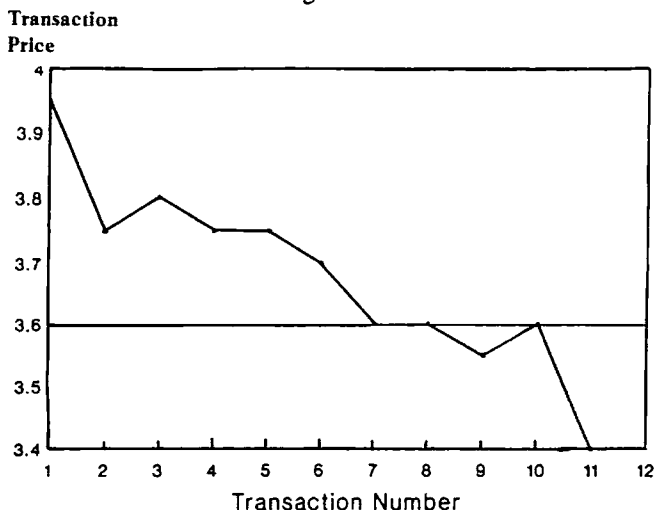


Figure 2. Path of transaction prices in an English auction session relative to the session equilibrium price of \$3.60.

equilibrium price was \$3.60 but not until the seventh transaction did this transaction price appear. Notice that although the equilibrium price was \$3.60, 8 out of 11 transactions were at prices different from the equilibrium. The average price was \$3.67 which appears to be to the benefit of seller.

This notion of the seller benefiting to the detriment of buyers can be translated to students through the concept of consumer and producer surplus. Consumer surplus is the difference between willingness to pay and the amount actually paid, while producer surplus is the difference between the price a producer is willing to receive and the amount actually received. An index of buyers' surplus was developed to measure the distribution of surplus between buyers and sellers and is

$$\text{Buyers/Actual Surplus Index} = \frac{\sum_{C=1}^M \text{BRP} - \sum_{C=1}^M \text{TP}}{\sum_{C=1}^M \text{BRP} - \sum_{C=1}^M \text{TP} + \sum_{C=1}^M \text{TP} - \sum_{C=1}^M \text{SRP}}$$

where BPP is buyer is buyer reservation price

SRP is seller reservation price

TP is transaction price

C is the transaction number of the traded unit

M is the number of units traded in the session.

The buyers' surplus index was used to compare the three market types with the hypothesis being that the English auction would result in less surplus accruing to buyers. This hypothesis was tested using one tailed t tests to detect a significant difference between the

Table 1. A Comparison of Buyer's Surplus Index Measures for Experimental Private Treaty, Price Reporting, and English Auction Markets

Buyers/Actual Surplus Index	Market Type		
	Private Treaty	Price Reporting	English Auction
	44.875	43.343	22.934**

**Using one-tailed t-tests at the .05 level, the percent of surplus accruing to buyers is significantly less in English auction relative to private treaty and price reporting market types.

buyers' surplus index for the three market types. Table 1 presents the three respective buyers' surplus index and shows that the English auction does have a significantly lower (at the .05 level) index than the private treaty or private negotiation market types. This confirmed the earlier observation that producers appear to gain surplus in an English auction.

The Value of the Experiment

Laboratory market experiments can enhance the learning of agricultural marketing students. The rationale lies in a Chinese proverb, "I hear and I forget, I see and I remember, I do and I understand." Students participating in an experiment experienced trading situations within the parameters of different market institutions. Afterward, they saw how their pieces of information related to others in the context of supply and demand schedules. Furthermore, a graph of the path of transaction prices revealed how price discovery over time converges on an equilibrium price. This emphasized the importance of economic theory and different market institutions.

The experiment reported here also examined distribution between buyers and sellers. It was found

that an English auction resulted in buyers capturing a significantly lower percentage of surplus than a private negotiation market with or without price reporting. Further investigation is needed into the effectiveness of laboratory market experiments in enhancing the learning of marketing concepts. This paper is an introduction to this teaching method.

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Teaching Farm Management Using a Computer-Simulated Farm

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Abstract

AGR 313 (Advanced Farm Management) is an undergraduate course taught at Illinois State University utilizing a computerized farm simulation. The simulation has proven to be an effective tool in teaching the decision making skills and economic concepts required to be a successful farm manager. The simulation allows the instructor to focus on different aspects of farm management including proper input usage, machinery replacement decisions, land purchase-rental analysis, decision-making in a risky environment, and decision-making over time. Students can be exposed to a wide variety of decision making environments in a relatively short time period by using the computer simulation. Just as important, students receive rapid feedback relating farm management decisions to outcomes. This greatly reinforces the lessons being learned.

Introduction

Farm management is the application of the decision making process to solving problems in the planning, operation, and control of the farm business. Farm managers must decide what to grow, how much to grow, and how to grow it. These decisions are made

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in a dynamic environment characterized by uncertainties in production and constraints on resources. Successful farm management requires the development of skills in all phases of decision making (Kay, 1986). Agriculture 313 (AGR 313) at Illinois State University utilizes a computer-simulated farm to teach applied decision-making in a farm management setting. The course title is "Advanced Farm Management."

AGR 313 consists primarily of junior and senior undergraduates majoring in the various disciplines related to agricultural production management: agribusiness, agronomy, agricultural education, animal science, and agricultural mechanization. The prerequisites for AGR 313 are AGR 213: Farm Management and AGR 216: Farm Accounting. Most of the students have taken introductory courses in agricultural economics, agricultural mechanics, animal science, and plant science in addition to more advanced course work in their respective areas of concentration.

The class is divided into management teams of 3-5 students. An attempt is made to distribute abilities (computer knowledge, mathematical skills, farm business management acumen, etc.) equally among the management groups.

Throughout the course, management groups perform in a competitive framework with a prescribed goal of maximizing the net income of the farm. The team with the highest net income for any particular decision is awarded 100 points. Other team scores are determined by the percent of the highest net income achieved. This grading procedure provides great incentive to identify management strategies which maximize profit.

Farm Setting

The computer-simulated farm is modeled after a cash grain operation. All teams begin with identical financial positions. Assets are valued at \$1,425,937 with debt of \$574,790 for a beginning net worth of \$851,147. There are eight, eighty (80) acre fields owned, distributed over two soil types (5 Grade I and 3 Grade II fields). The managers also have the opportunity to buy or cash rent up to four additional fields each of Grade I and Grade II soils. The managers must select from among seven crops — potatoes, cantaloupe, alfalfa hay, wheat, barley, bush beans, and sweet corn. Students sometime bemoan the fact that the traditional Central Illinois crops of field corn and soybeans are not included in the simulation. However, the primary objective of the course is to teach students to make management decisions based on careful analyses and budgeting of the alternatives. Traditional crops are not included to eliminate any preconceived ideas of what the "right" crop mix is. Crop decisions must be made on the basis of analyses rather than history. Crop prices and yields can be fixed by the instructor or permitted to vary according to prescribed distributions. The initial machinery set includes both old and new equipment and large and small equipment. Managers must