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## Experimental Economics

Elizabeth Hoffman

*Iowa State University*, [bhoffman@iastate.edu](mailto:bhoffman@iastate.edu)

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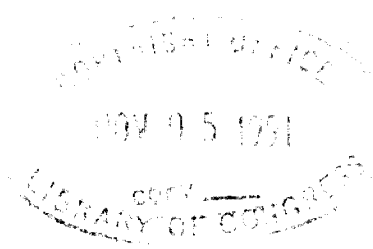
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## EXPERIMENTAL ECONOMICS

*Type of economics:* General economics

*Fields of study:* Econometrics and mathematical models; economic theory

*Experimental economics is a technique for testing economic theory, analyzing economic policy alternatives, and studying how both existing and new economic institutions operate in a controlled laboratory environment.*

### Principal terms

**DOUBLE-AUCTION MARKET:** a market in which buyers submit prices at which they are willing to purchase (bids) and sellers submit prices at which they are willing to sell (offers) to a central processing unit (or authority) that relays bid and offer information back to market participants

**ECONOMIC ENVIRONMENT:** the set of consumer preferences, firm costs, and institutions that combine to generate prices, outputs, quantities traded, and economic allocations

**ECONOMIC INSTITUTION:** a formal or informal economic organization for production, exchange, or distribution, including a set of rules for communication and resource allocation

**INDUCED VALUES:** the monetary payoff functions that are given to subjects in economics experiments and designed to induce subjects to behave as if they had specified consumer preferences or firm costs

**MONETARY INCENTIVES:** induced values

**NATURALLY OCCURRING ECONOMIC ENVIRONMENT OR INSTITUTION:** an economic environment or institution that exists outside the experimental laboratory

**POSTED-OFFER MARKET:** a market in which sellers submit offers to a central processing unit (or authority) and buyers either buy at the posted prices or purchase no units

**REDEMPTION VALUE:** the price at which a buyer in an experimental market experiment can sell a unit of an experimental commodity back to the experimenter

**REPLICATION:** the process by which the same experiment is repeated exactly, with successive sets of subjects, in order to observe a range of possible experimental results

**SMART MARKETS:** computer-assisted markets, which would not arise naturally, for shared facilities, public goods, or complex commodities

### Overview

"Experimental economics" is a general term for the experimental laboratory approach to studying economic institutions. Most applied economists study economic

institutions by observing the way in which they operate in the naturally occurring environment and by measuring such economic variables as the prices of goods and services, the quantities of goods and services that are bought and sold, the wages that are paid to workers, and the quantities of inputs and outputs in the production of goods and services. A controlled laboratory experiment, however, allows a researcher to study an economic institution in much more detail. In a carefully designed experiment, a researcher can specify exactly the monetary incentives that face economic agents, the rules that they must follow in order to engage in economic exchange, the degree of communication that is allowed, and the individual consequences of economic actions. Researchers studying naturally occurring institutions typically must infer much of this underlying structure from the observed economic outcomes, such as prices and quantities. In a laboratory experiment, the economic outcomes can be directly related to the underlying structure, allowing a researcher to analyze how different structures may lead to similar or different outcomes. This knowledge can then be applied to the study of naturally occurring institutions.

An experimental economics research project begins with a definition of the research goal. For example, the goal might be to test a theory, such as the basic model of supply and demand. In that model, the theoretical prediction to be tested is that the equilibrium economic outcome will be a particular market price and quantity.

The next step is to specify the monetary incentives, the rules governing economic exchange, and the consequences of individual actions in a set of instructions to experimental subjects, who will be recruited to participate and will earn real money. For example, in an experiment testing the model of supply and demand, experimental subjects are first divided into participants called "buyers" and participants called "sellers." Buyers are given schedules of redemption values that indicate the prices at which they can resell to the experimenter units of a fictitious commodity that they will purchase from sellers during the experiment. Typically, each buyer's first unit purchased is worth the most money and last unit purchased is worth the least money. This structure replicates a demand curve describing a buyer's willingness to pay increasingly less as he or she buys increasingly more units of a good. A buyer's profit on a unit purchased is the difference between the unit's redemption value and the price that is paid for the unit. Sellers are given cost schedules that indicate how much they must pay the experimenter for each unit of the fictitious commodity that they sell. Typically, each seller's first unit costs the least money and last unit costs the most money. This structure replicates a supply curve describing how a seller's marginal cost rises as he or she sells more and more units of a good. A seller's profit on a unit is the difference between the selling price for that unit and its cost.

The rules governing economic exchange essentially determine the economic institution within which exchange will take place. For example, a computerized double auction might be defined as follows. Each buyer and each seller is seated at a separate computer terminal and the only communication that is allowed between them is through a limited set of computer signals. Each buyer may type in a price (generally

called a bid) at which he or she is willing to purchase a unit. Each seller may type in a price (generally called an offer) at which he or she is willing to sell a unit. The highest bid and the lowest offer determine the current bid/ask spread of prices, within which the next trade will take place. All other bids are ranked from highest to lowest, and all other offers are ranked from lowest to highest. In order to enter the current market, a buyer must bid higher than the highest bid and a seller must ask lower than the lowest offer. Any buyer may accept the current lowest offer and any seller may accept the current highest bid. When a buyer and a seller agree on a price, they exchange one unit at that price and earn profits in real money as specified in the paragraph above. The next highest bid and next lowest offer then become the current bid/ask prices. Bids, offers, and trades may continue for a specified amount of time, generally called a trading day and lasting from three to five minutes. When this time is up, the market may start over again with the same or different redemption values and costs. An experimental market may run for as few as five or as many as twenty or more trading days, depending on the experiment. At the end of an experiment, a subject's total profit is the sum of his or her profits on each unit traded each trading day.

A test of the model of supply and demand in the context of the double-auction trading institution involves replicating the above experiment enough times to allow for the statistical testing of how close the experimental prices and quantities in each trading period conform to the model's predictions. This experiment has actually been replicated many times using many different reservation values and costs. The results provide very strong support for the contention that, if the same reservation values and costs are used in a sequence of trading periods involving the same set of subjects, prices and quantities converge almost exactly to the model's predictions within three or four trading periods.

### Applications

Experimental laboratory methods can be used as part of an overall research strategy in almost any field of applied microeconomics. Some experimentalists even use laboratory experiments to study macroeconomic phenomena, but laboratory experiments are most widely used to analyze and compare different kinds of markets, to test theories in industrial organization, and to study the way that relatively small groups of individuals make economic decisions in nonmarket environments.

The double-auction market is one of many market institutions that have been studied experimentally. Another widely studied market is the posted-offer market, in which sellers set prices which cannot be changed during a trading period and buyers simply decide whether or not to buy at the posted prices. This institution is similar to a supermarket, in which the seller sets prices and buyers select goods off the shelves. Numerous researchers have found that the prices in posted-offer markets tend to be higher than the prices in double-auction markets and that the quantities tend to be lower. This result is consistent with predictions of tacit collusion among sellers in some industrial organization models, which has led the U.S. Department

of Justice and the U.S. Federal Trade Commission to consider the rules for market exchange when deciding whether to pursue the prosecution of an industry for conspiring to fix prices.

One of the best applications of experimental economics is in studying the behavior of markets for tradeable assets, such as stocks and bonds, in which the value of the asset is not known with certainty at the time of trading. Before the October, 1987, stock market crash, the dominant academic theory of price formation in stock markets predicted that stock prices would move randomly around the long-term average value of the stock. This theory did not predict either speculative price bubbles and crashes or that clever traders could make money by studying price trends and "beating the system." Meanwhile, Vernon L. Smith, an experimental economist at the University of Arizona, was studying stock markets that are similar in structure to the New York Stock Exchange. At the beginning of each of his experimental stock markets, each participant received shares of a stock that earned a high value with a probability of 0.5 and a low value with a probability of 0.5. Participants knew that the experiment would last fifteen periods, and they were told in each period the average value of holding a share for the remaining periods. Yet, in experiment after experiment, the price of a share would rise well above the average holding value during the first seven to ten trading periods and then crash down to approximately the average holding value in the last few periods. In other words, Smith was observing speculative bubbles and crashes in his laboratory markets, in contrast to accepted theory. Before the crash in October, 1987, few scholars or traders accepted that Smith's experimental results applied to naturally occurring stock markets. His results were dismissed as applying only in the laboratory with inexperienced college students as traders. After the crash, Smith's results were taken far more seriously and new models, which allow for the possibility of speculative bubbles and crashes, have been developed.

Another experimental research project that has generated information about naturally occurring economic institutions is a study of voluntary contributions to the provision of a public good by R. Mark Isaac of the University of Arizona and James M. Walker of Indiana University. Economic theory suggests that individuals will, in general, voluntarily contribute little or nothing to the provision of public goods. This happens because public goods are jointly consumed and each individual has an incentive to "free-ride" on the contributions of others. Yet, some naturally occurring fund drives succeed in obtaining substantial contributions, and others do not. In order to explain these results, Isaac and Walker have identified sets of conditions under which voluntary contributions are likely to be relatively high and those under which they are likely to be relatively low. They find that voluntary contributions are likely to be relatively high when participants can communicate with one another before making their contributions; when the private returns from contributions to public goods are relatively high; when there is a clearly defined target level of total contributions; when participants can increase their contributions during the time period in which the group is trying to reach its target; and when there are more

participants in the contributing group. These results shed important light on the extent to which private contributions to the provision of public goods are likely or unlikely in the naturally occurring environment.

One of the most innovative uses of experimental economics is in the design and testing of new, computerized "smart markets," which may allow the decentralization of decisions that generations of economists have assumed could only be made by a central authority. These are markets which do not arise naturally, often because of the difficulty of coordinating the private information of economic agents. Computer algorithms aggregate private information into prices and quantities that all participants in the market can agree to accept. Sometimes, such markets must assign a different price and quantity to each individual market participant. Because these are invented markets, there are no naturally occurring markets to observe, but these invented markets can be tested in the laboratory. Before implementing such markets to solve naturally occurring allocation problems, it is important to test whether they behave as predicted in theory. Examples of such "smart markets" include markets to allocate takeoff and landing rights at major airports, markets to allocate the rights to use gas pipelines and electricity transmission lines among competing gas and electric companies, and markets to allocate public goods that are not provided by voluntary contributions and shared production facilities.

The comparisons of market institutions, the design of smart markets, and the studies of the voluntary provision of public goods combine in the application of experimental laboratory methods to analysis of economic policy and regulation. A new economic policy or regulation often involves changing an economic institution in an effort to improve economic performance, but economic agents do not always behave as predicted by current theory. Yet, as the policy or regulation is new, no naturally occurring examples of the new institution exist in order to be studied. Changing an institution without testing its performance can be costly and disruptive to the economy. An experimental comparison of the existing and the new institutions provides an inexpensive means of pretesting proposed policies or regulations.

### Context

The first economic experiment was conducted by Edward Chamberlin (1899-1967) in his graduate microeconomics class at Harvard University in the late 1940's. Vernon L. Smith was a student in one of those classes. Chamberlin invented the technique of "inducing" demand and supply curves by giving participants reservation values and costs. In his experiment, the market institution consisted of having buyers and sellers move around the room and negotiate bilateral trades with one another. Smith later formalized a theory of induced valuation and studied the behavior of double-auction, posted-offer, and stock markets.

During the 1950's, 1960's, and 1970's, a few other economists became interested in the possibility of using laboratory experiments as an empirical tool, but most of the economics establishment was either hostile toward experimental economics or was unaware of its existence. As late as the early 1980's, principles and intermediate

microeconomics textbooks still stated that economics was not a laboratory science. Few economists in the world considered themselves experimental economists.

Several developments in the late 1970's and 1980's combined to give experimental economics credibility as an empirical tool. First, a series of studies comparing double-auction and posted-offer markets convinced a number of economists that institutions could affect economic outcomes and that laboratory experiments could be used to study economic institutions. In the United States, the Federal Trade Commission, Justice Department, Interstate Commerce Commission, National Aeronautics and Space Administration, and National Science Foundation all began to fund laboratory experimental research in economics. In addition, graduate students in economics began to study experimental economics. Second, a number of economic theorists became interested in using laboratory experiments as part of a program of scientific theoretical development: state a theory, test it in the laboratory, compare the results to the theoretical predictions, refine the theory in light of the experimental results, and retest it. Their work convinced other theorists of the value of experimental economics. Third, economic experimentalists began to write down and formalize their experimental methodology, making it possible for any economist to conduct an experiment as part of a larger research project. Economic experimentalists also learned from experimental psychologists, whose experimental methodology was more mature.

By the late 1980's, laboratory experiments had become a generally accepted empirical methodology in economics. Principles textbooks included discussions of experimental results and teaching manuals explained to professors unfamiliar with laboratory experiments how to use them in class for instructional purposes. The National Science Foundation sponsored a series of summer workshops for professors at teaching colleges to learn how to run experiments in class. Experimental economists began working with statisticians and econometricians to develop new statistical techniques for analyzing experimental data. Researchers in finance, accounting, marketing, management information systems, economic history, resource economics, game theory, macroeconomics, labor economics, industrial organization, and decision theory began using laboratory experiments in order to test theories and analyze institutions and policies.

### Bibliography

- Hoffman, Elizabeth, and Matthew L. Spitzer. "Experimental Law and Economics: An Introduction." *Columbia Law Review* 85, no. 5 (1985): 991-1036. A thorough introduction to the technique and literature of experimental economics up to 1985. This article is written for lawyers but accessible to nonspecialists. Includes in-depth analyses of several classic experimental research projects.
- Isaac, R. Mark. "Laboratory Experimental Economics as a Tool in Public Policy Analysis." *Social Science Journal* 20, no. 3 (1983): 45-58. A readable introduction to how laboratory experiments can be used to inform policy analysis and regulation. Includes analyses of several experimental projects that did have an effect on public policy.

Plott, Charles R. "Industrial Organization Theory and Experimental Economics." *Journal of Economic Literature* 20, no. 1 (1982): 485-527. An excellent introduction to how experimental economics can be used to test theories in industrial organization. Includes analyses of several classic experimental works in industrial organization.

Smith, Vernon L. "Experimental Methods in Economics." In *The New Palgrave: A Dictionary of Economics*, edited by John Eatwell, Murray Milgate, and Peter Newman. London: Macmillan, 1987. The best introduction to experimental economics available in print in 1990. The presentation may be somewhat advanced for some readers.

\_\_\_\_\_. "Microeconomic Systems as an Experimental Science." *American Economic Review* 72, no. 5 (1982): 923-955. The best introduction to the approach to experimental economics is outlined in this article, but the presentation may be somewhat advanced for some readers.

Elizabeth Hoffman

#### Cross-References

Auctions and Auctioneers, 95; Econometrics, 632; Goods: Public vs. Private, 903; Industrial Organization, 1047; Regulation and Deregulation, 1973; Stocks and the Stock Market, 2168.

## EXPLOITATION

*Type of economics:* General economics

*Fields of study:* Economic theory and history of economic thought

*Labor exploitation refers to capitalist appropriation of the difference between value that workers generate and the wages that they receive. Exploitation is the main theme of Marxist economics, which was the impetus for many of the twentieth century revolutions. Marxist interpretation of exploitation also influenced Western economic thought and, therefore, social institutions of capitalist economic systems.*

#### Principal terms

ABSTRACT LABOR: the amount of labor power that is socially assigned to a given production process; a Marxist term

CONCRETE LABOR: the productive ability of an individual without social constraints, such as an average amount of labor power that goes into producing a commodity; a Marxist term

LABOR POWER: the mental and physical abilities of human beings to produce goods; a Marxist term

MONOPOLY: a single seller of a commodity, which can either control the price or the quantity sold in the market

MONOPSONY: a single buyer of a commodity, usually used for a single buyer in a labor market

NEOCLASSICAL ECONOMIC THOUGHT: a school of economics that promotes a market approach

PERFECT COMPETITION: a market condition with many buyers and sellers; no single buyer or seller can dominate the market to influence the price

SUBSISTENCE WAGE: a wage rate that can cover only the essential needs of a person and family; socially determined

SURPLUS VALUE: the value that a worker creates beyond the amount to cover a family's basic needs, appropriated by the capitalist; a Marxist term

#### Overview

The word "exploitation" means developing a resource or using an opportunity in order to gain an advantage. In economics, depending on the type of resource, this definition can have either positive or negative connotations. For example, a positive connotation may apply if land—a natural resource—is cultivated, used for a development, or mined to extract minerals. This resource is said to be exploited to increase goods and services available for consumption. In most cases in the capitalist world, the immediate goal of exploiting a natural resource is to gain an economic advantage. If the resource, however, is human labor, its exploitation implies that the exploiter acquires unfair economic gains.