

An Introduction to Experimental Economics

(from <http://www.answers.com/topic/experimental-economics>).

Experimental economics is the use of experimental methods to evaluate theoretical predictions of economic behaviour. It uses controlled, scientifically designed experiments to test economic theories under laboratory conditions. Typical empirical research is limited by the fact that only a subset of the set of all possible influences affect (or can be observed to be affecting) economic decision making. This inhibits or severely limits the ability to control for certain influences. With experiments, economists can fix some inputs and measure the effects of other inputs in a way that allows ceteris paribus comparisons.

Additionally, economic theory depends on assumptions about the preferences of economic agents. Whether these assumptions are correct is not observable from economic activity. All that can be said is that the preference can be inferred from the choice. Experimental economists use laboratory conditions to identify preferences and to examine if those preferences actually influence economic choices the way the theory says they should.

Experimental economics is an inter-disciplinary science. Not only are the economists usually well-versed in areas other than economics and mathematics, but also they work with other social scientists to determine the biological, social, and psychological reasons and causes for the choices the test subjects make. The Interdisciplinary Center for Economic Science at George Mason University, founded by 2002 Nobel Prize winner Vernon Smith, is one example of the collaboration of researchers with different areas of expertise.

Testing focuses on markets and what makes them work, rules for commerce, i.e. trading, bartering, exchange, etc., and the behavior of economic agents under different market or exchange mechanisms. With these lab experiments, it is possible to estimate or predict reactions to changes in economic rules. For example, predicting corporate behavior under different environmental policies has been difficult with traditional economic theory, but experiments can help determine if a market of environmental or natural resource commodities, e.g. pollution allowances, water rights, electricity, etc., will provide a more efficient mechanism for allocating scarce resources.

Historically most economics experiments were conducted in the laboratory, but recently interest in economics field experiments has grown. The development of experimental economics has also led to increased interest in econometric studies of natural experiments.

Experimental topics

Economics experiments can be loosely classified into the following topics: Markets, Games, Decision-making, Bargaining, Auctions, Coordination, Social Preferences, Learning, matching, and Field Experiments.

Coordination games: Coordination games are games with multiple equilibria, often Pareto ranked. There are two general sets of questions that experimental economists typically ask when examining such games: (1) Can laboratory subjects coordinate, or learn to coordinate, on one of multiple equilibria, and if so are there general principles that can help predict which equilibrium is likely to be chosen? (2) Can laboratory subjects coordinate, or learn to coordinate, on the Pareto best equilibrium and if not, are there conditions or mechanisms which would help subjects coordinate on the Pareto best equilibrium? Deductive selection principles are those that allow predictions based on the properties of the game alone. Inductive selection principles are those that allow predictions based on characterizations of dynamics.

Learning Experiment: The need for learning models comes from the fact that subjects in laboratory experiments often make decisions repeatedly. Moreover, in games of 2 players or more, subjects may form beliefs about what other subjects will do and these beliefs may be updated over time. Such a process is known as belief learning. Subjects may also move away from decisions that have given them bad payoff in the past and towards decisions that have rewarded them with high payoffs in the past. Such a process is known as reinforcement learning. Until the 1990s, simple adaptive models, such as Cournot best response or Fictitious Play, were generally used. In the mid-1990s, Alvin Roth and Ido Erev demonstrated that reinforcement learning can make useful predictions in experimental games. In 1999, Colin Camerer and Teck Ho introduced Experience Weighted Attraction, known as EWA, which was a general model that nested different forms of reinforcement and belief learning, and shows that fictitious play (with weights on past history) is mathematically equivalent to generalized reinforcement, where even unplayed strategies are reinforced. Criticisms of EWA include overfitting due to many parameters, lack of generality over games, and the possibility that the interpretation of EWA parameters may be difficult. The first criticism has been addressed by estimating parameters on some of the experimental periods or experimental subjects and forecasting behavior in the remaining sample (if models are overfitting, these out-of-sample validation forecasts will be much less accurate than in-sample fits, which they generally are not). The second criticism has been addressed by replacing fixed parameters with "self-tuning" functions of experience, which allows pseudo-parameters to change across the course of a game and also to vary systematically across games. While the debate between EWA and predecessors dominated the field for most of the past decade, the field appears to be re-emerging with new questions. Roberto Weber, for example, has raised issues of learning without feedback. David Cooper and John Kagel have investigated types of learning over similar strategies. Ido Erev and Greg Barron have looked at learning in cognitive strategies. Dale Stahl has characterized learning over decision making rules. Charles Holt has studied logit learning in different kinds of games, including games with multiple equilibria. Wilfred Amaldoss has looked at interesting applications of EWA in marketing. Amnon Rapoport, Jim Parco and Ryan Murphy have investigated reinforcement-based adaptive learning models in one of the most celebrated paradoxes in game theory known as "centipede games."

Market games: Vernon Smith, formerly of the University of Arizona and now at the Interdisciplinary Center for Economic Science at George Mason University conducted pioneering economics experiments on the convergence of prices and quantities to their theoretical competitive equilibrium values in experimental markets. Smith studied the behavior of "buyers" and "sellers", who are told how much they "value" a fictitious commodity, and then are asked to competitively "bid" or "ask" on these commodities following the rules of various real world market institutions, such as the Double auction (both sides can bid) used in many stock exchanges, as well the English auction and the Dutch auction. Smith found that in some forms of centralized trading, prices and quantities traded in such markets converge on the values that would be predicted by the economic theory of perfect competition, despite the conditions not meeting many of the assumptions of perfect competition (large numbers, perfect information).

Over the years, Smith pioneered -along with other collaborators- the use of controlled laboratory experiments in economics, and established it as a legitimate tool in economics and other related fields. Charles Plott of Caltech collaborated with Smith in the 1970s and pioneered experiments in political science, as well as using experiments to inform economic design or engineering to inform policies. In 2002, Smith was awarded (jointly with Daniel Kahneman) the Nobel (Bank of Sweden) prize in Economic Sciences "for having established laboratory experiments as a tool in empirical economic analysis, especially in the study of alternative market mechanisms".

Social preferences: The term "social preferences" refers to the concern (or lack thereof) that people have for each other's well-being, and it encompasses altruism, spitefulness, tastes for equality, and tastes for reciprocity. Experiments on social preferences generally study economic games including the dictator game, the ultimate game, the trust game, the public good game, and modifications to these canonical settings. As one example of results, ultimate game experiments have shown that people are generally willing to sacrifice monetary rewards when offered unequal allocations, thus behaving inconsistently with simple models of self-interest. Interestingly, the direction and size of the bias varies between cultures. (More market-oriented societies tend to have higher inequity aversion).

Methodology Guidelines: Experimental economists generally adhere to the following methodological guidelines:

- Incentivize subjects with real monetary payoffs.
- Publish full experimental instructions.
- Do not use deception.
- Avoid introducing specific, concrete context.

Critiques

The above guidelines have developed in large part to address two central critiques. Specifically, economics experiments are often challenged because of concerns about their "internal validity" and "external validity", for example, that they are not

applicable models for many types of economic behavior, so the experiments simply aren't good enough to produce useful answers.

Some economic theorists, especially the Austrian School, reject the entire concept of economic empiricism, since they reach their conclusions strictly by deduction (from axioms arrived at introspectively).

Experimental Finance

A branch of Experimental economics is Experimental Finance, which is the application of Experimental economics in financial markets. The goals of Experimental finance are to establish different market settings and environments to observe experimentally and analyze agents' behavior and the resulting characteristics of trading flows, information diffusion and aggregation, price setting mechanism and returns processes. Presently, researchers use simulation software to conduct their research.