

## **Confronting Theory with Experimental Data and vice versa**

**European University Institute  
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### **Course Description**

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#### **Course syllabus**

The course presents advanced topics in experimental/behavioral economics and designed to develop theoretical and experimental tools (the course will not be about experimental methods per se, however). Owing to the limitation of time, the topics covered will necessarily be only a small fraction of what one could (and ideally, should) cover in this course, and thus, the course cannot provide a complete coverage of the vast and growing body of work on behavioral / experimental decision theory and game theory. Experimental economics has become a major area of research in economics. Its basic premise is that all good economic theories can be testable in a controlled laboratory setting. In fact, one may argue that some economic theories can only be tested experimentally.

In combining theory and experiments, we should have two objectives in mind. The first objective is to confront the theory with some data to see whether the theory is at all consistent with the behavior exhibited in the laboratory. Clearly, there is much that can be learned about the theory from the data, quite apart from any notion of “testing” the theory. We hope to learn whether the theory is useful in interpreting the data, of course, but we also expect to find out what extensions of the theory are required to make it compatible with the data.

The second objective is to confront the data with the theory. A theoretical framework is needed for two reasons. First, the data set generated by experiments can be extremely rich and the behavior predicted by the theory is sometimes complex and subtle. Any attempt to explain rich datasets in purely “behavioral” terms would require a large number ad hoc assumptions, which would render the “explanation” rather uninformative. The second reason is that, without a theoretical framework, it is impossible to draw general conclusions that go beyond the particular setting of the experiment.

The course will consist of five equal weight segments:

### I. Risk preferences

Uncertainty is endemic in a wide variety of economic circumstances so models of decision making under uncertainty play a key role in every field of economics. The standard model of decisions under uncertainty is based on von Neumann and Morgenstern (1947) Expected Utility Theory (EUT), so it is natural that experimentalists should want to test the empirical validity of the Savage (1954) axioms on which EUT is based. Empirical violations of EUT provoke intriguing questions about the rationality of individual behavior and, at the same time, raise criticisms about the status of the Savage axioms as the touchstone of rationality. These criticisms have resulted in the development of various theoretical alternatives to EUT, and the investigation of these theories has led to new empirical regularities in the laboratory. Developing appropriate methods for appropriately confronting the theory of choice under risk (known probabilities) and ambiguity (unknown probabilities) with experimental evidence will have implications in many areas of economic theory and policy.

1. Camerer, C. (1995) "Individual Decision Making," in *Handbook of Experimental Economics*. J. Kagel and A. Roth, eds. Princeton U. Press.
2. Starmer, C. (2000) "Developments in Non-Expected Utility Theory: The Hunt for a descriptive Theory of Choice under Risk." *Journal of Economic Literature* **38**, pp. 332-382.
3. Harless, D. and C. Camerer (1994) "The Predictive Utility of Generalized Expected Utility Theories." *Econometrica* **62**, pp. 1251-1289.
4. Hey, J. and C. Orme (1994) "Investigating Generalizations of Expected Utility Theory Using Experimental Data." *Econometrica* **62**, pp. 1291-1326.
5. Holt, C. and S. Laury (2002) "Risk Aversion and Incentive Effects." *American Economic Review* **92**, pp. 1644-1655.
6. Choi, S., R. Fisman, D. Gale and S. Kariv (2007) "Revealing Preferences Graphically: An Old Method Gets a New Tool Kit." *American Economic Review Papers & Proceedings* **97**, pp. 153-158.
7. Choi, S., R. Fisman, D. Gale and S. Kariv (2007) "Consistency and Heterogeneity of Individual Behavior under Uncertainty." *American Economic Review* **97**, pp. 1921-1938.
8. Halevy, Y. (2007) "Ellsberg Revisited: An Experimental Study." *Econometrica* **75**, pp. 503-536.
9. Ahn, D., S. Choi, D. Gale and S. Kariv (2007) "Estimating Ambiguity Aversion in a Portfolio Choice Experiment." Mimeo.

## II. Social preferences

Many complex social and economic behaviors invoke social preferences. Obvious examples include charitable giving, negotiations, cooperation, taxation, neighborhood effects, social learning, social capital, development, and globalization, among others. In all of these cases, understanding behavior requires understanding the distributional preferences that lie behind it. A theoretical and empirical analysis of these preferences therefore has implications not just for economic policy but also for policy in a host of other areas. Moreover, social preferences implicate many disciplines, ranging from economics, through philosophy, and even law. The techniques and intellectual frameworks of all these disciplines must be brought to bear in order properly to understand such preferences. Economic theory raises intriguing questions about the rationality of social preferences. Insofar as social preferences are rational, then the techniques of economic analysis may be brought to bear on modeling and predicting behavior governed by these preferences.

1. Camerer, C. (2003) “Behavioral Game Theory: Experiments in Strategic Interaction.” Princeton University Press (Ch. 2).
2. Fehr, E. and K. Schmidt (1999) “A Theory of Fairness, Competition and Co-operation.” *Quarterly Journal of Economics* **114**, pp. 817-868.
3. Bolton, G. and A. Ockenfels (2000) “ERC: A Theory of Equity, Reciprocity, and Competition.” *American Economic Review* **90**, pp. 166-193.
4. Engelmann D. and M. Strobel (2004) “Inequality Aversion, Efficiency, and Maximin Preferences in Simple Distribution Experiments.” *American Economic Review* **94**, pp. 857-869.
5. Charness, G. and M. Rabin (2002) “Understanding Social Preferences with Simple Tests.” *Quarterly Journal of Economics* **117**, pp. 817-869.
6. Andreoni, J. and J. Miller (2002) “Giving According to GARP: An Experimental Test of the Consistency of Preferences for Altruism.” *Econometrica* **70**, pp. 737-753.
7. Fisman, R., S. Kariv and D. Markovits (2007) “Individual Preferences for Giving.” *American Economic Review* **97**, pp. 1858-1876.

## III. Social learning

There are innumerable social and economic situations in which agents are influenced by the decisions of others. The commonest examples are from everyday life, such as choosing a fashionable restaurant or a popular movie. However, it has also been suggested that the same factors influence technology adoption and asset-market decisions. From the point of view of rational choice theory, however, the important question is why rational, maximizing agents should behave

in this way. Several economic theories explain the existence of uniform social behavior. These include benefits from conformity for its own sake, sanctions imposed on deviants, strategic complementarities, and social learning, which describes any situation in which agents learn by way of observing the behavior of others. Among these theories, social learning alone explains not only why a society settles on a single pattern of behavior but also why mass behavior may be idiosyncratic, error-prone and fragile, in the sense that small shocks may cause behavior to shift suddenly and dramatically.

1. Bikhchandani, S., D. Hirshleifer and I. Welch (1998) “Learning from the Behavior of Others: Conformity, Fads, and Informational Cascades.” *Journal of Economic Perspective* **12**, pp. 151-170.
2. Bikhchandani, S., D. Hirshleifer and I. Welch (1992) “A Theory of Fads, Fashion, Custom, and Cultural Change as Informational Cascade.” *Journal of Political Economy* **100**, pp. 992-1026.
3. Smith, L. and P. Sørensen (2000) “Pathological Outcomes of Observational Learning.” *Econometrica*, **68**, pp. 371-398.
4. Çelen, B. and S. Kariv (2004) “Observational Learning under Imperfect Information.” *Games and Economic Behavior*, **47**, pp. 72-86.
5. Smith, L. and P. Sørensen (2008) “Rational Social Learning by Random Sampling.” Mimeo.
6. Anderson, L. and C. Holt (1997) “Information Cascades in the Laboratory.” *American Economic Review* **87**, pp. 847-862.
7. Goeree, J., R. McKelvey, T. Palfrey, and B. Rogers (2007) “Self-Correcting Information Cascades.” *Review of Economic Studies* **74**, pp. 733-762.
8. Çelen, B. and S. Kariv (2004) “Distinguishing Informational Cascades from Herd Behavior in the Laboratory.” *American Economic Review* **94**, pp. 484-497.
9. Çelen, B. and S. Kariv (2005) “An Experimental Test of Observational Learning under Imperfect Information.” *Economic Theory* **26**, pp. 677-699.

#### IV. Social and economic network

Networks are natural tools for understanding complex social and economic phenomena such as technology diffusion, neighborhood effects, financial crises and contagion, and social learning, among others. For example, apart from centralized exchanges such as the NYSE, most financial transactions take place in networks where one or more intermediaries link the initial seller and final buyer. Financial networks, which are crucial for the allocation of resources in

society, are a natural example to study, but the lessons we can learn have wider applications because the model of financial networks has many basic elements in common with any model of exchange, whether the commodities are real or financial. The goal is to identify the impact of network architecture on the efficiency and dynamics of economic outcomes. Moreover, policy decisions by firms and governments will be improved by the theoretical and empirical analysis of networks. The study of networks also has applications beyond economics.

1. Jackson, M. (2005), “A Survey of Models of Network Formation: Stability and Efficiency.” In *Group Formation in Economics: Networks, Clubs, and Coalitions* edited by G. Demange and M. Wooders. Cambridge University Press.
2. Kosfeld, M. (2004), “Economic Networks in the Laboratory: A Survey.” *Review of Network Economics* **3**, pp. 20-4.
3. Bala, V. and S. Goyal (1998) “Learning from Neighbors,” *Review of Economic Studies* **65**, pp. 595-621.
4. Gale, D. and S. Kariv (2004) “Bayesian Learning in Social Networks.” *Games and Economic Behavior* **45**, pp. 329-346.
5. Kranton, R. and D. Minehart (2001) “A Theory of Buyer-Seller Networks.” *American Economic Review* **91**, pp. 485-508.
6. Gale, D. and S. Kariv (2007) “Financial Networks.” *American Economic Review Papers & Proceedings* **97**, pp. 99-103.
7. Choi, S., D. Gale and S. Kariv (2005) “Behavioral Aspects of Learning in Social Networks: An Experimental Study.” *Advances in Applied Microeconomics*, Volume 13, Behavioral and Experimental Economics, edited by John Morgan.
8. Gale, D. and S. Kariv (2007) “Trading in Networks: A Normal Form Game Experiment.” Mimeo.

## V. Equilibrium

In games with multiple equilibria, there are important questions that theory alone cannot answer. Most importantly, theory cannot tell us which equilibrium is most likely to be played. In order to restrict the set of equilibria and produce stronger predictions, game theorists use a number of refinements. For example, they focus on the set of sequential equilibria, or Markov equilibria, or symmetric equilibria, or pure-strategy equilibria. Although these refinements are standard in game theory, whether any of these refinements is reasonable in practice is an empirical question. Answering this question is important for game theoretic analysis in general. The use of market-generated data for this purpose is problematic because so many crucial parameters and variables are unobserved. The

advantage of laboratory experiments is that we can, in principle, observe all the relevant parameters and variables. The series of papers we will discuss in this part of the course attempt to learn more about the empirical properties of a class of games called *monotone games* (extensive-form games with simultaneous moves and an irreversibility structure on strategies) and of the refinements that are widely used in game theory.

1. Camerer, C. (2003) “Behavioral Game Theory: Experiments in Strategic Interaction.” Princeton University Press.
2. Gale D. (1995) “Dynamic Coordination Games.” *Economic Theory* **5**, pp. 1-18.
3. Gale D. (2001) “Monotone Games with Positive Spillovers.” *Games and Economic Behavior* **37**, pp. 295-320.
4. Marx L. and S. Matthews (2000) “Dynamic Voluntary Contribution to a Public Project.” *Review of Economic Studies* **67**, pp. 327-358.
5. Choi S., D. Gale and S. Kariv (2007) “Sequential Equilibrium in Monotone Games: Theory-Based Analysis of Experimental Data.” Forthcoming *Journal of Economic Theory*.
6. Choi S., D. Gale, S. Kariv and T. Palfrey (2008) “Network Architecture, Salience and Coordination.” Mimeo.