

# CEAR Workshop: Econometrics of Choice Under Risk and Over Time

January 10 and 11, 2011, Denver

## General Information

The workshop disseminates current innovations in econometric work having to do with choice under risk and over time. Talks range over foundational econometric and measurement issues, innovative applied work on behavioral puzzles and anomalies in field data, cognitive correlates of choice under risk and over time, and applied work on consumer credit and mortgages and risky production in agriculture.

## Organizers

Nat Wilcox is the organizers of this workshop, which is funded by the Center for the Economic Analysis of Risk (CEAR) at Georgia State University. See [cear.gsu.edu](http://cear.gsu.edu) for more information on CEAR. Contact Wilcox at [nwilcox@chapman.edu](mailto:nwilcox@chapman.edu) about the substance of the workshop, and contact Mark Schneider at [cear@gsu.edu](mailto:cear@gsu.edu) with questions about participation and logistics.

## Dates & Times

Monday 1/10 – 9 am to 5 pm. Refreshments and lunch will be provided.

Tuesday 1/11 – 9 am to 3:30 pm. Refreshments and lunch will be provided.

Contact Mark Schneider at [cear@gsu.edu](mailto:cear@gsu.edu) for special dietary needs.

## Location

The workshop will be held at the Sheraton Denver Downtown, 1550 Court Place, Denver CO 80202 in the Directors Row H & I Rooms. This is also the main hotel for the ASSA/AEA meeting in Denver, which immediately precedes this CEAR workshop for maximum convenience.

## Lodging & Attendance

Attendance is open to all that are interested; however, due to space constraints a first-come, first-served policy will be followed. To verify if space is available and confirm attendance contact Mark Schneider at (404) 413.7463 or send an e-mail to [cear@gsu.edu](mailto:cear@gsu.edu).

We are asking that participants and attendees lodge at The Sheraton where the workshop will be held. This will allow us to meet our "quota" with the hotel for reservations at the hotel, keeping the costs of room time and catering down. The hotel is at 1550 Court Place, Denver, CO 80202, phone (303) 893-3333, and website [www.sheratondenverdowntown.com](http://www.sheratondenverdowntown.com).

Rooms can be reserved by calling the Sheraton number listed above and identifying yourself as attendees of CEAR Workshop" or "The Econometrics of Choice Under Risk and Over Time," or alternatively they may be made directly at [www.starwoodmeeting.com/Book/CEAR2011](http://www.starwoodmeeting.com/Book/CEAR2011). A discounted room rate is good until 12/10/10.

Please note again that you must reserve a space with Mark Schneider if you plan to attend.

## Program

### **Monday January 10**

8:00 – 8:50	Continental breakfast and coffee
8:50 – 9:00	Nat Wilcox (Chapman) <i>Welcome and Introduction</i>
9:00 – 10:00	John Geweke (University of Technology Sydney) <i>Structural econometric models of decision-making under risk: Problems and prospects</i>
10:00 – 10:15	Coffee Break
10:15 – 11:15	Liran Einav (Stanford University) <i>How general are risk preferences? Choices under uncertainty in different domains</i>
11:15 – 11:45	Discussion of Geweke and Einav: Glenn Harrison
11:45 – 12:45	Lunch (catered buffet at the Sheraton, room TBD)
12:45 – 1:45	Jeremy Fox (University of Michigan) <i>Using Selection Decisions to Identify the Joint Distribution of Outcomes</i>
1:45– 2:00	Coffee
2:00 – 3:00	Sumit Agarwal (Federal Reserve Bank of Chicago) <i>Cognitive Abilities and Household Financial Decision Making</i>
3:00 – 3:15	Coffee
3:15 – 4:15	John Rust (University of Maryland) <i>The Free Installment Puzzle</i>
4:15 – 5:00	Discussion of Fox, Agarwal and Rust: Chris Carroll and Nat Wilcox
6:30 – ?	Dinner for invited guests at Rioja, 1431 Larimer Street.

(continued on next page)

Program (continued)

**Tuesday January 11**

8:00 – 9:00	Continental breakfast and coffee
9:00 – 10:00	Stefan Hoderlein (Brown University) <i>Semiparametric Estimation of Random Coefficients in Structural Economic Models</i>
10:00 – 10:15	Coffee
10:15 – 11:15	Dan Houser (George Mason University) <i>Risk Attitudes and Job Networks</i>
11:15 – 11:45	Discussion of Hoderlein and Houser: Joerg Stoye
11:45 – 12:45	Lunch (catered buffet at the Sheraton, room TBD)
12:45 – 1:45	Jeffrey LaFrance (Washington State University) <i>Intertemporal Risk Management in Agriculture</i>
1:45 – 2:00	Discussion of LaFrance: John Rust
2:00 – 2:15	Coffee
2:15 – 3:15	Peter Moffatt (University of East Anglia) <i>Mortgage Choice as a Natural Field Experiment on Choice Under Risk</i>
3:15 – 3:30	Discussion of Moffatt: Dan Houser
3:30	Workshop ends

Sumit Agarwal (Federal Reserve Bank of Chicago) *Cognitive Abilities and Household Financial Decision Making* (by Sumit Agarwal and Bhashkar Mazumderb).

We analyze the effects of cognitive skills on two specific examples of consumer financial decisions where suboptimal behavior is well defined: first, the use of a credit card for a transaction after making a balance transfer on the account, and second, cases where individuals are penalized for inaccurate estimation of the value of one's home on home equity loan or line of credit application. We match individuals from the US military for whom we have detailed test scores from the Armed Services Vocational Aptitude Battery test (ASVAB), to administrative datasets of retail credit from a large financial institution. We show that our matched sample is reasonably representative of both universes from which it is drawn. Our results show that consumers with higher overall composite test scores, and specifically those with higher math scores, are substantially less likely to make a financial mistake. Importantly no such effects are found for verbal or for most other component scores. We also conduct some complementary analyses using other data sources. We use the National Longitudinal Survey of Youth (NLSY) to show that higher ASVAB math scores are associated with lower subjective discount rates suggesting one possible mechanism for our findings. Finally, we use the Health and Retirement Survey (HRS) to demonstrate that particular forms of cognitive ability matter for specific types of suboptimal behavior. We find that the mathematical component of cognitive skills is what matters most for financial decision making and financial wealth. In contrast, it is the non-mathematical components of cognitive skills that appear to matter for non-financial forms of suboptimal behavior (e.g. failure to take medicine). The HRS results also demonstrate the large ramifications of low cognitive math ability on long-term economic success.

Keywords: Household finance, Credit Cards, Home Equity, AFQT Scores

Liran Einav (Stanford University) *How general are risk preferences? Choices under uncertainty in different domains* (by Liran Einav, Amy Finkelstein, Iuliana Pascu, and Mark R. Cullen)

Abstract. We examine the extent to which an individual's actual insurance and investment choices display a stable ranking in willingness to bear risk, relative to his peers, across different contexts. We do so by examining the same individual's decisions regarding their 401(k) asset allocations and their choices in five different employer-provided insurance domains, including health and disability insurance. We reject the null that there is no domain-general component of preferences. Among the five insurance domains, the magnitude of the domain-general component of preferences appears substantial; we find for example that one's choices in other insurance domains are substantially more predictive of one's choice in a given insurance domain than either one's detailed demographic characteristics or one's claims experience in that domain. However, we find considerably less predictive power between one's insurance choices and the riskiness of one's 401(k) asset allocations, suggesting that the common element of an individual's preferences may be stronger among domains that are closer in context. We also find that the relationship between insurance and investment choices appears considerably larger for employees who may be associated with better financial sophistication. Overall, we view our findings as largely consistent with an important domain-general component of risk preferences.

JEL classification numbers: D14, D81, G11, G22

Keywords: Risk aversion, Insurance, Uncertainty, Portfolio choice

Jeremy Fox (University of Michigan) *Using Selection Decisions to Identify the Joint Distribution of Outcomes* (by Jeremy Fox and Amit Gandhi)

In selection, each outcome is observed only for those who make a particular discrete choice. We identify the joint distribution of the outcomes by exploiting the relationship between the all-but-one unobserved outcomes and the discrete choice. We also allow random coefficients in the selection equation. Full identification of the model allows any treatment effect of interest to be calculated. We do not use identification at infinity. Credit cards are discussed as an application.

John Geweke (University of Technology Sydney) *Structural econometric models of decision-making under risk: Problems and prospects*

The presentation identifies two challenges to the structural econometric paradigm for understanding individual and social decision making in the presence of uncertainty about events for which there is no downside limit. Examples of such events include the environmental impact of human activity, and the consequences of incentives for risk-taking in the financial sector, in the real world; and the risks confronted by both individuals and representative agents in economic models. The first challenge is rooted in the fact that when there is no downside limit then in most structural models the existence (or not) of expected utility is an arbitrary assumption that cannot be tested. The second challenge stems from the fragility of the econometric implications of structural models with respect to costs of decision making or information processing. There are no generic solutions for these problems. However their implications in specific applications of structural econometrics could be documented as a routine matter with little additional effort, and the presentation argues that this should be done. There is no single paper for the presentation. Two background papers are: Geweke 2001, A note on some limitations of CRRA utility, *Economics Letters* 71:341-345; and Bateman, Ebling, Geweke, Louviere, Satchell and Thorp, 2010, Investment risk framing and individual preference consistency, downloadable here: <http://ssrn.com/abstract=1664869>

Stefan Hoderlein (Brown University) *Semiparametric Estimation of Random Coefficients in Structural Economic Models* (by Stefan Hoderlein, Lars Nesheim and Anna Simoni)

In structural economic models, individuals are usually characterized as solving a decision problem that is governed by a finite set of parameters. This paper discusses the estimation of the nonparametric density of these parameters if they are assumed to vary continuously across the population. We establish that the problem of recovering the density of random parameters is an inverse problem. This framework helps us to answer the following questions: When does such a density exist, and is there a unique density that satisfies this relationship. We characterize the identified set, and provide sufficient and necessary conditions for point identification that are related to the economic primitives of the model. Moreover, we point out that these densities are only weakly identified in general, and establish means to assess the gravity of the problem and remedies to make estimation feasible.

Keywords: Euler Equation, Consumption, Nonparametric, Identification, Random Coefficients.

Dan Houser (George Mason University) *Risk Attitudes and Job Networks* (by Daniel Houser and Rong Rong)

A substantial theoretical and empirical literature demonstrates the important role that risk attitudes can and do play in determining labor market outcomes. Studies have connected risk preference to, for example, labor market entry and occupational choice, entrepreneurial activity, investment in education or the setting of reservation wages. To the best of our knowledge, however, the impact of risk attitudes on investment in job contact networks has been unexplored. This is unfortunate, as one important way to insure against unemployment is by using connections to acquire information about job opportunities. Extending recent theory by Galeotti and Merlino (2010), we show that more risk-averse individuals develop networks with a greater number of connections, and that this can have significant impact on employment and wage outcomes. We provide a Monte Carlo analysis that highlights empirical challenges associated with drawing inference with respect to the model's parameters. Empirical research on the endogenous formation of job contact networks promises to shed new light on sources of wage gaps and other forms of inequality, while at the same time providing new approaches to addressing discrimination and related sources of inefficiency.

Jeffrey LaFrance (Washington State University) *Intertemporal Risk Management in Agriculture* (by Scott Colby, Timothy Graciano, Jeffrey LaFrance, Rulon Pope and Jesse Tack)

Agricultural production is subject to supply risk. Expected and realized farm outputs and output prices are unknown and unobservable when inputs are chosen. Crop and livestock production decisions are linked over time. Producers' expectations are particularly difficult to model. This paper presents the necessary and sufficient condition to allow input demands to be specified as functions of input prices, technology, quasi-fixed inputs, and cost in place of planned/expected outputs. These are observable when inputs are committed to production. We then derive a flexible, exactly aggregable, economically regular econometric model of input demands. This model is consistent with any dynamic von Newman – Morgenstern expected utility function. We combine this framework with a model of the life-cycle production, investment and savings, and consumption decisions of owner/operators who face output and output price risk, and who have opportunities to invest in a conditionally risk free asset, other risky financial assets, and farm assets. The econometric framework allows for location specific technological change and production processes, cross-equation, interspatial, and intertemporal correlation among the error terms, and simultaneity between inputs and outputs, input and output prices, investment in durable goods used in agriculture, consumption, savings, and wealth. The result is a dynamic structural model of inputs, outputs, savings, investment, and consumption under risk. Ongoing work includes an application of this model to U.S. agriculture at the state level to crop and livestock production for 1960-2004, and an update of the data to 2008.

Key Words: Aggregation, consumption, ex ante cost, expected utility, functional form, investment, life cycle, rank, risk, savings

JEL Classification: C3, D2, D8

Peter Moffatt (University of East Anglia) *Mortgage Choice as a Natural Field Experiment on Choice Under Risk* (by Philomena Bacon and Peter Moffatt)

Microdata from the UK Survey of Mortgage Lenders is used to model borrowers' choices between variable and fixed rate mortgages. The data is treated as a large-scale "natural experiment" on risky choice, with the choice of a fixed rate corresponding to the "safe choice" in a more conventional experimental setting. The choice is assumed to depend partly on risk attitude, and partly on expectations of future movements in interest rates. Approximately 280,000 choices, made by borrowers between 1992 and 2001, appear in the sample. The ordered probit model is used for estimation, while taking account of a number of econometric issues including missing counterfactuals, selectivity, and endogeneity. Explanatory variables are divided into three groups: mortgage price variables; interest rate expectations; and borrower characteristics. A number of strong effects are found, including: fixing is more likely when agents expect interest rates to rise; a larger amount borrowed (i.e. higher pay-offs in the choice problem) increases the propensity to fix; the presence of female borrowers increases the propensity to fix; older borrowers are less likely to fix; high-income borrowers are less likely to fix, particularly so if income is "self-certified". The results offer fresh insights into the analysis of risky choice, particularly with regard to the roles of incentives and subjects' income.

Keywords and phrases: Risky choice; Fixed and variable rate mortgages; counterfactuals; interest rate expectations; ordered probit.

JEL: G20, M13

John Rust (University of Maryland) *The Free Installment Puzzle* (by Sungjin Cho and John Rust)

We analyze a unique set of credit card transactions by Korean credit card holders where we observe every single credit card purchase, installment, revolving and payment transaction over a three year period. In Korea, consumers are often offered "free installments", i.e. the option to make a large purchase on an installment plan ranging from 3 to 12 months, at zero percent interest. The puzzle is that relatively few people appear to take this option, with the vast majority opting to pay the entire amount in full at the next billing cycle. Establishing this puzzle is not quite as straightforward as it sounds since the installment decisions are censored in our data set. That is, we only observe installment decisions when consumers choose them, not when they have not chosen them. However we develop an econometric procedure that enables us to identify the frequency of time consumers are offered free installments and conditional on being offered one, the probability that the customer will take it. We provide some speculations as to why consumers would be so reluctant to take free installments, which to a finance expert, would be an irrational option to forgo, much like refusing to pick up a \$50 bill if one saw one laying on the ground.

### Invited Non-GSU Participants

- Sumit Agarwal (Federal Reserve Bank of Chicago)
- Chris Carroll (Johns Hopkins University)
- Liran Einav (Stanford University)
- Jeremy Fox (University of Michigan)
- John Geweke (University of Technology Sydney)
- Stefan Hoderlein (Brown University)
- Dan Houser (George Mason University)
- Jeffrey LaFrance (Washington State University)
- Mark Machina (University of California San Diego)
- Peter Moffatt (University of East Anglia)
- John Rust (University of Maryland)
- Joerg Stoye (Cornell University)
- Nat Wilcox (Chapman University)