LSE

Workshop on Model (in)adequacy in policy making

7 – 8 November, The Box (Tower 3, room 5.01), LSE

PROGRAMME

Thursday 7 November	
11.00 - 11.30	Arrival, registration and coffee
11.30 - 11.45	Welcome and introduction. Pauline Barrieu
11.45 - 12.45	*"Modelling the weather and climate"* Brian Hoskins, Imperial College London
12.45 - 13.45	Lunch
13.45 - 14.45	*"Language-based Games"* Joe Halpern, Cornell University
14.45 - 15.00	Short break
15.00 - 16.00	*"Model Uncertainty and Risk Aggregation"* Paul Embrechts, ETH Zurich
16.00 - 16.15	Coffee
16.15 - 17.30	*Round table discussion*. Chair: Leonard Smith
19.30 -	Dinner @ The Old Bank of England, Fleet Street
Friday 8 November	
09.45 - 10.00	Arrival and coffee
10.00 - 10.15	Summary of day 1 discussions. Leonard Smith
10.15 - 11.15	*"A Bayesian Framework for Precautionary Policies"* Nabil Al-Najjar, Kellogg School of Management
11.15 - 11.30	Short break / coffee
11.30 - 12.30	*"What can climate models tell us about the future?"* Jason Lowe, Met Office Hadley Centre
12.30 - 13.30	Lunch
13.30 - 14.30	*"Ambiguity and the historical equity premium"* Sujoy Mukerji, University of Oxford
14.30 - 14.45	short break
14.45 - 16.00	*Round table discussion*. Chair: Henry Wynn
16.00 – 16.15	Concluding remarks. Pauline Barrieu
16.15 -	Coffee and departures

Organising Committee

Professor Pauline Barrieu Professor Leonard Smith
Dr Roman Frigg Dr David Stainforth
Mrs Lyn Grove Professor Henry Wynn

ABSTRACTS

Modelling the weather and climate

Brian Hoskins, Imperial College London

The nature of simple and complex weather and climate models will be discussed, starting from the equations of fluid flow and thermodynamics. Uncertainty associated with sensitivity to initial conditions, representations of processes and the structure of the models will be discussed, and some ways uncertainties are handled, particularly in weather forecasting, will be reviewed.

Language-based Games

Joe Halpern, Cornell University

We introduce language-based games, a generalization of psychological games that can also capture reference-dependent preferences. In language-based games, the domain of the utility function is extended to what we call situations: maximal sets of atisfiable formulas in some language. The role of the underlying language in this framework is thus particularly critical. By choosing the right language, we can capture psychological games [Geanakpolos, Pearce, and Stachetti] and reference-dependent preference [Koszegi and Rabin]. Of special interest are languages that can express only coarse beliefs (eg, the probability of an event is "high" or "low", rather than "the probability is .628". Despite the expressive power of the approach, we show that it can describe games in a simple, natural way. Nash equilibrium and rationalizability are generalized to this setting; Nash equilibrium is shown not to exist in general, while the existence of rationalizable strategies is proved under mild conditions.

Model Uncertainty and Risk Aggregation

Paul Embrechts, ETH Zurich

The recent financial crises have triggered a multitude of regulatory documents worldwide; some of these were more politically driven, others touched strongly on corporate governance within the banking world going forward, whereas a third category proposes specific guidelines for the calculation of risk capital. The latter, more methodologically oriented documents, very much question some of the rules and practices in the calculation of Risk Weighted Assets. Based on the May 2012 Consultative Document "Fundamental Review of the Trading Book" by the Basel Committee on Banking Supervision, a document I like to refer to as Basel 3.5, I will address in particular its Question 8 p 41: "What are the likely constraints with moving from Value-at-Risk to Expected Shortfall, including any challenges in delivering robust backtesting, and how may these be best overcome?"

An important issue in my talk will concern Model Uncertainty, and this mainly through the calculation of best-worst bounds for risk measures under incomplete model assumptions. Part of the talk is based on the recent paper: Embrechts, P., Puccetti, G., Rueschendorf, L. (2013): Model uncertainty and VaR aggregation. *Journal of Banking and Finance* 37(8), 2750-2764. Further background reading can be found on my website: **www.math.ethz. ch/~embrechts**

ABSTRACTS

A Bayesian Framework for Precautionary Policies

Nabil Al-Najjar, Kellogg School of Management, Northwestern University

This paper proposes a rational-choice framework for evaluating precautionary motives in policy debates, such as the Precautionary Principle. The paper first argues that a rational policy process must be Bayesian to avoid paradoxical, even absurd, recommendations of policies that depend on sunk cost or suppress costless information. Second, a formal distinction between measurable risks and fundamental or Knightian uncertainties is made within the standard rational-choice framework and is thus free from the paradoxes of non-Bayesian approaches. Third, the paper presents a framework where precautionary policies may be justified.

Ambiguity and the historical equity premium

Sujoy Mukerji, University of Oxford

This paper assesses the quantitative impact of ambiguity on the historically observed financial asset returns and prices. The single agent, in a dynamic exchange economy, treats the conditional uncertainty about the consumption and dividends next period as ambiguous. The ambiguity is dynamic, depending endogenously on the history of shocks; eg, it increases during recessions. We calibrate the agent's ambiguity aversion to match only the first moment of the risk-free rate in data and, distinct from the standard practice, condition the uncertainty each period on the actual, observed history of (U.S.) macroeconomic growth outcomes. We show the model implied time series of asset returns match observed return dynamics very substantially.

What can climate models tell us about the future?

Jason A Lowe, Met Office Hadley Centre

The term "climate model" encompasses a wide range of tools. Models of the climate can help us explain and understand aspects of past and present climate variability and change. They also allow us to ask "what if" type questions, with answers that may help society better prepare for the future. We will explore some of the ways in which models with a climate component have been used to inform policy makers – showing examples of the good, the bad and the ugly.

Biographies of speakers

Professor Al-Najjar is the John L. and Helen Kellogg Professor of Managerial Economics and Decision Sciences at the Kellogg School of Management, Northwestern University. His research focuses on learning, games, and decision making under uncertainty.

Sir Brian Hoskins became the first Director of the Grantham Institute for Climate Change at Imperial College London in January 2008, and now shares his time between Imperial and Reading University, where he is Professor of Meteorology. His degrees are in mathematics from the University of Cambridge and he spent post-doc years in the USA before moving to Reading, where he became a Professor in his thirties and was a head of department for six years. For the 10 years up to September 2010 he held a Royal Society Research Professorship. His research is in weather and climate, in particular the understanding of atmospheric motion from frontal to planetary scales. His international roles have included being vice-chair of the Joint Scientific Committee for the World Climate Research Programme, President of the International Association of Meteorology and Atmospheric Sciences and involvement in the 2007 IPCC international climate change assessment. He has also had numerous UK roles, including playing a major part in the 2000 Report by The Royal Commission on Environmental Pollution that first proposed a 60 per cent target for UK carbon dioxide emission reduction by 2050, and is currently a member of the UK Committee on Climate Change. He is a member of the science academies of the UK, USA, China and Europe and has received a number of awards including the top prizes of the UK and US Meteorological Societies and honorary DScs from the Universities of Bristol and East Anglia. He was knighted in 2007 for his services to the environment.

Paul Embrechts is Professor of Mathematics at the ETH Zurich specialising in actuarial mathematics and quantitative risk management. Previous academic positions include the Universities of Leuven, Limburg and London (Imperial College). Dr. Embrechts has held visiting professorships at the University of Strasbourg, ESSEC Paris, the Scuola Normale in Pisa (Cattedra Galileiana), the London School of Economics (Centennial Professor of Finance), the University of Vienna, Paris 1 (Panthéon-Sorbonne), the National University of Singapore, Kyoto University, and has an Honorary Doctorate from the University of Waterloo, the Heriot-Watt University, Edinburgh, and the Université Catholique de Louvain. He is an Elected Fellow of the Institute of Mathematical Statistics, Actuary-SAA, Honorary Fellow of the Institute and the Faculty of Actuaries, Corresponding Member of the Italian Institute of Actuaries, Member Honoris Causa of the Belgian Institute of Actuaries and is on the editorial board of numerous scientific journals. He belongs to various national and international research and academic advisory committees. He co-authored the influential books "Modelling of Extremal Events for Insurance and Finance", Springer, 1997 and "Quantitative Risk Management: Concepts, Techniques, Tools", Princeton UP, 2005. Dr. Embrechts consults on issues in quantitative risk management for financial institutions, insurance companies and international regulatory authorities. For full details of his CV, see: **www.math.ethz.ch/~embrechts/CV-PE.html**

Joseph Halpern received a B.Sc. in mathematics from the University of Toronto in 1975 and a Ph.D. in mathematics from Harvard in 1981. After a year as a visiting scientist at MIT, he joined the IBM Almaden Research Center in 1982, where he remained until 1996, also serving as a consulting professor at Stanford. In 1996, he joined the CS Department at Cornell, and is now department chair. Halpern's major research interests are in reasoning about knowledge and uncertainty, security, distributed computation, decision theory, and game theory. Together with his former student, Yoram Moses, he pioneered the approach of applying reasoning about knowledge to analyzing distributed protocols and multi-agent systems. He has coauthored 6 patents, two books ("*Reasoning About Knowledge*" and "*Reasoning about Uncertainty*"), and over 300 technical publications. Halpern is a Fellow of AAAI, AAAS, ACM, IEEE, and SEAT (Society for the Advancement of Economic Theory). Among other awards, he received the ACM SIGART Autonomous Agents Research Award in 2011, the Dijkstra Prize in 2009, the ACM/AAAI Newell Award in 2008, the Godel Prize in 1997, was a Guggenheim Fellow in 2001-02, and a Fulbright Fellow in 2001-02 and 2009-10. Two of his papers have won best-paper prizes at IJCAI (1985 and 1991), and another two received best-paper awards at the Knowledge Representation and Reasoning Conference (2006 and 2012). He was editor-in-chief of the *Journal of the ACM* (1997-2003) and has been program chair of a number of conferences, including the Symposium on Theory in Computing (STOC), Logic in Computer Science (LICS), Uncertainty in AI (UAI), Principles of Distributed Computing (PODC), and Theoretical Aspects of Rationality and Knowledge (TARK).

Jason Lowe is Head of Knowledge Integration and Mitigation Advice at the Met Office's Hadley Centre. He is an experienced climate scientist who works with a team of researchers examining climate change-related topics such as impacts modelling, mitigation issues, climate model experimental design, and robustness of precipitation, temperature and sea level predictions. Recognised as a strong communicator of climate change science, he is also Chief Scientist for the AVOID programme in charge of its scientific direction and of ensuring that AVOID outputs are channelled to the right audiences for maximum impact.

Sujoy Mukerji, Professor of Economics, Oxford University, works principally in the area of decision making under uncertainty, in particular, ideas of robust decision making under ambiguity. His research includes foundational questions relating to these ideas as well as their applications in economics, eg, strategic behavior, contract theory, financial asset market equilibria. Some of his recent working papers may be found at: **www.economics. ox.ac.uk/index.php/academic/sujoy-mukerji**. He has been an Associate Editor of Econometrica since 2010.