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A seven-week course on
Info-Gap Economics
Modeling, Forecasting, and Policy

Department of Economics, University of Houston
October–November 2010

Course Rationale

Decisions under uncertainty arise in many areas of economics, including modelling economic systems, forecasting, and policy formulation. One uses data and models to formulate and evaluate designs and plans. However, this knowledge is highly uncertain.

Info-gap theory is a method for analysis, planning, decision and design under uncertainty. The future may differ from the past, so our models may err in ways we cannot know. Our data may lack evidence about surprises: catastrophes or windfalls. Our scientific and technical understanding may be incomplete. These are info-gaps: incomplete understanding of the system being managed. Info-gap theory provides decision-support tools for modelling and managing Knightian uncertainty. Info-gap theory has been applied by scholars around the world to engineering, biological conservation, financial and monetary economics, project management, medicine and homeland security, and more.

This course is devoted to learning the methodology of info-gap analysis and its integration with other decision tools for economic analysis. The GapZapper computer program—a free software for info-gap applications—will be demonstrated and made available to participants.

Course Structure

This course has three components. *Lectures* present new material and *exercises* allow the participants to master this material. In the latter half of the course participants will be encouraged to formulate *mini-projects*, either individually or in small groups. This facilitates the thorough internalization of the concepts and methods learned, their integration with other methods familiar to the participants, and their application to problems of interest.

Time and date of lectures

7 three-hour lectures, 2:30–5:30 pm, Thursdays. Starting 7 October and finishing 18 November.

Place: Room 212 McElhinney (Economics Department conference room).

Course Outline

Week 1. Introduction to info-gap decision theory. Uses and limitations of probability. Preliminary examples of info-gap robust-satisficing and opportune-windfalling.¹

Weeks 2–3. Financial economics. Portfolio allocations are often made under severe uncertainty about the outcomes. Correlations among assets are often unknown but significant. We use info-gap theory to study strategic allocations. We analyze the impact of uncertain correlations in structured securities. The relevance to the recent financial crisis is discussed.

Week 4–5. Modelling, estimation and forecasting. We use data to calibrate models. However, the data are subject to major revision and the underlying processes are imperfectly understood. How to account for this in model selection and calibration? How to use such models for forecasting?

Week 6. Public policy. Pollution emissions can be controlled by imposing legal limits or by taxation. Which policy is preferred from a welfare perspective when the costs and benefits are uncertain? Likewise, we study the allocation between research and abatement for managing long-range climate change.

Week 7. The formulation and evaluation of monetary policy depends on models and data which are highly uncertain. We consider also consider uncertainty in the strategic interactions between the central bank and the market participants.

Sources

- Yakov Ben-Haim, 2006, *Info-gap Decision Theory: Decisions Under Severe Uncertainty*, 2nd edition, Academic Press, London.
- Yakov Ben-Haim, 2010, *Info-Gap Economics: An Operational Introduction*, Palgrave.
- Yakov Ben-Haim, 2009, Info-gap forecasting and the advantage of sub-optimal models, *European Journal of Operational Research*, 197: 203–213.
- John K. Stranlund and Yakov Ben-Haim, 2008, Price-based vs. quantity-based environmental regulation under Knightian uncertainty: An info-gap robust satisficing perspective, *Journal of Environmental Management*, 87: 443–449.
- <http://info-gap.com>

¹o Yakov Ben-Haim, 2010, *Info-Gap Economics: An Operational Introduction*, Palgrave-Macmillan (“IGE”).
o Yakov Ben-Haim, 2006, *Info-Gap Decision Theory*, 2nd ed. (“IGDT”), sections 2.2, 2.5.
o Info-Gap Economics: An Overview, \lectures\talks\lib \houston-econ2010Lec01.pdf.
o Homework: Lewis Carroll on transcendental probability, Problem Set on Info-Gap Uncertainty, #8.