

Referee Report on

Werner Güth and Hartmut Kliemt (2015). How to Cope With (New) Uncertainties: A Bounded Rationality Approach. Economics Discussion Papers, No 2015-46, Kiel Institute for the World Economy. <http://www.economics-ejournal.org/economics/discussionpapers/2015-46>

This article identifies the important issue that theoretical models of reasoning and decision making cannot really deal with genuine uncertainty (i.e., when it is impossible to assign probabilities to the occurrence of some outcomes, or more generally when randomness cannot be quantified based on current formalisms). It then goes on to sketch a way to a solution, rooted in how people practically make decisions under uncertainty.

Even though the problem of modelling uncertainty is a well-known and acknowledged one in many circles, the article makes a contribution in that the problem is often swept under the carpet by assuming that somehow uncertainty can be reduced to risk by representing it by probability—even if it is a set of probabilities, etc. In economics, such approaches are certainly alive and kicking and thus the article makes a very valuable contribution by fuelling the discussion again. The main strength of the article is its open-mindedness and attempt to consider the problem of uncertainty from first principles. It also takes an interdisciplinary approach, incorporating ideas from economics, psychology and philosophy. I did not find any mistakes in the conceptual or technical material, except maybe for one typo (see below).

On the other hand, I believe that the article can be improved. My main suggestion is that more knowledge from other disciplines should be introduced to make the exposition more complete. First, the discipline of prescriptive decision making par excellence, operations research (OR), is not mentioned. But this is a discipline which has developed a whole field, called decision analysis, where, in the authors' jargon, a serious attempt is made to turn "external descriptions" into "internal prescriptions". For example, it is assumed that decision makers have utility and subjective probability functions and systematic techniques are used for eliciting them, and then the expected utility calculus is performed to come up with a suggestion. In so-called "soft OR", quantitative modelling is not the focus, but rather clarification of the problem, alignment of stakeholders' objectives, etc. Granted, not everyone agrees that the OR approach is effective— I, myself, also have reservations for the way it is practiced, for example, the often seemingly unconditional acceptance that utilities and probabilities can be elicited reliably—but the article seems incomplete without a discussion of the approach. Classic references are Keeney and Raiffa (1976) and von Winterfeldt and Edwards (1986) for decision analysis, and Rosenhead and Mingers (2001) and Mingers (2011) for soft OR.

Besides OR, material can be imported from management, and notably the work of James March. He has written extensively on the broader meanings of rationality and bounded rationality. For example, his idea that decisions can be made based on a logic of consequentialism (e.g., I make this decision because it increases my utility) or on a logic of appropriateness (e.g., I make this decision because it is the right thing to do in this situation or because this is the kind of person I am), seems relevant here. Can it be integrated in the flow chart of Figure 1 (p. 13)?

Another discipline that has seriously grappled with uncertainty is environmental, and more specifically climate, science.

Finally, also within economics, there are efforts to deal with genuine uncertainty as a recent working paper on financial stability in the Bank of England website shows (David Aikman et al, 2014, working paper No. 28).

And, although not to everyone's taste, the multiple books by Nassim Taleb can further round up the discussion.

A second umbrella comment I have is that some important terms for this article are kind of mentioned in passing, as for example Knightian uncertainty (p. 3), value at risk (p. 5), case theory (p. 11) and in a way that someone who does not know will not get it and someone who does would feel that the treatment is superficial. Please consider rewriting.

I finally move to other, more specific, suggestions, in the order they appear in the text.

On p. 2, I was very interested in seeing a discussion about how mathematical modelling may create an "illusion of control". Can you expand on this, especially in connection to the work of William James?

On p. 5, where the 2008- failure of financial models is discussed, could it be that a reason for failure was not just impracticality but also myopic selfishness?

On p. 7, there is an intriguing statement: "No formal model can do this [transform uncertainty into risk]". Maybe expand why this is so? Is it also so for the formal model you propose?

On p. 9, the definition of  $S_{(-j)}$  includes two identical terms  $s_{(j-1)}$ ; should one be  $s_{(j+1)}$ ?

The concluding section, and especially p. 16, runs the risk of appearing a bit naive because it seems to imply that not much empirical work has been done on effective practices of decision making under uncertainty, while there is such work based on semi-structured interviews, observations, etc. For example, in economics, see the work of Bewley and in management of Abolafia.

Thank you for the opportunity to read this interesting article. I always sign my reviews,  
Konstantinos Katsikopoulos