Risk: Can We Model What We Cannot Measure? - A Discussion[1]

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The authors do an excellent job of identifying some of the problems and confusion associated with the vocabulary used in what they call the discipline of decision science. They admonish us to be accurate in our terminology and then identify some existing confusion related to the use of decision terms. The authors are generous in providing an excuse for our inaccurate terminology because decision scientists come from diverse backgrounds. However, we need to be cognizant of the need for clear definitions used for theoretical work and translations of these definition into useful terms which can be used in applied research. From the beginning it is important to recognize that the authors have basically attempted to improve the understanding of terms used in theoretical work. However, they have provided little help for those struggling with applied research in this area. While the authors have done a laudible job on theoretical issues within the discipline, it should be remembered that as scientists and educators we also need useful definitions and concepts for applied work. In fact, some of the arguments which are used to further focus our thinking from a theoretical perspective have very damaging and severe impacts on scientists ability to conduct risk research of an applied nature. Examples of this problem will be clear as these arguments are discussed later in this paper.

In attempting to re-align our terminology in decision science the authors first discuss Knight's risk and uncertainty terms. The authors basically discard Knight's distinction between risk and uncertainty. Knight's distinction between risk and uncertainty has been associated with objective and subjective probabilities. The authors argue that all information is subjectively perceived, measured and interpreted. Thus, these definitions are of little value. While the authors arguments have value there is some use in making distinctions between certain classes of problems. Knight's concepts of risk and uncertainty do provide a classification which is somewhat appealing for different types of problems. Knight's concepts of risk and uncertainty do provide a nice classification for problems given the implicit assumption that history will repeat itself. Risk is a situation where historical data could be used to estimate the probabilities of an event occurring in the future given the assumption that history would repeat itself. History does not repeat itself, however, but it is often the best guide that we can use to predict the future and in many cases it is a helpful guide. Knight's

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uncertainty provided a description of problems where information about the probabilities of an event occurring are non existent or unimaginable.

Providing a classification for problems is beneficial because it relieves some of the burden placed on a theory to explain all possible situations. Rather than to discard all classifications, it may be useful to devise a new classification which would provide some value in analyzing problems. A classification such as that suggested by Robert King, subjective and empirical risk, may have some value given the assumption that history will repeat itself. Another approach is to provide for the extremes in a continuum of types of problems which range from having no information to those for which we have a great deal of information.

A classification related to the distinction made by Knight between risk and uncertainty is the objective versus subjective probability debate. The authors remind us that all probability measures are subjective. Others have argued that there are three types of probabilities; experimental where history is used to develop probabilities, subjective where individuals subjectively estimate probabilities, and logical where probabilities can be estimated because of knowledge of the system (such as a coin which has two sides which are equally likely from a physical standpoint to occur). An important point to remember is that for applied economics problems we do not have the opportunity to use experimental probabilities without the assumption that history repeats itself, and logical probabilities cannot be developed for the problems that we deal with. So essentially we are left with subjective probabilities for all of our applied problems.

The arguments which are used to conclude that all probability measures are subjective provides a major problem for applied risk research. The argument is made that information subjectively received cannot always be described in ways which can be understood by others not having similar experiences. The second problem raised is related to how information of commonly experienced events is summarized. The third problem which is raised is that not all individuals would interpret the data in the same way to make a decision. If arguments are applied to research of an applied nature in a risky decision analysis they could ultimately be used to argue that doing applied risk research is nearly useless.

The authors also discuss the association between lack of information and uncertainty. Again an underlying problem results from assumptions about history repeating itself. Some events are uncertain because we lack information, but the information which we lack is information about the future. The authors are correct in saying that collecting information will not lead to an event's outcome becoming certain because the uncertainty lies in the future and no collection of information from past situations can aid us in the future unless history does repeat itself.

The authors state that risk is defined in the dictionary as the possibility of loss or injury. The authors argue that this definition is simply too restrictive and that the term risk must also include the possibility of favorable as well as unfavorable events. I would not argue for or against this latter definition, but I would argue that we do need

to understand and determine how to measure risk so that it can be communicated to users of our information. We need to know not only what is useful in an applied setting but also what works for theoretical decision science. We also need to know how to translate the theoretically useful term to a useful term for applied work.

The authors proceed to provide an excellent discussion and outline of the distinction between the utility of income, strength of preference, and risk adversion. The utility or disutility of gambling has been discussed before, but the distinctions and importance of this are very clearly pointed out by the authors. The conclusion that the bending of the utility function is a composite measure of the utility of income and the utility of the game is correct. In applied work this leaves us with the additional problem of addressing the question of whether the utility of games proved to a decision maker is the same as real life business decision problems. It would be a heroic leap to assume that preferences for games are similar to preferences for real life situations. This again raises a problem for empirical work.

The work reported by the mathematical psychologist Krzysztofowicz provides serious additional problems for empirical work using utility functions. His findings suggest that relative risk attitudes are constant for an individual for a given situation but neither the value function nor the relative risk attitude is constant across individuals nor for the same individual across situations. These arguments cause very serious problems when utility functions are used in empirical work. We may need to pursue another research path which would provide us with definitions or descriptions of risk which decision makers can utilize. The results of the mathematical psychologist's study do tend to undermine the empirical usefulness of the rest of the paper which is intended to derive a more useful summary risk attitude measure. The reminder that summary risk measures do sacrifice a great deal of information is in order; however, if a summary measure must be used it is best to use the most appropriate one available.

In summary, the authors have attempted to provide the set of definitions which could be accepted consistently by professionals upon which to build a more rigorous theory. While many of their arguments are ligitimate and their suggestions very plausible, it may be useful in some situations to provide classifications of problems rather than develop and use single definitions which cover all possible problem situations. General rules never seem to work well particularly in applied work which is usually the objective of research at some point. While research at a theoretical level has progressed significantly over time, applied work has lagged because of the need for a useful definition or description of the decision making process. Without a clear understanding of the decision process applied research and applications will continue to lag behind theoretical developments.