

MEASURING RISK PREMIUM AGAINST NATURAL DISASTER RISKS BY CONTINGENT VALUATION SURVEY

Yoko MATSUDA*, Hirokazu TATANO** and Norio OKADA**

*Graduate School of Engineering, Kyoto University

** Professor, Disaster Prevention Research Institute, Kyoto University
Gokasho Uji, 611-0011 Kyoto JAPAN

Considering the modern society facing multiple disaster risks, it is required to carry out cost benefit analysis to know if a risk management policy is socially acceptable or has good demand on market. Since any benefit produced by these measures is resolved into residents, analysts should take into account residents' risk preference which is varied from households.

In this research, a discrete choice model is developed in order to adapt Contingent Valuation Method to measure households' risk preference through their willingness-to-pay for a risk-averse option. Values of risk aversion are estimated as parameters of their hypothetical utility function, followed by an empirical study dealing with earthquake risk. By adapting the same model to two types of samples, that is, with and without risk information, the difference which information influences on risk preference is also discussed.

In this case study, following three prerequisites are assumed. First, a choice of households under uncertainty follows expected utility maxim, which is a strong economic norm. Second, a form of utility function is specified as the three types corresponding to risk attitude: risk-neutral utility, constant absolute risk-averse utility and constant relative risk-averse utility. Lastly, a household's loss as an outcome of a disaster is expressed as decrease of his wealth along the same utility function. This idea follows description of uncertainty of measurable utility function suggested by von Neumann and Morgenstern.

The case study survey was conducted in August, 2002, targeting at 3,000 (of which 315 were returned) households in Osaka Prefecture, Japan. The questionnaire consisted of two folds. In *Test1*, option

purchase choice depends on his believed risk, which means no probabilistic information is offered, while in *Test2*, it depends on the earthquake scenario given prior to the question. As hypothetical risk information, half of the samples in *Test1* were shown the hazard map of earthquake presented by Osaka prefecture Government. Based on the parameter estimation result, following topics can be discussed. The details will be shown in the presentation.

The primary output is significant parameters in specified utility function including risk aversion measurement. When estimation is done on both data from two *Tests*, and practiced simultaneous estimation, the difference of the subjective damage probability, and actual hazard probability can be mentioned, consequently, the existence of risk perception bias in disaster risk is to be discussed. In the end, utility function that a representative household has is figured out, and also its risk premium under a certain risk scenario is to be calculated.

Key words: subjective risk, risk aversion, Contingent Valuation Method, discrete choice model