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Insurance against climate change and flood risk: Insurability and decision processes of insurers

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1. Background
Major portions of the Asia-Pacific region is facing escalating exposure and vulnerability to climate change and flood-related extremes. This highlights an arduous challenge for public agencies to improve existing risk management strategies. Conventionally, governmental funding was majorly responsible and accountable for disaster loss compensation in the developing countries in Asia, such as Taiwan. This is often criticized as an ineffective and inefficient measure of dealing with flood risk. Flood insurance is one option within the toolkit of risk-sharing arrangement and adaptation strategy to flood risk. However, there are numerous potential barriers for insurance companies to cover flood damage, which would cause the flood risk is regarded as uninsurable. This study thus aims to examine attitudes within the insurers about the viability of flood insurance, the decision-making processes of pricing flood insurance and their determinants, as well as to examine potential solutions to encourage flood insurance.

2. Methods and data
Using expected-utility theory, an insurance agent-based decision-making model was developed to examine the insurers' attitudes towards the insurability of flood risk, and to scrutinize the factors that influence their decisions on flood insurance premium-setting. This model particularly focuses on how insurers price insurance when they face either uncertainty or ambiguity about the probability and loss of a particular flood event occurring. This study considers the factors that are expected to affect insures' decisions on underwriting and pricing insurance are their risk perception, attitudes towards flood insurance, governmental measures (e.g., land-use planning, building codes, risk communication), expected probabilities and losses of devastating flooding events, as well as insurance companies' attributes. To elicit insurers' utilities about premium-setting for insurance coverage, the 'certainty equivalent,' 'probability equivalent,' and 'gamble tradeoff' methods were used. We then synthesized a Tobit and an OLS regression analysis to identify and examine the determinants of insurers' decisions on insurability and pricing for flood risk. Furthermore, the data were collected through a questionnaire survey, which was conducted with the assistance from the Non-life Underwriters Society, Taiwan and the Actuarial Institute, Taiwan. After pretesting, questionnaires were mailed to 410 randomly chosen commercial property-and-casualty insurance firms' actuaries and underwriters. The final sample consisted of 179 questionnaires for a 43.8% response rate.

3. Results
Results of the questionnaire survey reveal that flood risk tends to be more uninsurable when there is ambiguity regarding the probability of a particular flood event loss. The presence of insurers' risk aversion appears to be robust. Insurers would charge a significantly higher price for a flood insurance policy than normal property insurance. The findings also show that the insurers who perceived higher levels of flood risk, or/and had a company with smaller size or higher financial leverage, would trigger a higher premium for flood insurance. Governmental risk management strategies, such as land-use planning, building codes, flood-hazard zone regulations, also played a prominent role in enhancing insurability and decreasing insurance premium. Therefore, appropriate incentives should be combined with better public risk communication and mitigation strategies to stimulate insurance coverage in reducing flood loss.