

Integrated Cyber Security Risk Management-Insurance and Investment Cost Analysis

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Abstract : An insurer offers cyber insurance coverage to several firms with risk-averse decision-makers. The cyber insurance premium offered depends on the cyber security implemented at the firm. Each firm faces attacks by multiple types of hackers and decides on the level of investment for cyber security countermeasures. We address the software monoculture issue by considering that there is common, popular software used by all firms, and it is a source of correlated risk. Two types of cyber security interdependence breaching processes due to the software monoculture risk were analyzed. We derive the probability distribution for the number of breaches and develop the cyber insurance pricing model. We also introduce the concept of cyber security defense level. Furthermore, we proposed to determine the optimal cyber insurance price given a targeted defense level. Finally, we demonstrate the use of our model through several numerical examples.

Keywords : cyber insurance, hacker, breaching probability, cyber security, correlated risks, software monoculture risk, defense level, integrated risk management.

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