

# **Determining of Catastrophe Bond Price Based on the Copula for Magnitude and Depth**

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## **ABSTRACT**

Earthquake disasters often cause large losses, and injuries or death. These negative impacts are influenced by the magnitude and depth of the earthquake. This study aims to develop earthquake catastrophe bonds using Copula model in terms of earthquake magnitude and depth in the Java Island, Indonesia. Copula model can represent the dependency between variables, in this study the magnitude and depth of the earthquake. It is also a flexible model due to no requirement for independence assumption between observation. Five Copula functions i.e. clayton, frank, gumbel, copula gaussian (normal) dan t-student are attempted to assign the model of magnitude and depth of the earthquake. The selection and the parameter estimation of the best model is employed using maximum likelihood estimation method. The magnitude and depth data are fitted by generalized pareto and pareto distributions, respectively. The result deliberate that the frank copula is the best model for magnitude and depth of the earthquake in Java Island. Then, the price of earthquake catastrophe bonds and the rule of payment are determined based on frank copula. The illustration of the analysis is described by a numerical example of the earthquake catastrophe bonds buying.

Kata Kunci: *catastrophe bond; copula; depth; earthquake; magnitude*