

Flexible Dependence Structures for Risk Assessment: Extensions of Archimedean Copulas

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Copula functions offer a powerful and elegant framework for modeling dependence among random variables. Within this class, Archimedean copulas are particularly attractive due to their analytical tractability and simple construction. A notable limitation, however, is that many commonly used Archimedean copulas are characterized by a single dependence parameter, which constrains their ability to capture more intricate dependence structures. In this paper, we propose a modification of the Archimedean generator that preserves the defining properties of the family while introducing multiple dependence parameters. The resulting class of copulas provides greater flexibility and allows for a richer representation of dependence. We demonstrate the practical relevance of the approach using climate variables and peak electricity demand data, with particular emphasis on assessing—and ultimately insuring against—the risk that demand exceeds critical threshold levels.