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On a bivariate copula with both upper and lower full-range tail dependence

Lei Hua*

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Abstract. Copula functions can be useful in accounting for various dependence patterns appearing in joint tails of data. We propose a new two-parameter bivariate copula family that possesses the following features. First, both upper and lower tails are able to explain full-range tail dependence. That is, the dependence in each tail can range among quadrant tail independence, intermediate tail dependence, and usual tail dependence. Second, it can capture upper and lower tail dependence patterns that are either the same or different. We first prove the full-range tail dependence property, and then we obtain the corresponding extreme value copula. There are two applications based on the proposed copula. The first one is modeling pairwise dependence between financial markets. The second one is modeling dynamic tail dependence patterns that appear in upper and lower tails of a loss-and-expense data.

Key words: Hypergeometric functions; tail order; intermediate tail dependence; quadrant tail independence; usual tail dependence; Beta prime scale mixtures.

1 Introduction

Dependence modeling with copulas can be useful in modeling datasets that have various dependence patterns. In particular, where asymmetric dependence patterns and dependence in the tails are concerned,

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