

# Tail Dependence in REITs Returns

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## Abstract

This study investigates the dependence structure of returns of different sectors of equity REITs: Industrial & Office, Residential, Retail, and Hotel & Lodging. The sample covers the daily returns of the U.S. REITs from January 2000 to December 2011. Copulas, which provide a tractable way of modelling non-linear dependency among random variables, are employed under a financial time series framework. The model consists of two parts: the marginal part, which represents the dynamic behaviour of each individual marginal, and the copula part, which represents the joint dependence among those individual components. Specifically, the REITs returns are fitted using GJR-t-GARCH models and then analysed using time-varying conditional copulas to ascertain if tail dependence exists. The study tests a number of well-known copulas, i.e., Gaussian, Student t, Frank, Gumbel, Clayton, and Symmetrised Joe-Clayton, to identify the most suitable one. For Student t copula, the time path of the tail dependence is characterised to see how the dynamics of the tail dependency evolves, and then seek to examine the effects of tail dependence on optimal portfolios.

**Keywords:** REITs, Dependence Structure, Tail Dependence, Conditional Copula

**JEL Classification:** G10, C51, C12, C13, C32