

**ESTIMATING MARKET CRASH RISK IN THE INDIAN STOCK MARKET
THROUGH COPULAS**

AMRITHA SATISH KUMAR

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MADRAS SCHOOL OF ECONOMICS

Chennai- 600025

ABSTRACT

This thesis investigates the relationship between tail dependence and stock returns in the Indian stock market, with a focus on the Nifty 50 index. This study employs copula models to better estimate the dependence structure between individual stock returns and market returns. Lower tail dependence (LTD) is the measure of crash risk in this study since it measures the conditional probability of stocks crashing given the market return crashes whereas upper tail dependence (UTD) measures the probability that the stock returns take high positive values given the market returns are large and positive. LTD is used to analyse how stock returns are affected based on the level of crash risk. Using a combination of lower-tail, upper-tail, and no-tail dependence copulas, parameters are estimated for each company and year from 1995 to 2025.

The empirical results show that prior to 2008, stocks with stronger lower-tail dependence yielded higher excess returns, suggesting compensation for downside risk exposure. However, post-2008, this pattern reverses, with stronger downside dependence associated with lower returns, potentially signifying a change in the perception of risk and return relationship after the Global Financial Crisis of 2008. Additionally, stocks with higher upper-tail dependence consistently exhibit lower excess returns across the sample period proving the theoretical claim that only downside risk or lower tail risk concerns the investors more and the higher upper tail dependence need not be compensated with higher returns since there is no crash or extreme negative returns associated with upper tail dependence. The study aids in understanding lower tail risk in a developing economy's financial market, and highlight the role of copulas in modelling dependence beyond linear correlation that overcome distribution dependent assumptions.

Keywords: Copula Models, Tail Dependence, Nifty50

JEL Classification: D53