Dependency modeling

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Abstract

This research is a continuation of previous research on risk modeling (Ratuszny, 2014, 2015, 2021). Since changes in dependency can influence the model performance, it is crucial to investigate and to understand its consequences. Financial markets consist of many interacting elements, and understanding their dependency structure and its evolution with time is essential to capture the collective behaviour of them, to identify the emergence of extreme events, and to mitigate systemic risk arising from the simultaneous movement of several risk factors. This paper is intended to understand various types of dependency during adverse market conditions. Several approaches are investigated among which there are Copula based Multivariate GARCH model developed by Lee and Long (2005) or GO-GARCH models presented by Alexander (2001) and van der Weide (2002). The assumptions of the models and the ways of isolating risk factors influencing the relationships between markets are examined, which is extremely important in conducting model sensitivity analysis. Models are examined in 1989-91 (stock market crash), 2001 (dot-com bubble), 2008-2009 (financial crisis), 2011-2012 (European Sovereign Debt Crisis) and 2020 (Covid-19).

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