

# TESTS AND POWER COMPARISONS IN TIME-DYNAMIC COPULA MODELS

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Models for multivariate time-series have become crucial for most financial applications in recent years. It is well accepted that the hypothesis of multivariate normality can be dropped in favour of more flexible dependence structures which can be easily accomplished by a copula approach. Moreover, it has become a stylized fact that correlations in financial models are not constant over time. The major objective is to test whether dependencies modelled through copulas can also be assumed time-varying.

Based on the **S**emiparametric **C**opula-based **M**ultivariate **D**ynamic model introduced in [1] and [2] a numerically tractable estimation procedure is developed. The copula parameters are estimated locally via maximum likelihood on retrospective observations of a fixed bandwidth. Subsequently, two different procedures to test the null hypothesis of parameter constancy are applied and analysed especially with respect to their ability to detect parameter inhomogeneities of various types: a Binomial test for independent time periods to detect regime changes and an extremal test for weakly dependent time periods to uncover peaks in the dependence structure.

The asymptotic local power was calculated and in case of the extremal test gave rise to an extremal distribution result for asymptotically normal quantities. In simulation studies the theoretical findings were explored and empirical analyses revealed that time-varying dependencies are present.

## References

- [1] Chen, X. & Fan, Y. *Estimation of copula-based semiparametric time series models*, Journal of Econometrics, 2006, 130, 307–335.
- [2] Chan, N.-H.; Chen, J.; Chen, X.; Fan, Y. & Peng, L. *Statistical Inference for Multivariate Residual Copula for GARCH Models*, Statistica Sinica, 2009, 19, 53–70.