

Cross-sectional Vine Copula Factor Model

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Vine decomposition on D-vines and canonical vines has been applied to estimate conditional dependence by expressing a high-dimensional copula function by a product of bivariate copulas and univariate distributions in vine-copula GARCH models. However, D-vines and canonical vines do not perform well for cross-sectional data such as financial stock returns. By incorporating market factors in the multivariate density, we propose a new cross-sectional vine copula model to make the copula decomposition parsimonious. The problem now concerns only the number of market factors, regardless of the dimension of financial returns. The main objective is to introduce a new vine decomposition for cross-sectional time series data which is computationally affordable for high dimensional problems (with a dimension of hundreds). Simulation study is performed to illustrate that our methodology works in high-dimensional situations. An empirical study with multiple financial time series is also conducted to illustrate this new vine decomposition.

Key words: Conditional dependence, vine decomposition, high dimensional problem, financial stock returns