

Convolution Based Copulas in Finance

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In most applications in finance, we deal with linear restrictions among variables. When these variables are not gaussian and are linked by complex non linear relationships, the copula functions that must be used to represent their dependence structure should be consistent with the convolution relationships existing among the variables. This gives rise to the concept of *convolution based copulas*, proposed in Cherubini, Mulinacci and Romagnoli (2011a,b) and explored in details in Cherubini et al.(2012) (CGMR).

In this paper we review applications of this principle to the study of the dynamics of prices in speculative markets. This provides a generalization with respect to standard random walk models which go back to Bachelier in 1900 and Fama and Samuelson in the 1960s and 70s. Convolution based copulas allow extension of this theory in two respects. The first is that one can extend the possible dynamics of speculative prices beyond the assumption of independent increments that is maintained across all the literature. The second is that one can allow for assets that embed non linear derivatives, that is options: examples include assets with credit risk and those referred to managed funds.

References

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