

Generalization and construction of Archimax copulas for higher dimensions

Vladimír Jágr*

Faculty of Civil Engineering

Slovak University of Technology in Bratislava

jagr@math.sk

June 19, 2011

Keywords: copula, extreme value copula, Archimedean copula, Archimax copula, tail dependence function, Pickands dependence function.

Abstract

Extreme-value copulas of higher dimensions are discussed and we propose some new construction methods for tail and Pickands dependence functions. In short we recall an overview of some known results for d-dimensional Archimedean copulas. Finally, we focus to the main aim of this paper, which are higher dimensions of Archimax copulas. Some new classes of d-dimensional Archimax copulas are also introduced.

References

- [1] Alsina, C., Frank, M.J., Schweizer, B.: Associative Functions: Triangular Norms And Copulas, World Scientific, Singapore (2006).
- [2] Bacigál, T., Jágr, V. and Mesiar, R.: Non-exchangeable random variables, Archimax copulas and their fitting to real data, Kybernetika (submitted).
- [3] Capéraá, P., Fougères, A.-L., and Genest, C.: Bivariate distributions with given extreme value attractor, Journal of Multivariate Analysis 72 (2000), pp. 30 - 49.

*The research was supported by APVV LPP - 0004-07.

- [4] Durante, F., Mesiar, R., Saminger-Platz, S.: Editorial to the special issue devoted to "Copulas, measures and integrals", *Information Sciences* 179 (17) (2009), pp. 2861-2862.
- [5] Durante, F., Quesada-Molina, J.J. and Beda-Flores, M.: On a family of multivariate copulas for aggregation processes, *Information Sciences* 177 (2007), pp. 5715-5724.
- [6] Drees, H., Huang, X.: Best attainable rates of convergence for estimates of the stable tail dependence function. *Journal of Multivariate Analysis* 64 (1998), pp. 25 - 47.
- [7] Durante, F., Mesiar, R., Papini, P. L., Sempi, C.: 2-Increasing binary aggregation operators. *Information Sciences* 177 (2007) pp. 111 - 129.
- [8] Grabisch, M., Marichal J. L., Mesiar, R., Pap, E.: *Aggregation Functions*, Cambridge University Press, Cambridge (2009).
- [9] Gudendorf, G., Segers, J.: Extreme-Value Copulas, discussion paper 0926, Institut de Statistique, Université Catholique de Louvain (2009).
- [10] Jaworski, P.: On copulas and their diagonals, *Information Sciences* 179 (17) (2009), pp. 2863-2871.
- [11] Joe, H.: *Multivariate models and dependence concepts*, Chapman & Hall, London (1997).
- [12] Khoudraji, A.: Contributions à l'étude des copules et à la modélisation des valeurs extrêmes bivariées, PhD Thesis, Université Laval, Québec, Canada (1995).
- [13] Kimberling, C. H., A probabilistic interpretation of complete monotonicity, *Aequationes Math.* 10 (1974), pp.152 - 164.
- [14] Klement, E. P., Mesiar, R., Pap, E.: *Triangular Norms*. Kluwer Academic Publishers, Dordrecht (2000).
- [15] Liebscher, E.: A semiparametric density estimator based on elliptical distributions, *Journal of Multivariate Analysis*, 92 (2005), pp. 205 - 225.
- [16] McNeil, A.J., Nešlehová, J.: Multivariate Archimedean copulas, d-monotone functions and λ_1 -norm symmetric distributions, *Ann. Stat.* 37(5B) (2009), pp. 3059 - 3097.

- [17] Morillas, P. M.: A method to obtain new copulas from a given one, *Metrika*, 61 (2005) pp. 169 - 184.
- [18] Moynihan, R.: On τ_T semigroups of probability distributions II. *Aequationes Math.* 17 (1978) pp. 19 - 40.
- [19] Nelsen, R. B.: *An Introduction to Copulas*, Lecture Notes in Statist. 139, Springer, New York (1999).