Risk Analytics: Correlated default tutorial sheet

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1 Model risk

1. Evaluate the model risk of the asset-value model, with Gaussian and t-copulas
2. *** Evaluate the model risk of the graphical default model of [FGMS12]

2 Bernoulli mixture default models

1. Verify that the Gaussian copula example of a Bernoulli mixture model from the lecture has the same loss count distribution as a Gaussian copula default model from Risk and Regulation lecture with correlation matrix
$$\Gamma = \begin{pmatrix} 1 & \rho \\ \rho & 1 \end{pmatrix}$$
2. Prove the same with pen(cil) and paper
3. Fit the data `2dSamples.csv`, to Gaussian and t-copulas with lognormal marginals. Which fit is better?

3 Tail dependence

1. Compare the heaviness of tails of the Gaussian and t-copulas for different degrees of freedom

4 Graphical default models

1. Prove the formula from the lecture for the partition function Z for the one-factor, m-counterparty graphical default model. Hint: binomial theorem.
2. Prove the formula for the default count distribution for the one-factor, m-counterparty graphical default model.
3. *** Compare tail heaviness of Gaussian and t-copula one-factor models to that of the graphical default model of [FGMS12]

References

[FGMS12] Ismail Onur Filiz, Xin Guo, Jason Morton, and Bernd Sturmfels. Graphical models for correlated defaults. *Mathematical Finance*, 22(4):621–644, 2012.