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Accounting for risk of non linear portfolios: a novel Fourier approach

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The presence of non linear instruments is responsible for the emergence of non Gaussian features in the price changes distribution of realistic portfolios, even for Normally distributed risk factors. This is especially true for the benchmark Delta Gamma Normal model, which in general exhibits exponentially damped power law tails. We show how the knowledge of the model characteristic function leads to Fourier representations for two standard risk measures, the Value at Risk and the Expected Shortfall, and for their sensitivities with respect to the model parameters. We detail the numerical implementation of our formulae and we emphasize the reliability and efficiency of our results in comparison with Monte Carlo simulation.

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