SEMINARIO

MODELAMIENTO ESTOCASTICO

EXPOSITOR

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TITULO
Exponential Family Techniques
for the Lognormal Left Tail

ABSTRACT:

Sums of lognormals random variables arise in a wide variety of disciplines such as engineering, economics, insurance or nance, and are often employed in modeling across the sciences.

Since the lognormal is subexponential and heavy-tailed, then the asymp- totic properties of the probability that the sum goes to innity (right tail) are typically analyzed using subexponential techniques. In contrast, the study of the asymptotics of the probability that the sum becomes very small (left tail) is a light-tailed problem and the typical tools would be saddlepoint or large deviations techniques. This faces, however, the problem that the Laplace transform is not explicit.

In this talk we discuss a decomposition of the Laplace transform of the Lognormal distribution which can be employed to provide sharp approxima- tions for left tail probabilities of a sum of lognormals. The Laplace transform is decomposed into a closed-form expression given in terms of the Lambert W function corresponding to the asymptotic approximation provided by Laplace's method, and the term in the decomposition is the expected value of a function which is close to 1, hence negligible.

The proposed decomposition is used as basis for studying rst the ex- ponentially tilted density which can asymptotically become concentrated around the mode point of the integrand dening the Laplace transform and has a shape that can be described either as Lognormal, Gamma or Normal. Next a saddlepoint-type-approximation for the left

tail is presented, and ef- cient simulation algorithms for estimating both the Laplace transform and left tail probabilities are suggested.

Numerical examples are presented in a range of parameters that we con- sider realistic for nancial and engineering applications.

ΛViernes 30 de mayo a las $17:30$ hrs, Sala de Seminarios CMM, Séptimo Piso.