

A new inhomogeneous lognormal diffusion process with exogenous factors in diffusion coefficient

Ahmed Nafidi¹, Ramón Gutiérrez Jáimez², Ramón Gutiérrez Sánchez²

SUMMARY

We propose a new non-homogeneous one dimensional stochastic lognormal diffusion process, by introducing time function (Exogenous factors) in the diffusion coefficient of the process and which can be considered as an extension of the homogeneous lognormal process (see [1], [2] and [3]). From the corresponding Ito's stochastic differential equation, the probabilistic characteristics of the model are obtained such as the transition probability density function and the moments of the process. Finally, we develop the statistical inference of this model on the basis of maximum likelihood methodology with discrete sampling.

Keywords: Lognormal diffusion process, Exogenous factors, Statistical inference in diffusion process, Trend function

AMS Classification: 60J60, 62M05

References

- [1] TINTNER G, SENGUPTA JK. *Stochastic Economics*. Academic Press, 1972.
- [2] Gutiérrez R., Gutiérrez-Sánchez R. and Nafidi A. Maximum likelihood estimation in multivariate lognormal diffusion process with a vector of exogenous factors. *Monografías del Seminario Matemático García de Galdeano* **31**, 337-346, 2004.
- [3] Gutiérrez R., Gutiérrez-Sánchez R. and Nafidi A. Modelling and forecasting vehicle stocks using the trends of stochastic Gompertz diffusion models: The case of Spain. *Appl. Stochastic Models Bus. Ind.* **25**, 385-405, 2009.

¹Univ. Hassan 1, LAMSAD, Ecole Supérieure de Technologie de Berrechid, Avenue de l'université, BP 280, Berrechid, Maroc
Department of mathematics and Informatics
email: nafidi@hotmail.com

²Facultad de Ciencias, Campus de Fuentenueva 18071 Granada, Spain
Departamento de Estadística e Investigación Operativa
Universidad de Granada
email: rgjaimez@ugr.es , ramongs@ugr.es