

The powers of the stochastic Gompertz diffusion process: Statistical inference

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SUMMARY

This study concerns the powers of the Gompertz diffusion process obtained from the homogeneous Gompertz diffusion model studied in (cf. [1], [2]). Firstly, it is shown that the power of a Gompertz process is also a Gompertz process. Then, the probabilistic properties of the process thus defined are determined, as the analytical expression of the pdfs and the moments. Finally, based on the methodology established in (cf. [3], cf. []), we study statistical inference in this process, using the maximum likelihood method in discrete sampling of the process.

Keywords: Gompertz model, Trend functions, Inference in diffusion process

AMS Classification: 60J60, 62M05

References

- [1] GUTIÉRREZ, R., GUTIÉRREZ SÁNCHEZ, R., NAFIDI, A. (2006). A. Electricity consumption in Morocco: Stochastic Gompertz exogenous factors diffusion analysis. *Applied Energy* **83**, 1139-1151.
- [2] FERRANTE L, BOMPADE S, POSSATI L, LEONE L, MONTANARI MP. (2005). A stochastic formulation of the Gompertzian growth model for in vitro bactericidal kinetics: parameter estimation and extinction probability. *Biometrical Journal* **47** (3), 309-318.
- [3] GUTIÉRREZ, R., GUTIÉRREZ SÁNCHEZ, R., NAFIDI, A. (2009). Modelling and forecasting vehicle stocks using the trends of stochastic Gompertz diffusion models: The case of Spain. *Appl. Stochastic Models Bus. Ind.* **25**, 385405.

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