

# On the Esscher-Girsanov Transform\*

Marc J. Goovaerts

University of Leuven and University of Amsterdam

*Mail:* University of Amsterdam

Amsterdam School of Economics

PO Box 15867

1000 NJ Amsterdam, The Netherlands

*Email:* [Marc.Goovaerts@kuleuven.be](mailto:Marc.Goovaerts@kuleuven.be)

*Phone:* +31 20 525 4252

Roger J. A. Laeven

University of Amsterdam and EURANDOM

*Mail:* University of Amsterdam

Amsterdam School of Economics

PO Box 15867

1000 NJ Amsterdam, The Netherlands

*Email:* [R.J.A.Laeven@uva.nl](mailto:R.J.A.Laeven@uva.nl)

*Phone:* +31 20 525 4219

April 14, 2015

## Abstract

We revisit the Esscher-Girsanov transform (Goovaerts and Laeven, 2008), introduce its version appropriate for semi-martingales, and study its stochastic ordering properties.

**Keywords:** Esscher transform, Esscher-Girsanov transform, Lenglart-Girsanov theorem, Poisson distribution, Jump-diffusion, Semi-martingale, Exponential utility, Relative entropy, Minimal entropy martingale measure, Distortion risk measure, Stochastic ordering, Fréchet space.

**JEL-Classification:** D81, G10, G20

**MSC-Classification:** 60E15, 62P05

## References

- [1] BORCH, K. (1962). Equilibrium in a reinsurance market. *Econometrica* 30, 424-444.
- [2] BÜHLMANN, H. (1980). An economic premium principle. *Astin Bulletin* 11, 52-60.
- [3] GERBER, H.U. & E.S.W. SHIU (1994). Option pricing by Esscher transforms. *Transactions of the Society of Actuaries* 46, 99-191.
- [4] GOOVAERTS, M.J. & R.J.A. LAEVEN (2008). Actuarial risk measures for financial derivative pricing. *Insurance: Mathematics and Economics* 42, 540-547.
- [5] JACOD, J. & A.N. SHIRYAEV (2003). *Limit Theorems for Stochastic Processes*. 2nd edn., Section III.7.b, New York: Springer.
- [6] LAEVEN, R.J.A. & M.A. STADJE (2014). Robust portfolio choice and indifference valuation. *Mathematics of Operations Research* 39, 1109-1141.
- [7] YAARI, M.E. (1987). The dual theory of choice under risk. *Econometrica* 55, 95-115.

---

\*Financial support from the Netherlands Organization for Scientific Research under grant NWO VIDI Grant 2009 (Laeven) is gratefully acknowledged.