



Quantitative Finance > Statistical Finance

# Scaling properties and universality of first-passage time probabilities in financial markets

Josep Perelló, Mario Gutiérrez-Roig, Jaume Masoliver

(Submitted on 6 Jul 2011 (v1), last revised 29 Sep 2011 (this version, v2))

Financial markets provide an ideal frame for the study of crossing or first-passage time events of non-Gaussian correlated dynamics mainly because large data sets are available. Tick-by-tick data of six futures markets are herein considered resulting in fat tailed first-passage time probabilities. The scaling of the return with the standard deviation collapses the probabilities of all markets examined, and also for different time horizons, into single curves, suggesting that first-passage statistics is market independent (at least for high-frequency data). On the other hand, a very closely related quantity, the survival probability, shows, away from the center and tails of the distribution, a hyperbolic  $t^{-1/2}$  decay typical of a Markovian dynamics albeit the existence of memory in markets. Modifications of the Weibull and Student distributions are good candidates for the phenomenological description of first-passage time properties under certain regimes. The scaling strategies shown may be useful for risk control and algorithmic trading.

Comments: 7 pages, 5 figures

Subjects: **Statistical Finance (q-fin.ST)**; Mathematical Physics (math-ph); Data Analysis, Statistics and Probability (physics.data-an)

Journal reference: Phys. Rev. E 84, 066110 (2011)

DOI: [10.1103/PhysRevE.84.066110](https://doi.org/10.1103/PhysRevE.84.066110)

Cite as: [arXiv:1107.1174 \[q-fin.ST\]](https://arxiv.org/abs/1107.1174)  
(or [arXiv:1107.1174v2 \[q-fin.ST\]](https://arxiv.org/abs/1107.1174v2) for this version)

## Submission history

From: Josep Perello [[view email](#)]

[v1] Wed, 6 Jul 2011 16:05:58 GMT (85kb)

[v2] Thu, 29 Sep 2011 16:06:13 GMT (95kb)

[Which authors of this paper are endorsers?](#)

## Download:

- [PDF](#)
- [PostScript](#)
- [Other formats](#)

Current browse context:

q-fin.ST

[< prev](#) | [next >](#)

[new](#) | [recent](#) | [1107](#)

Change to browse by:

[math](#)

[math-ph](#)

[physics](#)

[physics.data-an](#)

[q-fin](#)

## References & Citations

- [NASA ADS](#)

Bookmark ([what is this?](#))



