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Continuous-time random walk with multi-step memory: an application to market dynamic

An extended version of the Continuous-Time Random Walk (CTRW) model with memory is herein developed [1,2].
This memory involves the dependence between arbitrary number of successive jumps of the process while waiting times between jumps are considered as i.i.d. random variables.
This dependence was established analyzing of empirical histograms for the stochastic process of a single share price on a market within the high frequency time scale.
Then, it was justified theoretically by considering bid-ask bounce mechanism containing some delay characteristic for any double-auction market.
Our model appeared exactly analytically solvable.
Therefore, it enables a direct comparison of its predictions with their empirical counterparts, for instance, with empirical velocity autocorrelation function.
Thus, the present research significantly extends capabilities of the CTRW formalism.

[1] T. Gubiec, R. Kutner, *Continuous-Time Random Walk with multi-step memory: An application to market dynamics*, accepted to EPJB

[2] T. Gubiec, R. Kutner, *Backward jump continuous-time random walk: An application to market trading*, Physical Review E 82 (4), 046119

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