

We would like to thank the anonymous referee for these helpful comments. We think revising the paper according to its suggestions will be quite straightforward. Please find below some details.

Review of paper 565

Modelling Trades-Through in a Limited Order Book Using Hawkes Processes

by Ioane Muni Toke and Fabrizio Pomponio

In my opinion, this paper deserves to be published, but the current version is not yet suitable for publication and major revisions are needed. The current version lacks clarity and focus and should be amended.

Here are my suggestions to the authors.

1. Title

What do the authors mean with "limited order book"? Do they refer to a limit-order book?

We indeed refer to the limit order book, as correctly stated in the rest of the paper. We missed the error when proof reading the prepared cover page.

2. Section 2

Section 2 should be completely re-written. The definition of Hawkes processes is not clear at all. Equation (1) gives intensities, but these quantities should be related to the counting processes. In the 1996 paper by Bremaud and Massoulié (section 1), these processes are defined quite clearly. Please notice that that paper was written by Bremaud and L. Massoulié and not only by Bremaud as incorrectly stated by the authors. Remember to amend the reference.

The missing author will be added in a revised version of the paper. As for the general tone of the section, we felt that the targeted audience of this Special Issue following the Tokyo "First Unconventional Workshop on Quantitative Finance and Economics" might be with interdisciplinary background, and have therefore lightened, probably too much, the mathematical formalism of the presentation. We can address this in a revised version of the paper, using work already done by one of the authors, as stated by the referee below. As suggested, we can restate the measure aspects of the definition of point processes and detail the definition of the conditional intensities.

Bremaud and Massoulié also define different kinds of stationarity (and statistical equilibrium) for these processes. Please, relate your discussion of stationarity to their definitions or specify what you mean by stationarity in section 2.2. In particular, you seem just to use stationarity of the first moment. Is that true? You claim that equa-

tion (5) is a necessary condition for stationarity of the expectations. Can you include a derivation? (See the link to Toke's slides below).

We cited the Brémaud and Massoulié paper as it appears to us as the clearest and most general statement of the stationarity result. However, we do not need the full force and details of the results stated there since our empirical study only deals with linear processes with exponential kernels and an empty initial condition. Roughly speaking, stationarity is to be understood in the sense that the distribution of number of points in an interval depends on its length but not on its location on the real half-line (see e.g. Daley and Vere-Jones). We will cite the older Hawkes and Oakes (1974) paper in a revised version of the paper, where proofs for the linear case can be found.

You build your statistical analysis in section 2.4 on the work by Bowsher. Are you just following his method or are you including some new development? Please make this point clearer. Your reference to Theorem 16 in the 1981 book by Brémaud is wrong. Are you referring to T16 on page 41 as Bowsher did in his paper? Please state this result with more clarity, as the book by Brémaud is not available in the public domain and readers cannot check directly if they do not have access to the book.

We indeed refer to theorem T16, page 41 (chapter II, section 6 Random Changes of Time) of the book by Brémaud. We can detail this result in a revised version of the paper. We will also emphasize the link to the work by Bowsher (2007), that we follow and detail in our simpler case.

3. Section 3

It seems to me that you are using the same data as in section 1. Is this true? Then the data description should be presented before the first analysis.

The paragraph describing the data will be moved in section 1 in a revised version of the paper.

4. Simulation of Hawkes processes

A reader would appreciate an algorithm for the Monte Carlo simulation of Hawkes processes also to verify the correctness of your statistical analysis. I found some pointers that you might consider adding: <http://www.mathworks.com/matlabcentral/fileexchange/17983> <http://projecteuclid.org/DPubS?service=UI&version=1.0&verb=Display&handle=euclid.aap/1127483739> and you might add your favourite code as an appendix or supplementary material.

Since no Monte Carlo simulation is involved in this paper, we didn't think a detailed algorithm was needed. However, if the editors think it might be an added value to the paper, we could add for example the algorithm described in one of the author's tutorial slides, cited below by the referee.

Let me finally add that one of the authors (Ioane Muni Toke) has written a very clear set of tutorial slides: http://fiquant.mas.ecp.fr/ioane_files/HawkesCourseSlides.pdf That one is the level of clarity and mathematical details needed in this manuscript. I do not understand why this was not done before.