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?

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 quantiites should be related to the counting processes. In the 1996 paper by Bremaud and Massoulie (section 1), these processes are defined quite clearly. Please notice that that paper was written by Bremaud and L. Massoulie and not only by Bremaud as incorrectly stated by the authors. Remember to amend the reference.

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

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 Bremaud 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 Bremaud is not available in the public domain and readers cannot check directly if they do not have access to the book.

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.

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.

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.