

1 Introductory Remarks

As we may be aware, the US-Africa Collaborative Research Network (CRN) will hold its second workshops this year at the venue of the SAMSA Conference. The dates of the conference have tentatively been set for November 24 - 29 at Victoria Falls, Zimbabwe. The CRN programme is being worked out by the steering committee. The setup of the workshops is that we gather at a venue near the conference and for two weeks or less, have a research conference that includes special lectures and problem solving group discussions on problems identified by the senior Faculty attending. We expect to have students attending but so far NRF funding available limits only to US students due to the nature of NRF. To try and have more people outside USA participating, the steering committee supported a PEER(Science) application which I applied with the help of our US collaborators, for the PEER(Science) grant to USAID through our UCT Research Office. The USAID grant is for projects that are already funded by NRF for the purpose of funding people who are outside US. We wait for the outcome of the application which may be out after July this year. Other avenues for getting funding for African students is also being explored and if you can facilitate funding for Ph.D, Masters and postdocs to attend it will be welcome. The SAMSA first call is now on the website www.samsa-math.org and for those on the samsalist you must have received it also through e-mails.

2 Between now and November

We are supposed to start discussing and working on problems that we feel are suitable for joint research. The objective is to stimulate joint research especially joint publications. NRF (and USAID) simply want recognition for the support through acknowledgements on any research done. We also need to have the senior faculty who will give special lectures and who will coordinate the direction of research. If we have many students, then we will have more senior faculty working in different groups each with a group of students interested in certain problems proposed by the Faculty. I am sure we would use Professor Oksendal's expertise in giving lectures internationally for these lectures but anyone willing to partner him is welcome. The Statistics section can also choose at least one senior faculty to give lectures and then we increase the number as more students come.

3 Lets all propose problems to work on jointly

During the process of both NRF and PEER applications, I have been motivating a need to look at models (financial) that are more suitable to African or developing economies wherever possible. An area I identified which could be worth exploring

is Term Structure of interest rates. Common models in this area which make computations easy are those when the term structure is affine. In that case closed form solutions of zero coupon bond prices can be obtained. If the term structure is not affine, it is usually not easy to find closed form solutions. If for example we propose the Black-Karasinski equation with jumps

$$dT(t) = \kappa [\alpha_1 - \ln T(t)] T(t)dt + \sigma_1 T(t)dB(t) + \int_{\mathbb{R}} \gamma_2 z \tilde{N}(dt, dz) , \quad (1)$$

where $B(t)$ is a standard Brownian motion and $\tilde{N}(dt, dz)$ is a Poisson random measure

then this could be a good starting point as an interest rate model. Justifying such a model would be to see if we can have a good fit with actual data (maybe LIBOR or JIBAR). This is not affine and it would be interesting if we could find closed form solutions of pricing bonds etc. Numerical methods have been done in e.g [1] for the case without jumps. We could also use another form of semi-analytic form of solving p.d.e , the Homotopy Analysis Method (HAM) as in ideas from [2].

We are free to propose different problems which can be solved jointly by the group.

References

- [1] Fabricio Tourrucôo , Patrick S. Hagan and Gilberto F. Schleiniger (2007), *Approximate formulas for zero coupon bonds*, Applied Mathematical Finance, Vol 14, No.3, 207 - 226.
- [2] Liao SJ, 1997, *Homotopy analysis method and its applications in mathematics*. Journal of Basic Science and Engineering. Shanghai Jiao Tong University