

On Infectious Models for Default Risk

Wai-Ki Ching

Department of Mathematics
The University of Hong Kong, Hong Kong

Abstract

=====

In this talk, we discuss the problem of modeling the temporal dependence of defaults and introduce a novel approach for describing the chain reaction of infectious defaults. We extend a Markov chain model for crisis management in epidemiology, namely, Greenwood's model, to describe the chain reaction of infectious defaults of bonds across any pair of industrial sectors. The development of the extended version of Greenwood's model contributes to the literature in two major aspects. First, it contributes to the credit risk literature by providing a new framework for measuring risk of a credit portfolio over the duration of a default crisis, called a default cycle. This is different from the traditional approach for risk measurement in which the time horizon is fixed and leads to a new dimension for risk management. Second, it provides a new model for crisis management in epidemiology by extending an important model in the field. We employ recursive formulae for the joint probability distributions of the duration of a default crisis and the number of defaults over the crisis. Moreover, we employ two important risk measures, namely, Value-at-Risk (VaR) and Expected Shortfall (ES), as proxies of risk over a default cycle. Numerical experiments are given to illustrate the practical implementation of the model and identify some main features of the model.

Short Biography

=====

Dr. Wai-Ki Ching is an associate professor in the Department of Mathematics at the University of Hong Kong. He obtained his B. Sci. (Hons) and M. Phil. degrees from the University of Hong Kong in 1991 and 1994 respectively. He then received his Ph.D. degree from the Chinese University of Hong Kong in 1998. He was a visiting post-doc Fellow at the Cambridge University in 1999. Before taking up the lectureship at his Alma Mater in 2001, he was a lecturer in the Faculty of Mathematical Studies at the University of Southampton (2000-2001). He was awarded the Best Student Paper Prize (2nd Prize) in the Copper Mountain Conference (Colorado University and SIAM) U.S.A. (1998), the Outstanding Ph.D. Thesis Prize in the Engineering Faculty, the Chinese University of Hong Kong, Hong Kong (1998), the Certificate of Merit in the IEEE (Hong Kong Section) Postgraduate Student Paper Contest, Hong Kong (1998) and the Croucher Foundation Fellowship, Hong Kong (1999).

Ching's research interests are mathematical modeling and applied computing. In particular, the applications of the stochastic models and numerical algorithms in solving problems related to Markov chains, data mining, computational finance and bioinformatics. He is an author/editor of

more than 170 publications including 3 books, 5 edited journal special issues, over 90 refereed journal papers and 60 refereed book chapters and conference proceeding papers. He has organized and served as program committee members in more than 20 conferences and workshops.