31 May - 03 June 2016
at
ISEG- Lisbon School of Economics and Management

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SUBMISSION FORM

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Title of Paper / Presentation / Session to appear in program:

Risk Estimation Model of Epidemic Outbreaks for an Insurer

Author/s:

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3. Yasukazu Yoshizawa **4.**

What will your final submission be? Presentation and Paper ☑ Presentation Only ☐

If selected, what level of knowledge will delegates attending your session require? (please select only) one

☐ No prior knowledge ☑ General industry knowledge assumed ☐ Technical/specific industry knowledge assumed

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ABSTRACT

(TITLE OF PAPER / PRESENTATION TO APPEAR IN PROGRAM)
(Name of Author/s)

Title of Paper: Risk estimation model on epidemic outbreaks for an insurer

Name of authors: Naoyuki Ishimura (Chuo university, Tokyo, Japan), Daniel Komadel (University of Economics in Bratislava, Slovakia), and Yasukazu Yoshizawa (Tokio Marine and Nichido Fire Insurance Co. Ltd., Tokyo, Japan)

Key words: (enter up to 8 key words applicable to your abstract / paper / presentation)
Epidemic outbreaks, Kermack-McKendrick model, Threshold theorem, Doubly stochastic Poisson processes, Catastrophe options, Risk estimation model for an insurer

Purpose of your paper: (To assist delegates / readers searching for your paper on the website after the event, please enter a brief description (maximum 220 characters) on the purpose of your paper.)

Epidemic outbreaks, which have been observed in recent years, have caused a big impact on modern society once if they are occurred. We recall, for examples, SARS (Severe Acute Respiratory Syndrome), Ebola virus diseases, MERS (Middle East Respiratory Syndrome) and so on. Insurance companies have a potential to mitigate the effect of such events. Here we propose a simple stochastic model for an insurer to estimate the risk of epidemic outbreaks.

The construction of our model is based on several apparently separate aspects. The first one is a rough estimate on ultimate number of removals once the epidemic burst takes place. This is given through the threshold theorem, which is originally due to Kermack-McKendrick. The second point is the onset of epidemic outbreaks, which is modelled by the doubly stochastic Poisson process. This part is motivated by the catastrophe options as risk transfer instruments. Finally, the market risk is involved to derive a financial product.

Abstract: (Place text here using font size Calibri (Body) 11)

It has been observed in recent years that epidemic outbreaks, such as SARS (Severe Acute Respiratory Syndrome), Ebola virus diseases, MERS (Middle East Respiratory Syndrome), and so on, sometimes made a large impact on the modern society. These phenomena are challenging issues for whole world.

Apart from the scientific research, the function of insurance companies will be important in order to mitigate and stabilize the effect due to epidemic bursts. The overall estimate of the risk from these tragedy events is then necessarily investigated.

In this presentation, we introduce a simple stochastic model to estimate such risk of epidemic outbreaks for an insurer.

Our strategy is a combination of several apparently independent ingredients. The first aspect is of course a mathematical modeling of diseases, which has been studied over 300 years and much progress has been made so far. Here we just employ the classical deterministic model of Kermack-McKendrick, one of whose important outcomes is the so-called threshold theorem; we can estimate a rough number of ultimate removed individuals from the population suffering from an infectious disease.

The second point is the onset of epidemic outbreaks, which is regarded as a trigger variable and is described by a stochastic process. From the financial viewpoint of an insurer, the phenomena of epidemic bursts is of a catastrophic nature because it may bring enormous financial expenditures within the short period of time. Such a feature makes it similar to the catastrophic events such as a huge earthquake, a big typhoon, and so on. We utilize a doubly stochastic Poisson process to model the onset.

Finally, in addition to above, the point to be involved is the market risk. Once an epidemic outbreak takes place, a depression will be followed and we should be concerned with the depreciation of securities. We simply use a standard Black-Scholes-Merton type model to evaluate the depreciation process.

Note: If you are not presenting a paper for this Colloquium, please include as much detail as possible in your Abstract (maximum three pages) to enable delegates to prepare for your session.