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Donatien Hainaut

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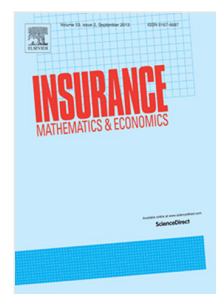
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Contagion modeling between the financial and insurance markets with time changed processes

Donatien Hainaut*

ISBA, Université Catholique de Louvain

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Abstract

This study analyses the impact of contagion between financial and non-life insurance markets on the asset-liability management policy of an insurance company. The indirect dependence between these markets is modeled by assuming that the assets return and non-life insurance claims are led respectively by time-changed Brownian and jump processes, for which stochastic clocks are integrals of mutually self-exciting processes. This model exhibits delayed co-movements between financial and non-life insurance markets, caused by events like natural disasters, epidemics, or economic recessions.

KEYWORDS: Self-exciting process, Cramer-Lundberg risk model, Stochastic optimal control.

1 Introduction

Non life insurance claims, by nature, are not correlated to financial markets, excepted in case of events like natural disasters, epidemics, or serious economic recession. For example, in 2003, the severe acute respiratory syndrome (SARS) spread across several countries and affected with a delay the insurance industry in different ways. Some areas of impacted insurance operations are clear – event cancellations coverage, travel insurance and life and health policies. This epidemic also slowed down economic exchanges and indirectly caused turmoil in financial markets. More recently, during the financial crisis of 2008, the number of claims covered by credit insurances surged in US, as underlined in a recent report from the IMF (2016). As last example, we mention climate changes. It is already affecting and will over time significantly affect the incidence of natural conditions such as: tropical cyclones; winter storms; wild-fires; hail storms; lightning strikes; droughts and floods. These events are expected to affect significantly property claims to non-life insurers. In parallel, climate change will have a huge economic and social impact and will lead to financial instability. These observations motivate us to study the influence of a potential contagion between the

*Postal address: ISBA, UCL, Voie du Roman Pays 20, B-1348 Louvain-la-Neuve (Belgique). E-mail to: donatien.hainaut@gmail.com.

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