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Risk Decomposition with Application to Mortality/Longevity Securitization

In this talk, I consider a market model where there are two flows of information. One flow is the public information, while the other flow contains additional information generated by a death time of an insured. I am interested in addressing the mortality/longevity risk and its securitization. This securitisation requires the dynamics' specification for the prices of the mortality/longevity-linked derivatives such as longevity bonds. Thus, one can ask the following: Can we get these prices without any assumption on the time of death and its connection to the market model? Can we decompose any mortality-linked risk into pure financial risks, pure mortality risks and correlated risk(s) from these two kind of risks?

In my talk, I will answer these questions and I will highlight the key innovative stochastic ideas behind our answers. Our results are useful for a much broader scope of applications, even though they are essentially motivated and applied to longevity/mortality risks. In fact, by using the progressive enlargement of filtration with the death time, we introduce new classes of martingales. Then, via these new spaces of martingales, we derive a complete, precise and explicit optional decomposition for martingales stopped at the death time. Afterwards, we elaborate the "dual" decomposition of our optional decomposition for any risk up to the death time. These two decompositions are vital for addressing numerous problems in risk management and portfolio analysis under mortality.

This talk is based on two joint works with C. Daveloose/M. Vanmaele (Belgium) and with Sina Yansori (UofA) respectively.