Martingale random fields in time change models, the role of information in optimal portfolio problems

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Abstract

Time change is a powerful modelling technique of long history. Its main idea stands in the representation of complicated stochastic structures by known processes with a randomly perturbed time-line. We review the fundamental concepts to come to consider price dynamics driven by time changed Levy models within the framework of martingale random fields. These include examples of classical models for default risk, and also mean field dynamics or Volterra type structures. We then consider different optimal portfolio problems, which will be studied by means of maximum principles under enlarged or partial information. In fact, to achieve the results, we work with different information flows associated to the time changed noise, related backward stochastic differential equations, stochastic non-anticipative and anticipative derivatives and calculus.

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