ARBITRAGE, CREDIT AND INFORMATIONAL RISKS

Editors
Caroline Hillairet • Monique Jeanblanc • Ying Jiao
ARBITRAGE, CREDIT AND INFORMATIONAL RISKS
Vol. 1: An Introduction to Finsler Geometry  
by Xiaohuan Mo (Peking University, China)

Vol. 2: Numerical Methods for Exterior Problems  
by Lung-An Ying (Peking University & Xiamen University, China)

Vol. 3: Approaches to the Qualitative Theory of Ordinary Differential Equations: Dynamical Systems and Nonlinear Oscillations  
by Tongren Ding (Peking University, China)

by Guo Chun Wen (Peking University, China)

Vol. 5: Arbitrage, Credit and Informational Risks  
edited by Caroline Hillairet (Ecole Polytechnique, France), Monique Jeanblanc (Université d’Évry, France) and Ying Jiao (Université Lyon I, France)
Learning without thought is labor lost; thought without learning is perilous

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Preface

This book includes some contributions presented at the workshop “Arbitrage, Credit and Informational Risks”. This event has been held at Beijing International Center for Mathematical Research (BICMR) in June 2013 in the framework of the Sino-French Research Program in Mathematics (SFRPM). It was dedicated to the presentation of research results and discussions in the field of financial mathematics around the themes of arbitrage, credit and asymmetric information risks. The book is split into three parts.

In the first part, we collected papers in which two different notions of arbitrages and related concepts are studied. The first one is the well-known condition of No Free Lunch with Vanishing Risk (NFLVR); it is equivalent to the existence of an equivalent local martingale measure under which discounted prices are local martingales. The second one is the condition of No Unbounded Profit with Bounded Risk (NUPBR), which is also known as No Arbitrage of the First Kind; it is equivalent to the existence of a positive local martingale deflator such that prices multiplied by this deflator are local martingales. This part contains the four following papers:

Claudio Fontana studies the stability of NFLVR and NUPBR, as well as other arbitrage conditions, under an absolutely continuous change of probability measure.

Johannes Ruf and Wolfgang J. Runggaldier present a systematic construction of market models that satisfy NUPBR, but not NFLVR, by stating sufficient assumptions on the first hitting time of zero by the inverse of the martingale deflator.

In the context of jump-diffusion market models, Jacopo Mancin and Wolfgang J. Runggaldier construct examples of models that satisfy NUPBR, but not NFLVR.

Working in a progressive enlargement setting, and assuming that NFLVR and NUPBR hold in the reference filtration, Anna Aksamit, Tahir
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Choulli, Jun Deng and Monique Jeanblanc give conditions so that NUPBR is satisfied in the enlarged filtration, whereas NFLVR fails to hold.

The second part contains four papers devoted to Credit Risk:

Sébastien Hitier and Ying Zhu study the problem of pricing credit derivatives in a structural model. In structural models, the default time is the hitting time of a given barrier by the firm value. Structural models, although based on sound economic arguments, are difficult to handle for calibration in practice. The authors demonstrate how a structural model can be calibrated and used for risk-neutral pricing of credit derivatives.

Stéphane Crépey proposes and studies a dynamics model for bilateral counterparty risk on credit derivatives, which goes beyond the classic immersion setting.

Shiqi Song develops mathematical background for a dynamic model of a single default, based on the fairly general construction of the conditional law of the default event from its Azéma supermartingale. He establishes a new formula for the semimartingale decomposition of martingales in the reference filtration and gives results related to the existence of the conditional density of the default time.

Laurence Carassus and Simone Scotti apply the error calculus methodology to the problem of an optimal credit allocation under a hidden regime switching model.

The third part presents four contributions in the area of Control Problems and Information Risks:

Ivan Guo and Marek Rutkowski consider a class of recursive multiplex stopping games in a discrete time setting. Such games have interpretations in economic and financial modelling, for example, as multi-person game options. They prove the existence of an optimal equilibrium and provide an explicit algorithm for the computation of the value of the game.

Monique Jeanblanc and Anthony Réveillac present examples of Backward Stochastic Differential Equations (BSDEs) whose driver is not integrable and degenerates when the terminal time approaches. Such BSDEs may have, depending on the terminal conditions, no solution or an infinite number of solutions.

Caroline Hillairet studies a portfolio optimization problem in a market model characterized by the presence of different prices for the same asset, which arise as a consequence of different information settings.
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In the presence of ‘shadow costs’ of incomplete information, as well as stochastic volatility and jumps in the dynamics of the asset, Sana Mahfoudh and Monique Pontier compare the corresponding cost value process of two different hedging strategies.

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