
Guest Editorial

Asset and liability management/ liability-driven investment for pension funds

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The demographics of the global community of working people are moving in a clear direction, essentially we are living longer. The requirement of financial care through pensions for this ageing population is becoming an important problem not only in the advanced economies but also in the emerging economies. This special issue brings together a collection of papers by a number of experts who have studied different facets of the pension problem. In recent years the pension fund industry has adopted tailor-made asset and liability management (ALM) strategies, also called liability-driven investment (LDI). The focus of the special issue is on quantitative methods for ALM/LDI for pensions funds. The aim of LDI strategies is to match and outperform a pension fund's liability stream and, at the same time, take into account country-specific regulations. The decision models as well as simulation/evaluation models which take into consideration stochastic asset price dynamics and stochastic behaviour of the liabilities are covered. Inflation risk, interest-rate risk, contribution risk of the pension plan's sponsor and no doubt the longevity risk of its members, are examples of additional risk some or all of which are measured and managed by these models.

The papers in this special issue address a number of inter-related themes including pricing of assets, models for *ex ante* financial decision making and strategies of asset

allocation including overlays. Schwaiger, Lucas and Mitra have a set of four alternative stochastic programming models addressing the question of optimum fund allocation in the face of future uncertainties. Their models include PV01 sensitivities and trade-off between cash input required and PV01 mismatch. Iyengar and Ma have applied robust optimisation for the asset allocation model where the uncertainty set is ellipsoidal. The authors formulate their model with second order cone programming constraint and report that the corresponding model is computationally tractable. Yang, Gondzio and Grothey also investigate the issue of computational tractability of an asset allocation model, which is based on second-order stochastic dominance for the purpose of risk control. Their computational study underlines how exploitation of structure and use of interior point optimisation can lead to efficient solution of the computational decision models. Asset pricing is the focus of the paper by Dempster, Medova and Villaverde. The authors present a three-factor term structure interest rate model for consol bond valuation. They discuss a detailed computational study and simulation results and present a detailed analysis of the yield curves. Given that almost all pension funds include fixed income assets in one form or other, this paper clearly makes a very important contribution to the valuation of this class of assets. Mulvey, Kim and Ma present a paper in which they

first highlight the present situation that large corporate and public funds have become underfunded and thereby mismatched during the recent prolonged recessionary period. Their contribution is in proposing a strategy of incorporating a duration enhancing overlay to the pension fund assets, thereby controlling the underlying risk. Berkelaar and Kouwenberg address the question of asset allocation from an extremely novel perspective. They state that the goal of the investment policy should be to maximise expected excess returns over liabilities subject to an acceptable level of risk expressed relative to liabilities. Their asset allocation is based on drawdown risk optimisation and through simulation studies they show that their strategy leads to better downside protection. Ferstl and Weissensteiner study short-term treasury management strategies. They develop a multistage stochastic programming model, which in turns uses a scenario generator with no arbitrage interest

rate model with market price estimation and change of measure. Finally, they carry out extensive back testing to validate their model. Overall, we believe we have here an exciting collection of research papers which truly reflect the state of the art. We would like to take this opportunity to thank the editor for suggesting this special issue; grateful thanks are also due to Michael Dempster and Katharina Schwaiger for assistance in preparing it.

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