Pricing long-term options with stochastic volatility and stochastic interest rates
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The markets for long-term options have expanded tremendously over the last decade. Nowadays many of these derivatives along with pension schemes and insurance products depend on joint changes in stock prices, interest rates and inflation. As a result the dependencies between the underlying assets have a large impact on the pricing and risk management of the above contracts. The simultaneous decrease in asset prices and long-term interest rates, around 2003 and during the credit crisis, provides an illustration of this phenomenon and caused the funding ratios of many pension funds to drop to historically low levels. Especially insurance companies and pension funds are dealing with such contracts in large amounts and they are becoming increasingly aware of the incorporated options and associated risks. At any rate, appropriate methods for the valuation of long-term options should be able to accommodate the stochastic nature of the market risks in a realistic and efficient manner.

This thesis studies the pricing and risk management of long-term options and consists of three parts. The first part focuses on the incorporation of long-dated maturities into new derivative pricing models. The second part develops efficient simulation schemes for the valuation and risk management of exotic options. The final part examines the pricing of two specific types of embedded options.

Alexander van Haastrecht (1985) holds a Bachelor’s degree in Mathematics and a Master’s degree in Econometrics from the VU University Amsterdam (both cum laude). During his PhD he worked on the pricing of collective pension contracts at the Risk Management department of Delta Lloyd Leven. He presented his research at various international conferences and has published articles in the International Journal of Theoretical and Applied Finance, Insurance: Mathematics and Economics, and the Journal of Futures Markets. Alexander currently holds a position as financial risk advisor at Delta Lloyd Leven. He specializes in market consistent valuation, risk management and product design.