Quoniam

QUANTITATIVE INVESTMENT ENGINEERING

ABSTRACT – DISSERTATION

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ESSAYS ON TERM STRUCTURE MODELING: ESTIMATION, NONLINEARITIES, AND IMMUNIZATION

Dynamic term structure models explain the joint evolution of bond yields of different maturities. In macroeconomics, they provide the link between short-term rates which are mainly influenced by monetary policy and long-term rates which are key determinants of, e.g., investment spending or the acquisition of durable consumption goods. In finance, term structure models are essential for pricing of fixed-income securities.

The thesis deals with term structure modeling of interest rates in discrete-time from both a statistical and a theoretical perspective. In the first chapter, a nonparametric technique is applied to estimate a sequence of smooth yield curves based on observed bond yields. In the second chapter, an explicit solution for arbitrage-free bond prices is derived for the case that the short rate follows a nonlinear threshold process. An empirical study with German and US data in the third chapter shows that statistical tests prefer the threshold model over its linear counterpart.

Moreover, the theoretical term structure implied by the threshold specification exhibits properties that are qualitatively similar to those observed in the data. The final chapter contains an empirical investigation showing that affine term structure models outperform traditional duration measures with respect to hedging.