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Pricing and quality option in Japanese government bond futures

BING-HUEI LIN, REN-RAW CHEN & JIAN-HSIN CHOU

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Abstract

An empirical study of the Hull - White model for pricing Treasury bond futures contracts with quality option is presented. Japanese long-term Government Bond (JGB) futures contracts are chosen, because unlike US Treasury bond futures contracts, which embed both the quality and timing options, the JGB contracts contain only the quality option. Interest rate model parameters are estimated using a simple regression technique and the yield curve is smoothed by B-spline functions with a correction for heteroscedasticity. By applying a discrete trinomial tree approach proposed by Hull and White, the quality option embedded in the JGB futures is then determined by the difference between the theoretical futures prices for contracts with and without allowing multiple deliverable grades. Without the addition of other timing options, the value of the pure quality option is less significant compared to those of other empirical studies. It is approximately 0.02 percentage points of par three months prior to

delivery. In this study, it is demonstrated that the Hull - White model is simple and computationally efficient.

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