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Optimal measure transformation problems for defaultable bonds, futures prices and forward prices

We associate the price of a defaultable bond with an optimal measure transformation problem. The optimal measure transformation problem is closely related to decoupled non- linear forward-backward stochastic differential equation (FBSDE). In the default-free case we prove the equivalence of the optimal measure transformation problem and an optimal stochastic control problem of Gombani and Runggaldier (Math. Financ. 23(4):659-686, 2013) for default free bonds in the framework of quadratic term structure models. The measure which solves the optimal measure transformation problem is the forward measure. These connections explain why the forward measure transformation employed in the FBSDE approach of Hyndman (Math. Financ. Econ. 2(2):107-128, 2009) is effective. We obtain explicit solutions to FBSDEs with random terminal conditions and with jumps in affine term structure models and quadratic term structure models, which extend Hyndman (Math. Financ. Econ. 2(2):107-128, 2009). The futures price and the forward price of a risky asset are also considered in the framework of optimal measure transformation problems. Joint work with Renjie Wang