Markovian Models for Bond Prices

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Bond prices are often modeled in terms of the so called *forward curves* family, $\{F(x,r); x \geq 0,\ r \geq 0\}$ and a nonnegative stochastic process R of *short rates*, by the formula

$$P(t,T) = F(T-t, R(t)), \quad T, t \geq 0,\ t \leq T.$$

For pricing purposes as well as for building non arbitrage models, it is of interest to characterize those models for which the so called *discounted bond prices*:

$$\hat{P}(t,T) = e^{-\int_0^t R(s)ds} P(t,T), \quad t \in [0,T],$$

are, for each T, martingales with respect to the filtration generated by R.
In the talk we survey some old results and present new ones on the models for which the process R is Markovian. We treat both the discrete and continuous time cases.

References:

M. Barski and J. Zabczyk, *Bond markets with Lévy factors*, book in preparation,
D. Duffie, D. Filipović and W. Schachermayer, *Affine processes and applications to finance*, The Annals of Applied Probability, 13(2003),No.3, 984-1053,
D. Filipović, *A general characterization of one factor affine term structure models*, Finance Stochast. 5(2001), 389-412,
D. Filipović and J. Zabczyk, *Markovian term structure models in discrete time*, Preprint 601 (1999), Polish Academy of Sciences,
D. Filipović and J. Zabczyk, *Markovian term structure models in discrete time*, The Annals of Applied Probability, 12(2002),N0.2 710-729,
M. Keller-Ressel, W. Schachermayer and J. Teichmann, *Affine processes are regular*, Probab. Theory Relat. Fields, 151(2011), 591-611.