The $\mathrm{d}X(t) = Xb(X)\mathrm{d}t + X\sigma(X)\mathrm{d}W$ Equation and Financial Mathematics I.

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Abstract: The existence of a weak solution and the uniqueness in law are assumed for the equation, the coefficients b and σ being generally $C(\mathbb{R}^+)$-progressive processes. Any weak solution X is called a (b, σ)-stock price and Girsanov Theorem jointly with the DDS Theorem on time changed martingales are applied to establish the probability distribution μ_σ of X in $C(\mathbb{R}^+)$ in the special case of a diffusion volatility $\sigma(X, t) = \tilde{\sigma}(X(t))$. A martingale option pricing method is presented.