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Estimation for Diffusion Processes Using Reverse-Time Specifications

In the paper we consider methods of estimation for diffusion processes based on explicit specifications of the dynamic of the reversed process. In the parametric setting we show the equivalence of martingale estimating equations derived from the forward and the backward dynamics of the process. For nonparametric methods of estimation of the drift parameter, we justify using the forward and the reversed trajectories jointly and present an argument suggesting that such an approach should lead to a significant gain in efficiency. We demonstrate that this is indeed the case in the context of the Cox, Ingersoll, and Ross model of short interest rate. Depending on the parameter set and the criterion, the reduction of the integrated errors ranges from 100% up to 400%.