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Propagation of initial errors on the parameters for linear and Gaussian state space models

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For linear and Gaussian state space models parametrized by $\theta_0 \in \Theta \subset \R^{r}, r \geq 1$ corresponding to the vector of parameters of the model, the Kalman filter gives exactly the solution for the optimal filtering under weak assumptions. This result supposes that θ_0 is perfectly known. In most real applications, this assumption is not realistic since θ_0 is unknown and has to be estimated. In this paper, we analysis the Kalman filter for a biased estimator of θ_0. We show the propagation of this bias on the estimation of the hidden state. We give an expression of this propagation for linear and Gaussian state space models and we extend this result for almost linear models estimated by the Extended Kalman filter. An illustration is given for the autoregressive process with measurement noises widely studied in econometrics to model economic and financial data.

Subjects: **Other Statistics (stat.OT)**; Statistics Theory (math.ST)

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