

The aim of this work is to discuss the use of the Kalman filter in some economical problems. Generally taken, the Kalman filter is a mathematical method (an algorithm) used for estimation of the non-observable component of a state. Especially, this approach will be applied to estimate the risk-neutral state price density of CALL options. In such case a non-linear relation between state and observed variables may be assumed, and the problem has to be linearized by Taylor expansion. In detail, the main Kalman filtering in the simple linear case will be presented in the first chapter. In the second chapter, you can find some application of that Kalman filtering in case of CALL options. The study of the extended Kalman filter and its application in case of a nonlinear state model and the use of the Taylor expansion can be found in Chapter 3. In the fourth chapter, we will be talking about estimating the risk-neutral price density of a CALL option. The corresponding outputs from the program R and the most important results of this work are summarized in the last Chapter 5.