

Ergodic robust maximization of asymptotic growth under stochastic factors

Josef Teichmann
(ETH Zürich)

We consider an asymptotic robust growth problem under model uncertainty and in the presence of (non-Markovian) stochastic covariance. We fix two inputs representing the instantaneous covariance for the asset process X , which depends on an additional stochastic factor process Y , as well as the invariant density of X together with Y . The stochastic factor process Y has continuous trajectories but is not even required to be a semimartingale. Our setup allows for drift uncertainty in X and model uncertainty for the local dynamics of Y . Under suitable, quite weak assumptions we are able to characterize the robust optimal trading strategy and the robust optimal growth rate. The optimal strategy is shown to be functionally generated and, remarkably, does not depend on the factor process Y . Our result provides a comprehensive answer to a question proposed by Fernholz in 2002. Mathematically, we use a combination of partial differential equation (PDE), calculus of variations and generalized Dirichlet form techniques.