

## Prediction and Optimal Trading in U.S. Commodity Markets

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In the presentation we show a way of modelling the evolution of price of a financial instrument (here we apply the model to a price of U.S. commodity futures contract, but other financial instruments could be modelled including shares of stock) with a linear stochastic process - here namely the vector autoregressive process of order  $p$  [2]. The process is fitted to the data using Bayesian statistics [4], so that the parameters are considered to be random variables. In the first part of the presentation a detailed description of modelling and used approximations is given. Approximate forecast of the price evolution up to a horizon  $h$  is made using Monte Carlo sampling from posterior parameter distribution and model with log-normal innovations is considered. At the end of the first part few results are shown, comparing the predictive power of such model to benchmark models usually used in today's Financial Mathematics.

In the second part we introduce possible ways of optimal control of a trading process, involving price evolution according to the model described in the first part, where the agent tries to optimize his wealth, possibly also considering the risk involved in investing into a risky financial asset. Such an optimization task can be solved in many cases [1],[3], but in the presented model, where future prices are not independent from one time moment to the next, the parameters are random and transaction costs are present, approximate solutions of the optimal control are proposed.

### References

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- [3] I. Karatzas and S.E. Shreve. *Methods of Mathematical Finance*. Springer, 1998.
- [4] M. Kárný, J. Böhm, T.V. Guy, L. Jirsa, I. Nagy, P. Nedoma, and L. Tesař. *Optimized Bayesian Dynamic Advising, Theory and Algorithms*. Springer, 2005.

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