

The aim of this project is to explore and develop Bayesian dynamic mixture models for applying them in forecasting several commodities prices.

Forecasting commodities prices is a hard task. Actually, there exist various econometric methods, but it is very often hard to produce more accurate forecasts than those from some simple models. However, fluctuations of these prices are very important for economics and finance markets. Good models can help in better understanding which processes take place in modern economies. As a result, numerous researchers try to find new and better models.

Bayesian methods are especially promising, if the investors perspective is considered. These models are estimated recursively, which means that every time when the new information is coming from the market, it is then used to re-estimate the model. Contrary to that, the conventional models usually forget about such an updating. Technically, let us assume that we estimate some unknown parameter, which has some prior distribution. When the set of observations expands (for example, time passes and new information comes from the market) this distribution can be re-estimated – and the posterior distribution is obtained. In other words, starting from some rough estimations on the interesting parameter, we can expect that, as the new additional information comes, we will be able to “shrinkage” our estimations.

Except from that, the very important feature of dynamic mixture models is that they fully let the “true” model to switch in time. Numerous literature shows that the set of important determinants of commodities prices vary in time. For example, up to 1990s most of the oil price models focused on supply and demand factors, whereas in 2000s more stress was given to the factors from financial markets. Also many researches notice that the set of potentially important determinants is too big to be tackled with the conventional econometric methods.

Besides that, Bayesian dynamic mixture models can still be improved on a theoretical basis. Several steps in this modelling scheme can be explored deeper and improved with various novel tools from machine learning techniques and with genetic algorithms. Therefore, the second aim of this project is to thoroughly analyze and expand dynamic mixture models with a stress put on their economic and financial forecasting applications. As a result, the developed tools would be useful not only to forecasting commodities prices, but also other economic and financial time-series.

Such a research on Bayesian dynamic mixture models is a novel approach. The realization of this project can bring some new information for economists, policymakers and investors interested in commodities markets. Besides, the developed econometric tools can be useful for those who work with problems which should be described with time-varying time-series models, large number of explanatory variables, “big data” issues, etc.