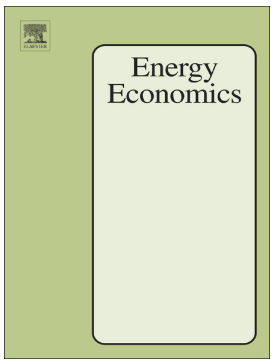

The prediction of oil price turning points with log-periodic power law and multi-population genetic algorithm

Fangzheng Cheng, Tijun Fan, Dandan Fan, Shanling Li

PII: S0140-9883(18)30131-2
DOI: doi:10.1016/j.eneco.2018.03.038
Reference: ENEECO 3976

To appear in:

Received date: 8 July 2017
Revised date: 24 March 2018
Accepted date: 31 March 2018

Please cite this article as: Fangzheng Cheng, Tijun Fan, Dandan Fan, Shanling Li , The prediction of oil price turning points with log-periodic power law and multi-population genetic algorithm. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Eneeco(2018), doi:10.1016/j.eneco.2018.03.038

The prediction of oil price turning points with log-periodic power law and multi-population genetic algorithm

Fangzheng Cheng[a], Tijun Fan[a], Dandan Fan[b], Shanling Li[c,*]

[a]*School of Business, East China University of Science and Technology Shanghai 200237, China*
[b]*School of Glorious Sun of Business and Management, Donghua University Shanghai 200051, China*
[c]*Desautels Faculty of Management, McGill University Quebec H3A 1G5, Canada*

Abstract

The turning points in international oil price are the most significant and sudden corrections in prices in the world market. Accurate prediction of turning points can help governments and enterprises develop effective oil reserve strategies and economic decisions. Nevertheless, forecasting the turning points poses great challenges in both methodology and computational effort. Log-periodic power law (LPPL) is one state-of-the-art method to predict turning points. In this research, we propose an improved version of LPPL forecasting model by incorporating a method called multi-population genetic algorithm (MPGA) to search for optimal values of parameters in the LPPL model. By doing so, the improved LPPL model provided significantly superior performance in predicting the turning points compared to prior researches. To verify the quality of the improved LPPL model, we collected the data of WTI spot price in the period starting from April 2003 to November 2016 and used the improved LPPL model to predict the three turning points in this period based on the data prior to the turning points. In addition, we compared the improved LPPL model with three LPPL models that use other approaches to search for parameters, including simulated annealing, standard genetic and particle swarm optimization. We showed that the results from our LPPL model are superior to other three search approaches. We also

*Corresponding author.
Email addresses: fz.cheng@mail.ecust.edu.cn (Fangzheng Cheng), tjfan@ecust.edu.cn (Tijun Fan), sunshinemarcle@163.com (Dandan Fan), shanling.li@mail.mcgill.ca (Shanling Li)