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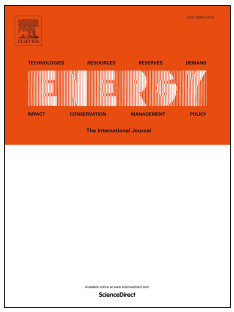

Oil price forecasting using a hybrid model

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Abstract

Forecasting oil prices is an important and challenging matter, because of its impact on many economic and non-economic factors. Because factors such as economic growth, political events and psychological expectations affect oil prices, forecasting oil prices has great uncertainty. There is no consensus among researchers about the techniques and models used to predict oil prices; hence, methods of forecasting with higher accuracy and lower error should be developed. It is important to combine different models and investigate different approaches, especially time-varying forms. In this paper, the exponential smoothing model (ESM), autoregressive integrated moving average model (ARIMA), and nonlinear autoregressive (NAR) neural network are combined in a state-space model framework to increase the accuracy of forecasting that accounts for problems in accurate diagnosis of linear and nonlinear patterns in economic and financial time-series such as for crude oil prices. In the proposed hybrid model (PHM), time-varying weights for each model are determined by Kalman filter. The PHM is used on monthly OPEC crude oil prices and WTI crude oil spot prices. The numerical results show a decrease in forecasting error using the PHM compared to its constructive models, the equal weights hybrid model (EWH), the genetic algorithm weights hybrid model (GWH), and the Zhang's hybrid model (ZHM).

Key Words: *Crude oil price, Forecasting, Hybrid model, Kalman-Filter, NAR.*